CDM

Remedial Investigation Report

Former Philip Services Corporation Site
Rock Hill, South Carolina

Prepared For: **South Carolina Department of Health & Environmental Control**

September 2008

Remedial Investigation Report

Contents

Figures

Tables

Executive Summary

This executive summary presents an overview of the background, results, and conclusions of the remedial investigation (RI) that was conducted at the former Philip Services Corporation (PSC) site in Rock Hill, South Carolina. The PSC Site is a former hazardous waste transportation, storage, and disposal facility. Operations began at the site in 1966 and continued until 2003. These operations included waste incineration from 1980 to 1995. The South Carolina Department of Health and Environmental Control assumed environmental management responsibilities for the site in December 2003, when the current owners went bankrupt.

The objectives of the RI were to:

- Characterize the soil and sediment associated with site-related activities, particularly in previously identified Solid Waste Management Units, Areas of Concern, and waste operations/storage areas where limited or no soil samples have previously been obtained.
- Assess surface soil risks for the undeveloped portion of the site east of Wildcat Creek.
- Identify potential sources of constituents in groundwater and determine the nature and extent of these sources.
- Identify and/or confirm potential migration pathways.
- Characterize the nature and extent of contaminants in groundwater.
- Assess risks to human health.
- Support the development of the Feasibility Study (FS).

Camp Dresser & McKee Inc. (CDM) completed several activities to support these objectives, including reviewing data collected in previous investigations, sampling various environmental media (e.g., soil, groundwater, and sediment), installing additional monitoring wells, performing remedial technology engineering evaluations, and assessing potential human health risks. The RI field work was conducted in three phases from May 2006 through December 2007. The phased approach allowed for focus data collection with each phase building on the previous phase and addressing remaining data gaps.

The results of the RI revealed that contaminant migration and fate characteristics are controlled by four dominant hydrogeologic features: saprolite, alluvium, partially weathered rock (PWR), and bedrock. The saprolite contains shallow groundwater. Contaminants present in the saprolite migrate to the alluvium, PWR, and bedrock features. The alluvium is more permeable than the saprolite and exerts a high degree of control over the site hydrogeology. Contaminants migrating to the alluvium are likely diluted by a higher flux of groundwater through this zone before eventually discharging to Wildcat Creek. The configuration of the PWR at the site is highly variable, and groundwater will either migrate from this zone to the alluvium or bedrock. Groundwater in the bedrock is controlled by fractures, and groundwater from this zone migrates to either alluvium deposits or underneath Wildcat Creek.

The results of environmental media sampling during the RI revealed that several chemicals, predominantly volatile organic compounds (VOCs), were detected above regulatory screening criteria in both surface and subsurface soil. Detected concentrations above criteria are limited to four soil focus areas: 1) Warehouse (Drum Storage and Management) Area, 2) Incinerator / Drum Repackaging Area, 3) Solvent Ditch Area, and 4) South Drum Storage Area. The highest concentrations in soil were detected in the Incinerator Area. The presence of several VOCs above EPA Region 9 Soil Screening Levels (SSLs) indicates that ongoing sources of groundwater contamination may be present in these areas.

The groundwater sampling results from the RI were consistent with the soil sampling results. In general, groundwater concentrations were high in areas with high soil concentrations. Several monitoring wells on site, encompassing the warehouse to Wildcat Creek, contain concentrations above EPA Maximum Contaminant Levels. Similar to soil, four focus areas were identified for soil based on observed concentrations and potential source areas: 1) Incinerator / Drum Repackaging Area, 2) Solvent Ditch Area, 3) Burn Pits, and 4) Fuel Oil Area.

The human health risk assessment conducted for the RI indicated that site-related environmental contamination posing potential cancer risks and noncancer hazard are related to contaminated groundwater, surface soil, and subsurface soils. The pathways of principal concern are exposure to chlorinated VOCs in groundwater though drinking water ingestion, and inhalation of VOCs in indoor air originating from groundwater. The final chemicals of concern (COCs) in soil related to potential human exposure risks are primarily metals (thallium and vanadium), with chlorinated VOCs limited to subsurface soils in two hot spot locations (RISB-25 and RISB-64)**.** However, 19 additional chemicals were identified as COCs for soil based on SSL exceedances. Sixteen VOCs along with manganese were identified as COCs in groundwater based on calculated risks as well as a comparison to drinking water standards.

Section 1
Introduction

This document presents the results of the Remedial Investigation (RI) at the former Philip Services Corporation (PSC) site in Rock Hill, South Carolina. The RI was performed in three phases (Phase I, Phase II, and Phase III) and field work was completed between May 2006 and September 2007. Data obtained from Phase I was incorporated in the planning of Phase II work. Following analysis of the data collected from Phase II, it was determined that Phase III activities were necessary to better assess the nature and extent of contaminants in groundwater.

1.1 Project Overview

The purpose of this RI Report is to document the results of the RI conducted at the former PSC Site. The RI was designed to further refine information regarding the nature and extent of contamination, and assess potential human health risks. The RI data will also support identification and evaluation of remedial alternatives during the Feasibility Study (FS).

Although the PSC site is not a National Priority List site under the U.S. Environmental Protection Agency's Superfund program, the RI Report has been prepared in observance of Superfund guidance (CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act). The RI has also been conducted in general accordance with the provisions of the *National Oil and Hazardous Substances Pollution Contingency Plan* (40 CFR 300).

The field work for Phase I was conducted during the weeks of May 29, 2006 and June 5, 2006. This work included completing site-wide investigations of the surface and subsurface soil, sediment, and groundwater. Additionally, the existing wells were inventoried. Based on the results of the Phase I Investigation, groundwater monitor well and additional subsurface soil locations were chosen for the Phase II Investigation.

The field work for Phase II was conducted between December 11, 2006 and March 5, 2007. The Phase II work included installing 20 groundwater monitor wells, completing 11 additional soil borings, conducting a site-wide groundwater sampling event, performing a multi-phase extraction pilot study, and performing an aquifer hydraulic assessment. The Phase II results revealed that data gaps remained for groundwater contamination extent. Thus, a Phase III investigation was conducted to address these data gaps.

The field work for Phase III was conducted between August 13, 2007 and September 20, 2007. The Phase III work included installing 11 groundwater monitoring wells and performing groundwater sampling on the 11 newly installed wells and select additional wells to confirm results from Phase II.

In addition to the data collected in the three phases of the RI, results from recent pre-RI investigations were used in the overall evaluation of site conditions.

1.2 RI Objectives

The objectives of the RI, as outlined in the RI/FS Work Plan (CDM, August 2006), were as follows:

- Characterize the soil and sediment associated with site-related activities, particularly in previously identified Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and waste operations/storage areas where limited or no soil samples have previously been obtained.
- Assess surface soil risks for the undeveloped portion of the site east of Wildcat Creek.
- Identify potential sources of constituents in groundwater and determine the nature and extent of these sources.
- Identify and/or confirm potential migration pathways.
- Characterize the nature and extent of contaminants in groundwater.
- Assess risks to human health.
- Support the development of the FS.

The data collected during the RI were designed to fill existing data gaps and satisfy these objectives. The results of the data collection efforts are presented in this RI Report.

Section 2
Project Background Summary

2.1 Site Description and Background

The PSC Site is a former hazardous waste transportation, storage, and disposal facility. In 1966, Quality Drum Company and Industrial Chemical Company began operations consisting of waste storage, treatment, and recycling. The facility received spent solvents from offsite facilities, stored the solvents on the site in drums and tanks, and recovered these solvents through distillation. Until 1980, wastes from the distillation process (still bottoms) were sent to a local landfill. In 1980, a hazardous waste incinerator was installed for still bottoms treatment.

In May 1983, Stablex Inc. acquired the facility. At that time, approximately 26,000 drums and 200,000 gallons of bulk liquid waste (stored in tanks) were present on the site. In 1986, ownership of the property was transferred to NUKEM, who changed the facility name to ThermalKEM in 1987. ThermalKEM operated as a hazardous waste incinerator and storage facility under RCRA interim status (EPA I.D. No. SCD 044 442 333). Phillip Services Corporation (PSC) took over operation and management of the facility in November 1995 and ceased operation of the incinerator one month later. The South Carolina Department of Health and Environmental Control (SCDHEC) assumed the environmental management responsibilities following the bankruptcy of PSC in December 2003.

Through the years of operation, the facility has sustained two large structural fires. The facility also experienced a subsurface diesel fuel release, with the quantity of fuel spilled estimated to be greater than 200,000 gallons. Based on several investigations and groundwater sampling, an extraction and treatment system was installed in 1988. Additional extraction components (groundwater extraction wells EW-2 and EW-3 and a fuel interceptor trench) were installed in the mid 1990s.

The incinerator was dismantled after it was shutdown, and a pit was excavated into soil beneath its footprint to remove contaminated soil. This work was performed prior to SCDHEC management of the site. In 2004, the excavated pit was backfilled and the incinerator building was demolished under the direction of SCDHEC. Upgrades to the treatment system were also completed in 2005.

Figure 2-1 presents a current site location map. The site consists of approximately 44.5 acres of industrial property on the west side of Wildcat Creek and approximately 108 acres of undeveloped woodland on the east side of Wildcat Creek. Robertson Road borders the industrial portion of the property to the northeast, and the Norfolk Southern Railroad forms the northwestern boundary. Wildcat and Fishing Creeks border the industrial property on the southeast and southwest, respectively.

The site is immediately surrounded by undeveloped land and commercial/industrial properties. Osmose Wood Preserving Inc. is located directly across the railroad to the northwest. Low-density residential properties and a high school are located in the vicinity of the site. Higher density residential areas are located to the southeast and northeast, towards the City of Rock Hill.

2.2 Previous Investigations and Remedial Activities

Several previous investigation and remedial activities have occurred at the PSC site. The timeline of events, as derived from Section 2.3 of the RCRA Facility Investigation Part 1 Report (PSC, August 1999), is shown in the following table. This table is not intended to be completely comprehensive of investigation and remedial activities, and CDM has been unable to confirm several of the activities and dates presented in the RCRA Facility Investigation Part 1 Report.

Table 2-1
Timeline of Investigations, Remedial Activities, and Other Events
Remedial Investigation Report
PSC Site, Rock Hill, South Carolina

Date(s)	Activity
Prior to 1983	Six monitoring wells existed on site.
June 1983 to March 1984	Excess drum inventory was brought under permitted storage capacity, and contaminated surface soil was removed.
June 1983 to September 1984	Old tanks were cleaned out, and tanker trucks were removed and cleaned out.
1983	Burn pit soil was excavated.
	Groundwater monitoring was initiated.
	A soil investigation was conducted identifying soil type and general geotechnical conditions.
	Six additional monitoring wells were installed throughout the site.
October	The Solvent Ditch was removed and cleaned.
1984	A hydrogeologic study revealed “solvent-like odors” in borings slightly downgradient of the Solvent Ditch.
	Borings were completed as monitoring wells to assess groundwater quality in the vicinity of the Solvent Ditch.
	A quarterly groundwater quality monitoring program was initiated voluntarily.
1985	A geophysical investigation was conducted to search for buried materials at the site. The Burn Pits were identified and soil in this area was excavated.

Date(s)	Activity
1985 and 1986	Additional hydrogeologic investigations were performed to assess groundwater quality in the vicinity of the Solvent Ditch.
November 1986	Water identified in the Incinerator Building Sump during EPA's RCRA Facility Assessment was removed. The leak found to be the source of water was repaired.
1986 and 1987	Studies were conducted to design an extraction well (EW-1) to contain and remediate groundwater at the Solvent Ditch.
1988	Well BP-1A installed in the area of the former Burn Pits.
July	Extraction well EW-1 was installed and connected along with production well PW-1 to the plant groundwater treatment system. Pump and treat remediation of groundwater began.
	RCRA Part B hazardous waste incinerator and storage permit SCD04444233 was issued but appealed by a local citizen's group.
	An aquifer performance test was conducted at extraction well EW-1.
June 1990	Diesel fuel was detected in piezometer P-2 during the routine measurement of water level elevations.
1991	An investigative study and remediation feasibility study was conducted for the diesel fuel area.
February	The Preliminary RFI on the diesel fuel area was submitted to EPA.
1992	Pumping of production well PW-1 was discontinued because volatile organic compound (VOC) concentrations at MW-100 had decreased to below detection limits.
January	An additional product delineation investigation was conducted in the diesel fuel area.
March	A lineament study of regional fracture traces was conducted.
January and July	ENSR conducted field investigations in support of the RFI Work Plan to be submitted in August 1992. Five saprolite wells and three bedrock wells were installed, including three well points in the bed of Wildcat Creek.
July 1993	Diesel fuel was detected in EW-1. The pumping rate was decreased to between 10 – 25 gallons per minute (gpm).
September and	Extraction wells EW-2 and EW-3 were installed.

Date(s)	Activity
October 1994	
August to October 1995	The diesel fuel interceptor trench was installed.
December 1995	Operation of the incinerator ceased and a revised Part B Permit Application was submitted.
February and March 1996	EW-2, EW-3, and the interceptor trench were connected to the groundwater treatment system. The trench sump pump was also connected to an oil/water separator unit.
April to June 2004	Additional investigations were conducted by CDM and SCDHEC involving groundwater sampling, surface water sampling, surface soil sampling, and a test pit investigation.
June 2004	Incinerator excavation pit was backfilled and the incinerator building was demolished.
September – October 2005	Upgrades were completed for the extraction and treatment system consisting of replacing equipment and adding instrumentation and automation.

Through the RCRA Part B Permit Corrective Action process at the PSC site, four SWMUs and seven AOCs were identified and included in the permit. These SWMUs and AOCs are graphically shown on **Figure 2-2**. The SWMUs and AOCs, as listed in the RFI Part 1 Report, and a brief description of the wastes managed/disposed in each area are presented below:

- ***Incinerator Building Sump (SWMU 8)*** – contained incinerator ash and water from the incinerator water seals. The incinerator was operated from 1981 to 1995.

- ***Container Storage Area (SWMU 11)*** – large drum storage area on ground surface containing drums of spent halogenated and non-halogenated solvents. This location was used for container storage from pre-1983 until 1995.

- ***Truck Washing Station and Sump (SWMU 19)*** – wastes managed included wash water, residue, and soil from trucks carrying spent halogenated and non-halogenated solvents. The truck washing station/sump was operated from 1981 until 1995.

- ***Burn Pits* (SWMU 41)** – previous disposal area of solvent distillation still bottoms by open pit burning. The burn pits were operated approximately between 1966 and the early 1970's. Impacted soil was excavated in this area in 1985 under supervision of SCDHEC.

- ***Solvent Ditch Area of Concern*** – spill and leakage from tank trucks and the tank farm migrated to this area via stormwater runoff. This ditch was operated from the 1960's until 1983. Soil excavation was performed to remove visibly impacted material in 1983.

- ***Fuel Oil Area of Concern*** – suspected diesel fuel leaks from underground piping associated with three underground storage tanks (USTs) and from diesel fuel delivery piping to the incinerator.

- ***Drum Repacking Area Fire Area of Concern*** – this building housed spent halogenated and non-halogenated solvents in lab pack form and drums of solids and sludges from spent solvents. The building was destroyed by fire in 1995 and rebuilt the same year.

- ***Blend Tank Overflow Area of Concern*** – tank farm where liquids containing spent halogenated and non-halogenated solvents were blended for incineration prior to 1995. After 1995, solvents were blended with diesel fuel in this area.

- ***Scrubber Containment Overflow Area of Concern*** – wastes managed at this location included caustic solutions of scrubber water with particulate matter from incineration.

- ***Boiler Explosion Area of Concern*** – the boiler was used as a backup steam supply for the scrubber and was replaced after it exploded in March 1991. No wastes were managed here but approximately 50 gallons of diesel fuel would have exploded with this boiler.

- ***Stormwater Outflows Areas of Concern*** – collection and outflow areas for stormwater runoff from the site and treatment, storage, and disposal areas.

These SWMUs and AOCs are described further in the RFI Part 1 Report. Figure 2-2 also identifies additional areas of concern for this RI/FS, including the Stablex Materials Area, other drum storage and management areas, and a stormwater pond. The Stablex Materials Area was identified by SCDHEC in historical photographs, and a geophysical survey conducted by SCDHEC indicated that there were subsurface anomalies in the area. While the Stablex Materials Area was planned for use as a disposal area, it is unknown whether any wastes were deposited there.

2.3 Environmental Setting

2.3.1 Topography and Drainage

The PSC site is located in the Piedmont Physiographic Province of South Carolina. This province is characterized by gently rolling hills and ridges intersected by stream and river valleys. Within the vicinity of the site, land surface elevations range from about 650 feet east of the site down to about 480 feet on Fishing Creek south of the site (Figure 2-1). Elevations on the site average from about 510 feet to 530 feet.

Two surface water features are adjacent to the site. Fishing Creek flows from the northwest to form the south boundary of the site and continues to flow to the south downstream of the site. Wildcat Creek flows from the north to form the east boundary of the operations area of the former facility. Wildcat Creek flows into Fishing Creek along the south boundary of the site. Most surface drainage from the operations area of the former facility is directed to the east into Wildcat Creek through several stormwater outfalls. One stormwater outfall also directs surface runoff from the southwest corner of the operations area to Fishing Creek.

Although the topographic relief is relatively subtle in the site vicinity, topographic patterns do exist that may provide additional insight into subsurface conditions. **Figure 2-3** provides a visual aid for evaluating the topography and geomorphology of the site vicinity. It should be recognized that this figure has a vertical exaggeration of about 5 to 1. Vertical exaggeration is necessary to discern the topographic patterns. With regard to elevation and slope, three distinct patterns are discernable from the figure. The most striking pattern exists east of the site where elevations are the highest and surface slopes the steepest. This east geomorphic area is likely to be underlain by rock that has undergone less weathering than the other two geomorphic areas that have been eroded to lower elevations with low slopes. This is particularly true of the southwest geomorphic area, which has very subtle slopes and the lowest elevations in the site vicinity. This geomorphology indicates that the underlying rock is more weathered than the rock beneath the other two areas. The north geomorphic area has moderate elevations/slopes compared to the other two areas, and the underlying rock is likely moderately weathered.

Wildcat Creek follows the apparent contact between the north and east geomorphic areas. Prior to its confluence with Wildcat Creek, Fishing Creek follows the contact between the north and the southwest geomorphic areas. Below Wildcat Creek, Fishing Creek follows the contact between the east and southwest geomorphic areas. These geomorphic expressions and related surface water flow patterns have additional implications to the regional geology and hydrogeology, as discussed below.

2.3.2 Geology and Hydrogeology

The geology of the Piedmont Physiographic Province of South Carolina includes crystalline bedrock of metamorphic and igneous origin. The metamorphic rocks range from coarsely-crystalline, weather-resistant gneiss to easily weathered mica schist and the finer-grained form called phyllite. Igneous rock, referred to as gabbro, reportedly exists beneath the site. Gabbro is a crystalline rock that is dark in color and contains minerals that are moderately susceptible to weathering processes. It is probable that this gabbro has been subjected to some degree of metamorphism and may be more appropriately classified as a meta-gabbro. Although the mineral composition may not be significantly altered by the regional metamorphism, it could have imparted structural changes in the rock such as development of regional fracture systems. If regional metamorphism has not affected the rock, stress-relief fractures are expected in this unaltered rock type.

The east geomorphic area is likely underlain by a rock more resistant to weathering than the rock beneath the site. This rock is also likely to be igneous in origin based on the uniformly radial drainage pattern that has developed in this area. This indicates that fractures having strong directional characteristics do not likely exist in the east area.

The regional nomenclature applied to aquifer systems in the Piedmont Province is to classify the system as the Piedmont Aquifer regardless of the depth zone. Groundwater in Piedmont Aquifer systems typically occurs in three zones of interest. In descending order these zones include the regolith zone, the transition zone between bedrock and the regolith, and the bedrock zone.

The regolith zone at the site consists primarily of saprolite, the unconsolidated weathering product of the underlying parent rock that retains the relic structure of the parent rock. The regolith zone also includes the recent stream alluvium deposits associated with Fishing Creek and Wildcat Creek. The regolith thickness at the site ranges from 15 feet to 35 feet. The saprolite and the alluvium are fully connected hydraulically and behave as a single groundwater zone. However, it is probable that the permeability of the alluvium (primarily sand with silt) is higher than the permeability of the saprolite (primarily silt with sand and clay size materials). The depth to groundwater in the regolith measured at the site ranges from 5 feet near the streams to 20 feet at the higher elevations.

Groundwater flow in the regolith zone is from areas of topographic highs to areas of topographic lows. Recharge to this zone occurs at all elevations from precipitation, and this recharge represents a driving force for groundwater flow. Where the land surface intersects the elevation of the saturated zone in the regolith (such as along streams), groundwater discharge occurs creating a groundwater migration pattern toward the nearest surface stream. Some quantity of groundwater in the regolith zone also migrates downward to recharge the transition zone and the bedrock zone.

The transition zone between the regolith and bedrock zones consists of partially weathered bedrock and primarily of rock fragments, boulder-size rocks, and fractured bedrock that is in full hydraulic connection with the overlying regolith zone. Wells typically cannot be installed through the transition zone using auger techniques, and rotary or sonic techniques are required.

Groundwater flow in the transition zone follows similar patterns to the regolith zone. However, because of groundwater flow through fractures, the flow path of least resistance may differ in this zone, and the permeability is typically much higher than the regolith zone. Some quantity of groundwater in the transition zone migrates downward to recharge the bedrock zone. Lateral groundwater flow in the transition zone is toward discharge points such as streams. Groundwater in the transition zone may migrate in the downstream direction of stream flow before the vertical gradient effectively causes it to discharge.

Groundwater in the gabbro bedrock beneath the site occurs in the primary pore space of the rock and in fractures developed in the rock. The primary porosity of the gabbro is likely very low and not significant for groundwater migration. However, the primary porosity may contain site-related constituents that could be slowly released into fractures, resulting in low concentrations of site-related constituents in groundwater migrating through the fractures for an indeterminate period of time.

The bedrock may include fractures developed from historic deformation events. These types of fractures are usually directional in nature, and a primary direction of fracture orientation can be discerned along with an antecedent fracture direction that tends to be about 60^{o} from the primary direction. These fractures can exist at great depths in the Piedmont, and production wells can be successful at depths of over 500 feet. Stress relief fractures may also be present. These fractures develop as the weight of overlying rock is removed by weathering and the rock expands creating a fracture. Stress relief fractures are horizontal more so than deformations fractures and are usually rare below a depth of 200 feet.

Groundwater migration in the bedrock rock follows the same general rules as the other two zones and migrates from topographic high areas of recharge to topographic low areas of discharge such as streams. However, features of a more regional scale, such as major drainage basin divides and rivers, rather than features of a site-specific scale, such as Wildcat Creek, may influence groundwater flow patterns in deep bedrock. Furthermore, the groundwater flow paths of least resistance in the bedrock zone are along fractures. Based on potential fracture directions, the regional groundwater migration in bedrock ranges from southeast to southwest.

2.4 Historical Aerial Photographs

CDM obtained historical aerial photographs which show different levels of activity at the site during 1979 (**Figure 2-4)**, 1984 (**Figure 2-5)**, and 1989 (**Figure 2-6**). All aerial photographs were obtained from the United States Geological Survey.

Section 3
Remedial Investigation Approach

This section summarizes the field investigation activities completed at the PSC site. The section is divided into three major subsections: Phase I, Phase II, and Phase III. CDM prepared several documents to guide the RI and refine the approach, including:

- PSC Remedial Investigation/Feasibility Study (RI/FS) Work Plan (Work Plan) – CDM, May 2006
- Field Sampling Plan (FSP) - CDM, May 2006
- Quality Assurance Project Plan (QAPP) - CDM, Revised December 2006
- Phase I Technical Memorandum and Phase II Work Plan (Phase I Report) - CDM, October 2006
- Phase II Sampling Results and Hydrogeologic Findings – Interim Report (Phase II Report) - CDM, May 2007

The results of the RI are included in Section 4 (Summary of Findings). A summary of all soil and permanent monitor well sample locations, including wells installed prior to the Remedial Investigation, is provided in **Figure 3-1.**

3.1 Phase I Activities

This subsection describes the Phase I field activities, which were conducted in general accordance with the approach and procedures prescribed in the approved Work Plan and FSP. Some deviations occurred based on field observations, access conditions, and SCDHEC recommendations. These deviations are discussed further in Sections 3.1.2 and 3.2.2.

Specifically, CDM conducted the following activities during Phase I:

- Surface/subsurface soil sampling at 52 onsite locations (RISB-1 through -52) and two offsite background locations (RI-BCK1 and RI-BCK2).
- Surface soil sampling at 10 locations (RISS-1 through -10) on the undeveloped property east of the industrial facility, across Wildcat Creek.
- Sediment sampling at seven locations (RISD-1 through -5, RISD-WCBK, and RISD-FCBK) in Wildcat Creek and Fishing Creek.
- Sediment sampling at two onsite locations, one in a stormwater catch basin (RICB-3) and one inside the warehouse building (RI-WASTE).
- Groundwater sampling at four onsite locations (RITW-12, -28, -34, and -38)

- Well inventorying of existing groundwater monitor wells using available documentation.

Phase I did not include surface water sampling because an extensive surface water investigation was previously completed in 2004 by CDM and SCDHEC and revealed minimal surface water impacts. That investigation included installing vapor diffusion modules in Fishing and Wildcat Creeks and performing onsite screening using a portable gas chromatograph. The investigation also included collecting surface water samples for offsite laboratory analyses. Limited impacts were observed in the onsite screening and no organics were detected in the laboratory surface water samples. Additional details can be found in the *Summary Report – Initial Site Investigation* (CDM, October 2004).

Summary Phase I location maps are provided as **Figure 3-2** and **Figure 3-3** for activities on the west and east side of Wildcat Creek, respectively. A sample summary table is presented as **Table 3-1**. Additional Phase I activity details are provided in the following subsections**.**

3.1.1 Soil Sampling

Phase I soil sampling consisted of three sampling activities: onsite surface and subsurface soil sampling, surface soil sampling across Wildcat Creek, and background surface and subsurface soil sampling.

Onsite Soil Sampling

Surface and/or subsurface soil samples were collected from 52 onsite locations using direct push technology, as shown on Figure 3-2. Samples were collected in each boring from the surface (0-1 feet) and at 2-foot intervals thereafter up to the groundwater table (or refusal). Soil lithology was recorded for each of the subsurface locations, and the boring logs are presented in **Appendix A.**

Each of the collected samples was screened onsite shortly after collection using Color-Tec methods as an early indication of volatile chlorinated ethenes. Details regarding the Color-Tec procedure are available in the Field Sampling Plan (CDM, May 2006). Phase I Color-Tec screening data are presented in **Appendix D, Table D-4**. This table includes photoionization detector (PID) readings for each sample and a correlation of Color-Tec data to laboratory results. Color-Tec and PID results were used for screening purposes only. They were not included in the human health risk assessment and will not be used for remedial action evaluations.

In general, each surface soil sample was sent to Analytical Services Inc. (ASI) for analysis of EPA’s Target Compound List (TCL) of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), and EPA’s Target Analyte List (TAL) for metals. One subsurface soil sample from each boring was also submitted to the laboratory for the same analyses. The subsurface sample was generally selected based on the interval that showed the highest Color-Tec or PID result. Samples in the vicinity of the former incinerator and drum storage areas were also analyzed for polychlorinated biphenyls (PCBs). Table 3-1 shows the complete laboratory sample summary.

Five of the originally planned boring locations were modified, and another eight locations were added. These changes were based on the Color-Tec screening results, access conditions, and/or SCDHEC guidance. The changes were designed to better satisfy the RI/FS objectives. A summary of changes from the original approach is shown on **Table 3-2**.

Other deviations from the work plan included the following:

- Subsurface laboratory split samples were collected from 4-foot intervals instead of 2-foot intervals for logistical reasons.

- Because eight sample locations were added, SCDHEC attempted to minimize the additional number of laboratory samples by using the onsite screening data. The sample summary provided in Table 3-1 shows what samples and analyses were run for each boring location, and Table 3-2 summarizes the changes that were made.

Sampling across Wildcat Creek

Ten surface soil samples were collected across Wildcat Creek in the undeveloped and wooded area of the property, as shown on Figure 3-3. This quantity of samples (1 for every ~10 acres) was intended to provide sufficient data for statistical analysis, if required. It was also intended to allow representation of the entire undeveloped area. There were no deviations from the work plan associated with surface soil sampling across the creek. Surface soil samples were sent to ASI for analysis of TCL SVOCs and TAL Metals.

Background Sampling

In addition to the onsite borings, two background soil samples were obtained for surface (0-1 foot) and subsurface (3-4 feet) with a hand auger within a 1-mile radius of the site. RISB-BK1 was collected approximately 1,000 feet northwest of the site, north of Robertson Road. RISB-BK2 was collected south of South Pointe High School, approximately 0.5 miles from the site. The approximate locations of the background samples are shown in Figure 3-3. Background samples were sent to ASI for analysis of TCL VOCs, SVOCs, and TAL Metals.

3.1.2 Groundwater Sampling

During Phase I, the Geoprobe® encountered refusal prior to reaching the water table in most of the borings. Therefore, groundwater samples could not be obtained in all boreholes as originally planned, nor could they be obtained from multiple depths.

Temporary wells were installed and allowed to recharge at nine locations (RITW-11, -12, -13, -15, -21, -25, -28, -34, and -38) where the water table was reached. Of the temporary well locations, four (RITW-12, -28, -34, and -38, as shown on Figure 3-2) provided sufficient recharge for sample collection. Samples were collected from each of these locations and sent to ASI for TCL VOC analyses. An additional sample for Color-Tec analysis was obtained from RITW-15. However, this location did not yield enough groundwater for VOC analysis.

Each temporary well was completed as a 1-inch well with a 10-foot screen. Groundwater was sampled from the wells between 24 and 48 hours following installation using low-flow sampling methods with a peristaltic pump. All temporary wells were abandoned by removing the PVC riser/screen and grouting the hole with a tremie pipe.

3.1.3 Sediment Sampling

Sediment sampling was conducted at seven locations along Wildcat Creek and Fishing Creek, as shown in Figure 3-2. Two of these locations (RISD-WCBKG and RISD-FCBKG) represent background conditions upstream of the site, one for each creek. The remaining locations were intended to be immediately downgradient of the scour areas for Outflows 1, 2, 3, and 4 and for the former burn pits.

A sediment sample was collected from only one stormwater catch basin (RICB-3) as sediment was not present in the remaining catch basins identified in the work plan. An additional sediment sample (RI-WASTE) was collected inside the warehouse building at SCDHEC's request after a pool of water was discovered near the former drum conveying area.

All sediment samples were collected using stainless steel bowls and spoons. The stream sediment samples were collected immediately downstream of each outflow location. Background sample RISD-WCBKG was collected approximately 50 feet upstream of Robertson Rd, and background sample RISD-FCBKG was collected upstream of Vernsdale Rd (about 50 feet north of the railroad tracks).

Sediment samples were sent to ASI for analysis of TCL VOCs, SVOCs, and TAL Metals.

3.1.4 Monitor Well Inventory

CDM conducted a monitor well inventory of the existing wells at the PSC site. This task consisted of reviewing available boring logs, construction details, and analytical data for each well. The objectives of this task were to develop a better understanding of well construction and usability and to determine a groundwater sampling scope for Phase II.

3.2 Phase II Activities

Phase II included supplemental soil sampling, monitor well installation, and monitor well sampling to support the RI objectives. Phase II included the following activities:

- Focused soil sampling to further characterize and bound the extent of constituents (horizontal and vertical) and to isolate potential source areas.
- Installing 13 shallow (Regolith or PWR) and 4 bedrock monitoring wells, 3 piezometers, and 5 staff gages to further refine the extent of contaminants in groundwater and to support FS evaluations.
- Conducting site-wide groundwater sampling to locate groundwater source areas and migration pathways.
- Collecting engineering data to support the FS.

These activities were described and completed in general accordance with the Phase I Report. The FSP was also used as a guide for some of the procedures followed during Phase II.

3.2.1 Additional Soil Sampling

Soil borings were completed at 11 locations (RISB-56 through -59 and RISB-61 through -67), as shown in **Figure 3-4**. Samples were collected from each of these locations at various depths and submitted to ASI for analysis. The sampling depths and associated analysis parameters are summarized in **Table 3-3**.

Soil samples were also collected at eight additional monitor well installation locations (RIMW-1, -5 through 8, -13, -19, and RIPZ-3), as shown on Figure 3-4. The sampling depths and analysis parameters are summarized in Table 3-3.

Boring logs for the additional soil samples are located in Appendix A.

3.2.2 Well Installation

Seventeen groundwater wells (RIMW-1, RIMW-3 through -16, and RIMW-18 and -19) and three piezometers (RIPZ-1 through -3) were installed, as shown on Figure 3-4. Of these 20 well/piezometer locations, 4 were completed in the saprolite horizon, 11 were completed in the partially weathered rock (PWR) horizon, and 5 were completed into bedrock. Geologic logs and well construction details for all of the wells installed in Phase II are located in **Appendix B**.

The bedrock wells were installed into competent bedrock using air-drilling techniques. The wells were set as specified in the Phase I Technical Memorandum and Phase II Work Plan (CDM, October 2006) for bedrock wells, and are conventional monitor wells (2”-PVC casing/screen, silica sand pack, bentonite seal, and cement grout annular fill). Piezometer well RIPZ-2 was installed the same as the conventional monitor wells except 1"-PVC casing/screen was used instead of 2" PVC.

The saprolite and PWR wells were installed using auger or air rotary techniques. These wells were set as specified in the Phase I Technical Memorandum and Phase II Work Plan (CDM, October 2006) for shallow wells, and are conventional monitor wells (2"-PVC casing/screen, silica sand pack, bentonite seal, and cement grout annular fill). Piezometer well RIPZ-1 was installed the same as the conventional monitor wells except 1"-PVC casing/screen was used instead of 2" PVC.

In addition to standard installation procedures; rock coring, packer testing, and geophysical logging were performed on select wells to establish depth intervals for well installation.

Rock coring was performed for wells RIMW-18 and RIMW-19. These cores were evaluated to determine fracture zones and orientations to assist in the decision process when setting screen intervals for bedrock wells. Photos of rock cores are provided in **Appendix C.**

Packer tests were used when installing bedrock wells to determine the most appropriate interval to set screens. Groundwater samples were collected using packer tests for RIMW-18 at depth intervals of 44-56 ft bls and 56-68 ft bls and for RIMW-19 at depth intervals of 63-75 ft bls and 76-88 ft bls. Split samples were collected for each interval: one split was analyzed onsite for chlorinated ethenes using the Color-Tec method and the other split was sent to ASI for laboratory analysis of VOCs by EPA Method 8260B.

The results from the Color-Tec analysis were used to determine if additional depth intervals needed to be sampled. The laboratory data were used to confirm the Color-Tec data before setting the wells. Laboratory results from the packer tests are provided in **Table 3-4**. Color-Tec data for these two wells are presented in Appendix D, Table D-4.

Geophysical logging services were provided by Dr. James Ursic of the Environmental Protection Agency (EPA). A summary of the geophysical tools used and analysis conducted is presented in **Appendix C**. The Appendix C report includes geophysical logs and photographs of rock cores.

3.2.3 Site-Wide Groundwater Sampling

Two weeks following well installation, a site-wide groundwater monitoring event was conducted. This event included sampling the newly installed wells as well as several existing wells, as identified on Table 3-3. This table also includes the analysis parameters for each sampled well. All samples were sent to ASI for analysis as shown in Table 3-3. In addition to sampling, site-wide water level measurements were recorded.

3.2.4 Engineering Data Collection

Additional data were collected during Phase II to support remedial technology engineering evaluations for the FS. Activities performed included the following:

- Aquifer Hydraulics Tests
- Dual Phase Extraction Pilot Tests
- Biochemical and Geochemical Data Collection

3.2.4.1 Aquifer Hydraulics Tests

CDM performed several tests to assist in the evaluation of aquifer hydraulics of the bedrock and regolith hydrogeologic zones. Prior to the testing, CDM collected site-wide groundwater levels for comparison purposes.

To allow the aquifer to approach equilibrium without any extraction well operation influences, the extraction wells and trench pumps were stopped. The aquifer was allowed to stabilize for two weeks while collecting water levels from 14 locations as shown on **Figure 3-5** (eight manually and five using automated water level recorders). Following two weeks of aquifer stabilization, site-wide water levels were collected again.

Once all the data were obtained from the aquifer equilibration period, aquifer performance tests were performed on wells EW-2 and EW-3. These tests consisted of a six-hour step test. Pumping rates used were approximately 2 gallons per minute (gpm), 3 gpm, and 3.5 gpm for both EW-2 and EW-3. The work plan indicated that four steps would be performed, but only three were performed because the maximum yield was reached during the third step, making the third step the maximum pumping rate step. The step tests were followed by a 72-hour aquifer constant rate performance test (APT). The pumping rates for the APT tests were 2.7 gpm and 3 gpm for EW-2 and EW-3, respectively. Figure 3-5 shows the locations of wells EW-2 and EW-3 and also shows the location of observation wells used to monitor water levels during the tests.

3.2.4.2 Multi-Phase Extraction Tests

Multi-phase extraction (MPE) tests were performed by Kemron Environmental Services, Inc. to evaluate potential remediation technologies for source area chlorinated VOCs and the fuel oil area. The system extracts both subsurface vapor and liquid from a monitoring or recovery well through the application of varying levels of vacuum pressure. To control the liquid level and prevent groundwater mounding, a drop tube is inserted in the well to the static water level depth. The vacuum and airflow are conveyed through the drop tube. As the water table begins to rise from the vacuum, both free product and groundwater are extracted through the drop tube as the drop tube maintains the water level.

The first MPE test was conducted in the solvent ditch area as shown in **Figure 3-6**, and RIMW-8 was used as the extraction well. Surrounding wells were used to monitor pressure changes at varying distances from RIMW-8: MW-110A (56 feet), P-1 (105 feet), RIMW-4 (119 feet), RIMW-5 (112 feet), and OB-8A (50 feet). The pilot study was conducted at two induced vacuum pressures (6.5 in Hg and 17 in Hg), and measurements were taken until pressure readings stabilized during each test.

The second MPE test was conducted in the fuel oil area as shown in Figure 3-6, and PW-2A was used as the extraction well. The following surrounding wells were used to monitor pressure changes at varying distances from PW-2A: P-2 (20 ft), OB-900 (20 ft), OB-21 (6 ft), OB-22 (11 ft), and OB-23 (20 ft). The pilot study was conducted at induced vacuum pressures of 8 in Hg and 16.5 in Hg, and measurements were taken until subsurface conditions stabilized for each induced pressure. Following the first two induced pressure extractions, the vacuum pressure was increased to 23 in Hg to maximize fluid recovery.

3.2.4.3 Biochemical and Geochemical Data Collection

The biochemical and geochemical data were collected to evaluate in situ remedial technologies for source control and groundwater remediation. Bio- and geochemical data were collected from 12 wells as shown in Table 3-3 during the Phase II groundwater sampling event. Results are presented in Section 4.

3.3 Phase III Activities

Phase III activities were conducted based on additional data gaps discovered during analysis of the groundwater data following Phase II activities. The Phase III approach was outlined in the Phase II Sampling Results and Hydrogeologic Findings Interim Report (CDM, May 2007), and the work performed during Phase III included the following activities:

- Installing 11 additional wells and abandoning 11 wells.
- Geophysical logging by EPA on selected wells during construction.
- Conducting groundwater sampling on the newly installed wells and selected existing wells to confirm findings in Phase II.

Correspondence with SCDHEC prior to Phase III activities resulted in some changes to the scope of work originally outlined in the Phase II Interim Report. These changes included:

- Recording soil lithology during well construction
- Adding one saprolite monitor well (RIMW-24)

- Installing diffusion bag samplers in RIMW-15 and collecting samples from these diffusion bags for onsite screening and laboratory analysis

- Adding three existing wells (RIMW-15, MW-121B, and MW-122B) to the groundwater sampling event

- Revising the well abandonment plan to cover the following 11 wells: MW-123B, MW-116, MW-117, OB-12, OB-13, OB-21, OB-23, OB-900, OB-901, OB-902, and PW-2A. Although PW-1 and RIMW-15 were initially selected to be abandoned by SCDHEC, they were not abandoned based on SCDHEC direction in the field. PW-1 was not abandoned because a pump was encountered in the well that could not be readily removed and RIMW-15 was not abandoned because diffusion sample results indicated that the well is not screened in multiple zones as previously suspected.

3.3.1 Well Installation and Abandonment

Eight bedrock groundwater monitor wells (RIMW-20, -21, -22, -23, -25, -26, -28, and -29) and three saprolite/PWR monitor wells (RIMW-24, -27, and -30) were installed to further refine the extent of contaminants in groundwater and to support FS evaluations. These monitor well locations are shown on **Figure 3-7**.

The bedrock wells were installed into competent bedrock using sonic drilling techniques. These wells were set as specified in the Phase II Work Plan for bedrock wells, and are conventional monitor wells (2”-PVC casing/screen, silica sand pack, bentonite seal, and cement grout annular fill).

Although monitor well RIMW-27 was intended to be installed as a bedrock well, it was not screened in bedrock. After setting steel casing into competent rock, it became apparent that the casing was set in “false rock”. The casing was likely set in a rock ledge or boulder. At the direction of SCDHEC, the well was installed at the total depth achieved in this location.

The saprolite wells (RIMW-24 and RIMW-30) were installed to the top of PWR using sonic drilling techniques. These wells were set as specified in the Phase II Work Plan for shallow wells, and are conventional monitor wells (2”-PVC casing/screen, silica sand pack, bentonite seal, and cement grout annular fill).

Boring logs for these wells are provided in Appendix A, and construction well diagrams are provided in Appendix B.

Eleven well locations were also abandoned as shown in Figure 3-7. These locations were abandoned for the following reasons:

- Multiple Zone Wells – select wells with sand pack interval that connects the bedrock zone with a higher hydrogeologic zone (PWR, saprolite, etc.) or are screened across the bedrock zone and a higher hydrogeologic zone were abandoned. This is because the data (e.g., water quality and water levels) from such wells are not likely representative of any single hydrogeologic zone.

- Redundancy – select wells that are screened in the same hydrogeologic zone as another well, are screened within five vertical feet of that well, and are in relative proximity to the well are considered to be redundant. These wells were also recommended for abandonment. When comparing wells, the well with the least amount of information available (e.g., boring logs, well construction details, etc.) was abandoned over wells with more complete information.

- Insufficient data – select wells that do not have sufficient information to know if they are screened in multiple hydrogeologic zones were abandoned.

At SCDHEC's request, CDM performed diffusion sampling in four equal intervals (70-77.5 ft bls, 77.5-85 ft bls, 85-92.5 ft bls, and 92.5-100 ft bls) of the 30-foot screen of RIMW-15. Each diffusion sampler was screened on site using Color-Tec methods. Two diffusion samples were selected for offsite laboratory analysis. The results of this analysis are shown in **Table 3-5**. Color-Tec data for the diffusion samplers are presented in Appendix D, Table D-4**.**

3.3.2 Groundwater Sampling

Two weeks following well installation, groundwater sampling was conducted for the wells identified in **Table 3-6**. This event included sampling the newly installed wells as well as three existing wells (RIMW-15, MW-121B, and MW-122B). This table also includes the analysis parameters for each sampled well. All samples were sent to ASI for analysis of TCL VOCs. In addition to sampling, site-wide water level measurements were recorded.

Section 4
Remedial Investigation Results

This section summarizes the results of the Remedial Investigation (RI). The RI was completed in three phases and included a hydrogeologic evaluation; soil (surface and subsurface), sediment, and groundwater investigations; hydraulic testing; MPE testing; and biochemical and geochemical data collection.

The RI design and investigation procedures, Phase I results, and partial Phase II results were presented in the Work Plan, Phase I Report, and the Phase II Report.

The summary of findings presented below includes a comparison of detections against regulatory criteria. The regulatory criteria, including EPA Region 9 Preliminary Remediation Goals (PRGs), EPA Region 9 Soil Screening Levels (SSLs), EPA Region 4 Ecological Screening Values (ESVs), and EPA Maximum Contaminant Levels (MCLs), are presented in **Table 4-1.**

The tables and figures in the following sections show the detected compounds only. Summary tables of all the laboratory results are presented in **Appendix D**. The complete laboratory reports for the RI data are included on the enclosed CD-ROM. Hard copy laboratory reports with raw data are on file at CDM.

4.1 Site-Specific Hydrogeology

4.1.1 Geology

The site-specific hydrogeology was found to be consistent with expectations developed during work plan preparation. In descending order, three hydrogeologic zones were identified that include the regolith zone (shallow), the transition zone between bedrock and the regolith (intermediate), and the bedrock zone (deep).

The regolith zone at the site consists of two primary types of unconsolidated formation materials. Saprolite is the dominant type and is the unconsolidated weathering product of the underlying parent rock that retains the relic structure of the parent rock. The saprolite consisted of a wide range of grain sizes ranging from clay to silt to sand. Generally, the grain size is smaller near land surface and increases in size with depth down to the transition zone where rock fragments (gravel-sized grains) are common. The saprolite thickness is typically about 20 to 30 feet.

The regolith zone also includes the recent stream alluvium deposits associated with Fishing Creek and Wildcat Creek. **Figure 4-1** shows the estimated area underlain by alluvial deposits. Based on the recent borings, the alluvium consists primarily of sand with sand and gravel deposits found in closer proximity to Wildcat Creek. The alluvium typically occurs to a depth of about 20 feet and was observed to be the thickest at location RIMW-23, where medium- to coarse-grained sand and gravel was encountered to a depth of almost 35 feet.

The saprolite and the alluvium are fully connected hydraulically and behave as a single groundwater zone under water table conditions. Based on the geologic descriptions, the permeability of the alluvium is much higher than the permeability of the saprolite. The depth to groundwater in the regolith measured at the site ranges from 5 feet near the streams to over 20 feet at the higher elevations. In the west portion of the site, the water table may be deeper than the regolith zone, and the water table is located in the transition zone.

The transition zone between the regolith and bedrock zones consists of partially weathered bedrock and primarily of rock fragments, boulder-size rocks, and fractured bedrock that is in full hydraulic connection with the overlying regolith zone. The observed transition zone consisting of partially weathered rock (PWR) typically ranged from about 5 feet to about 25 feet. One exception in the PWR thickness was discovered at the location of RIMW-22 where the PWR was found to be about 85 feet thick.

Bedrock samples were obtained from the bedrock formation during the RI. The rock types encountered primarily included diorite, granodiorite, gabbro, norite, and diabase. Granodiorite and diorite were the most frequently encountered rock types. The mineral assemblages associated with these rock types include feldspar, hornblende, biotite, and chlorite. These rocks were medium to coarsely crystalline and tended to weather to friable PWR and sand-sized particles. The gabbro mineralogy primarily included pyroxene, hornblende, and chlorite. Diabase intrusions were also observed in the gabbro that demonstrated contact metamorphism as feldspar deposits.

The primary rock type observed at the northern portion of the PSC site was norite, which contains mostly plagioclase with some pyroxene. In the central and southern portions of the site, the feldspar content decreases, the pyroxene content increases, and the rock type becomes gabbro. The rock type on the western portion of the site has enough pyroxene that it could be considered a pyroxenite.

Other geologic observations included the presence of a diabase dike and minerals indicative of weathering of feldspars such as laumontite, chlorite, and epidote within fracture zones. Iron staining was also observed in selected fracture zones indicating that water had been present within the fracture zone. In a few locations, siderite and/or pyrite was observed in fracture zones. The foundational fracturing of the rock appeared to be the result of the intrusive activities, which created steeply dipping stress fractures trending northwest/southeast and northeast/southwest. Additional fracturing occurred as the result of the intrusion of two diabase dikes (elevations 430-420 ft and 388 ft), which were noted in three of the bedrock wells (RIMW-21, RIMW-22, and RIMW-26).

The effects of the fracturing were enhanced in portions of the site where elevated feldspar content was observed. The fracturing increased permeability, allowing water to move within the fractured zones. Where the fracturing occurred within zones containing higher feldspar content, the enhanced permeability in combination with the susceptibility of feldspars to weathering allowed significant enhancement of the fracture zones and alteration of the feldspars to laumontite, epidote, and chlorite. Chemical alteration also occurred as the intrusive diabase dike reacted with the norite parent rock. From a depth of approximately five feet below the diabase dike and greater, the degree of fracturing and alteration is much less significant.

The highest degree of weathering/fracturing and the highest percentage of feldspar were observed at RIMW-20, 21, and 22, which are also the locations at the site where the depth to bedrock was significantly greater and where the diabase dikes were observed. Depth to bedrock at RIMW-26 was similar to RIMW-21; a diabase dike was also noted in RIMW-26. A zone of high fracturing and gravel was observed in the central portion of the site at elevations 470-460 ft at wells RIMW-25, RIMW-27, RIMW-28, and RIMW-29. This zone of gravel/relict fracturing may also be present in RIMW-22, RIMW-26 and RIMW-27, which contained PWR at elevation 470-460 ft. Another zone of gravel and high fracturing was observed at elevation 420-410 ft in the northern part of the site at RIMW-20, RIMW-21, and RIMW-22.

4.1.2 Hydrogeology

Potentiometric surface maps were developed for the regolith (saprolite, alluvium, and PWR) and bedrock hydrogeologic zones from data collected in September 2007. The regolith/PWR potentiometric surface is shown on Figure 4-1, and the bedrock potentiometric surface is shown on **Figure 4-2**. The associated groundwater elevations are also summarized in **Table 4-2**. Calculated vertical gradients for select well pairs are presented in **Table 4-3**.

The regolith/PWR groundwater elevations decrease east-southeast toward Wildcat Creek. The hydraulic gradient is steeper in the west portion of the site that is underlain by saprolite and decreases in the vicinity of the creek where the regolith consists of alluvium. This difference in hydraulic gradient is believed to be associated with the alluvium being more transmissive than the saprolite. Regolith/PWR groundwater flows from the saprolite into the alluvium and then into Wildcat Creek. However, it is possible for the regolith/PWR groundwater to flow beneath Wildcat Creek in the alluvium for some distance downstream before effectively discharging into the active stream channel.

Bedrock groundwater elevations also generally decrease east-southeast towards the creek. However, in the area surrounding Wildcat Creek where stream alluvium is present, the groundwater flow pattern appears to be controlled more so by the alluvial valley rather than the current location of the stream channel. This actually is not very surprising because the bedrock groundwater discharge is more efficient where the alluvial valley is the deepest and the alluvium is most permeable. This area is expressed on the potentiometric surface map as a trough formed by the 507-foot contour.

4.1.3 Cross Sections

CDM has prepared hydrogeologic cross sections based on data obtained during the RI and previously existing data. Boring logs and well construction logs were recorded during the RI and are presented in Appendix A and B, respectively. Five cross sections were prepared, and the locations are shown in **Figure 4-3**. These cross sections were developed to correlate the hydrogeologic zones (shallow – saprolite, intermediate – PWR, and deep – bedrock). **Table 4-4** presents a well summary for all pre-RI and RI wells on site.

Cross Section 1 (CS1) was used to evaluate the north-central portion of the groundwater plume and to evaluate the relationship with extraction well EW-2 and surrounding wells. CS2 was used to evaluate the incinerator area and the south-central portion of the groundwater plume. CS3 was used to evaluate central portion of the plume. CS4 was used to evaluate conditions perpendicular to the groundwater flow direction. CS5 was used to evaluate the relationship between extraction well EW-2 and surrounding wells. Cross sections CS1, CS2, CS3, and CS5 generally proceed in the direction of groundwater flow, from the east toward Wildcat Creek.

The cross sections are generalized to show the three major hydrogeologic zones identified above. Data were taken from the newly installed wells and borings, and from historic boring logs, as available. Elevations for the top of bedrock, the top of PWR, and groundwater were each processed using Kriging interpolation methods to develop elevation contours across the site for these features. The cross sections were then prepared from the resulting elevations. **Appendix I** includes the elevation contour maps used to prepare the cross-sections. Each cross section was separated into two figures, one containing chlorinated ethenes/ethanes (CEE) concentrations and one containing BTEX/chlorinated benzenes (CB) concentrations. These concentrations are discussed in later subsections. The observed hydrogeology is discussed below.

Cross Section 1

CS1 is shown in **Figures 4-4** and **4-5**. This section extends from west to east on the north end of the warehouse, crossing through the Drum Processing, Drum Packaging, and former Burn Pits areas before crossing Wildcat Creek to the east . Just east of the warehouse building, the bedrock elevation decreases sharply to RIMW-22, then increases again towards Wildcat Creek. It should be recognized that the interpretation depicted of the bedrock surface associated with RIMW-22 could be exaggerated. This low point in the bedrock surface may not be as laterally extensive as shown in the cross sections. Groundwater flow along this section is toward Wildcat Creek. It should be noted that the water table surface is in the PWR in the west portion and in the regolith in the east portion.

Cross Section 2

CS2 (**Figure 4-6** and **Figure 4-7**) extends from west to east and crosses the Drum Storage/Solvent Recovery, Blend Tanks Overflow, Solvent Ditch, and Fuel Oil areas before crossing Wildcat Creek. CS2 has a bedrock surface depression similar to that in CS1, although not as drastic. Just east of the warehouse building, the bedrock elevation decreases to RIMW-26, then increases again towards Wildcat Creek. The groundwater flow direction is toward Wildcat Creek in this section. The saprolite layer appears to be thicker in CS-2 than in CS-1 and the water table surface resides entirely in the regolith rather than having portions in PWR.

Cross Section 3
CS3 is shown in **Figures 4-8** and **4-9.** This section extends from northwest to southeast and crosses the Drum Repackaging and Fire, Incinerator, and the Fuel Oil areas before crossing Wildcat Creek. CS3 indicates that the bedrock surface decreases downgradient of the warehouse building and increases towards Wildcat Creek. Surface elevation decreases approximately 20 feet from the west boundary to the creek. The groundwater flow in this section is toward Wildcat Creek.

Cross Section 4
CS4 runs from south to north as shown in **Figures 4-10** and **4-11**. This section is generally drawn perpendicular to the direction of groundwater flow and extends through the Fuel Oil and Drum Storage and Management areas. The hydrogeology indicates that the wells on this section are screened in either PWR or bedrock. Bedrock elevation decreases slightly near EW-2 then increases slightly before dropping dramatically just east of the north end of the warehouse.

Cross Section 5
CS5, which is shown in **Figures 4-12** and **4-13**, runs from west-northwest to east-southeast. This section crosses through the Drum Repackaging and Fire Area and extends just south of the former Incinerator location and Fuel Oil area. Similar to CS1 and, CS2, and CS3, the bedrock surface elevation decreases east of the warehouse before increasing towards Wildcat Creek. The groundwater flow in this section is toward Wildcat Creek.

4.2 Environmental Media Sampling

This section presents the analytical results for sampling conducted during the RI for soil, groundwater, and sediment. As discussed further below, the data for soil and groundwater are presented based on potential areas of concern developed using historical reports, historical data, and data collected during the RI.

4.2.1 Soil

This subsection presents the results of soil sampling activities, which were conducted during Phase I and Phase II of the RI. **Table 4-5** presents a summary of the compounds detected in soil above screening criteria. The sampling locations are shown in Figure 3-1. All soil analytical results are presented in **Appendix D,** Table D-1.

Soil sampling results for semi-volatile organic compounds (SVOCs) and metals are also provided in Table 4-5. The SVOC results show that only one location (RISB-49) had concentrations detected above SSLs, and no locations with concentrations detected above PRGs. Four metals (arsenic, chromium, nickel, and thallium) were detected above PRGs and SSLs at several locations in soil. No locations had detections of metals above both criteria.

The sample locations with VOC detections above either the industrial soil PRGs or SSLs with a dilution attenuation factor (DAF) of 20 are presented in **Figure 4-14** for surface soil and **Figure 4-15** for subsurface soil, with total organic concentrations (separated by class of VOC) shown for each of these locations. Three classes of VOCs and their typical degradation products were identified as having the highest concentrations in both soil and groundwater site wide:

- BTEX – Benzene, toluene, ethylbenzene, and toluene.

- Chlorinated ethenes and ethanes (CEE)– Chloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; cis-1,2-dichloroethene; 1,1,2,2-tetrachloroethane; tetrachloroethene; 1,1,1-trichloroethane; trichloroethene; 1,1,2-trichloroethane; and vinyl chloride.

- Chlorinated benzenes (CB)– Chlorobenzene; 1,2-dichlorobenzene; 1,3-dichlorobenzene; 1,4-dichlorobenzene; 1,2,3-trichlorobenzene; and 1,2,4-trichlorobenzene.

Although other compounds were detected on site, they were generally coupled with higher concentrations of compounds from one of the three identified classes. It is also anticipated that remedial alternatives will be focused on these three classes of compounds.

In addition to segregation of VOC results by class, soil results were grouped into four areas of concern based on observed concentrations and historical information about releases. These areas are shown on Figure 4-15 and summarized below:

- Soil Area #1 – Warehouse (Drum Storage and Management) Area. This area is located on the northern end of the warehouse and contains the former East Drum Storage, Drum Receiving, and Drum Packaging areas.

- Soil Area #2 - Incinerator /Drum Repackaging Area. This area contains both the southern end of the warehouse (Drum Repackaging and Fire area) and the former incinerator area southeast of the warehouse.

- Soil Area #3 – Solvent Ditch Area. This area contains the former solvent ditch area. This area is also located southeast of the former Blend Tanks Overflow area.

- Soil Area #4 – South Drum Storage Area. This area is the furthest southeast on the site and although this area does not include any previously identified SWMUs, it is adjacent to the former storm water pond and a former drum storage area.

The soil results for each VOC class and area of concern are discussed below.

4.2.1.1 Soil Area #1 - Warehouse (Drum Management and Storage) Area

Soil samples collected in this area include RISB-16, -20, -21, -30, -66 and RIMW-6 and -19. Additional locations near this area include RISB-9, -17, -31, -32, -38, and -67.

Surface soil (0-1 ft or 0-5 ft bls) samples had detections above criteria for CEE at RISB-16 and RIMW-6 in this area. These locations each had over 1 mg/kg total CEE, with cis-1,2-dichloroethene (DCE) being predominant at RIMW-6 (3.4 mg/kg) and tetrachloroethene at RISB-16 (2.8 mg/kg). Neither BTEX nor CB was detected in this area.

Subsurface soil samples had detections above screening criteria for CEE in 5 of 12 subsurface sampling locations. BTEX and CB were not detected above screening criteria in subsurface samples from this area. The highest concentrations of CEE (30.4 mg/kg) were detected at RIMW-6 from 4-6 feet bls.

4.2.1.2 Soil Area #2 - Incinerator / Drum Repackaging Area

Soil samples collected in this area include RISB-6, -11, -12, -13, -18, -19, -23, -26, -45, -46, -52, -61, -62, -63, -64, and -65 and RIMW-1. Additional locations near this area include RISB-7 and RISB-51.

Surface soil samples (0-1 and 0-5 ft bls) had detections above soil criteria for BTEX in four locations, for CEE in seven locations, and for CB in one location. The highest concentrations of CEE and BTEX were detected in RISB-64 (17 mg/kg) and RISB-65 (65 mg/kg), respectively. Both of these locations were in the drum storage area of the warehouse. The highest concentration of CB was detected in RISB-46 (32 mg/kg). CB were only detected in the incinerator area and not in the warehouse storage area.

Subsurface soil samples had detections above screening criteria for BTEX in four locations, for CEE in 12 locations, and for CB in one location. The highest concentrations were detected at RISB-64 for CEE (291 mg/kg), RISB-12 for BTEX (2,700 mg/kg), and at RISB-18 for CB (27 mg/kg). The BTEX and CB concentrations were detected at these levels from 1-5 feet bls, and CEE were detected at their highest levels in this area from 5-10 feet bls. BTEX and CEE were detected above screening levels at depths up to 20 feet bls. The estimated depth to groundwater in regolith is between 17 and 20 feet bls in this area. Site wide, the highest concentrations were detected in this area for all three VOC classes.

4.2.1.3 Soil Area #3 - Solvent Ditch Area

Soil samples collected in the Solvent Ditch area include RISB-28, 29, -50, -59, and RIMW-8. Additional locations near this area include RISB-27 and RIMW-5.

No concentrations were detected above soil criteria for surface soil samples (0-1 ft bls) collected from this area. Subsurface soil samples had detections above screening criteria for BTEX in one location and for CEE in five locations. CB were not detected above screening criteria in this area. The highest concentrations were detected at RISB-29 for BTEX (590 mg/kg) and RIMW-8 for CEE (6 mg/kg). CEE were detected above criteria at depths up to 20 feet bls (RIMW-5). The estimated depth to groundwater in RIMW-5 is approximately 20 feet bls.

4.2.1.4 Soil Area #4 - South Drum Storage Area

The South Drum Storage area includes soil locations RISB-2, -25, -47, and -57. Surrounding locations RISB-4, -24, -39, -48, and -58 are also being evaluated for this area.

In surface soils (0-1 feet bls), CEE was detected above soil criteria at RISB-2. The total CEE concentration at this location was 0.14 mg/kg. BTEX and CB were not detected above screening criteria in surface soil samples from this area.

Subsurface soil samples had detections above screening criteria for BTEX in one location and for CEE in four locations. CB were not detected above screening criteria in this area. The highest concentration observed for total CEE was 50 mg/kg at RISB-25 from 17-20 feet bls. BTEX was detected at RISB-2 (5.9 mg/kg) from 9-13 feet bls and was also detected from 17-21 feet bls at 4.2 mg/kg. The depth to groundwater is approximately 20-21 feet bls in this area.

4.2.2 Groundwater

Table 4-6 presents the compounds detected in groundwater above screening criteria during the RI. Groundwater sample (monitor well) locations are shown in Figure 3-1. All groundwater analytical results are presented in Appendix D**,** Table D-2.

Groundwater samples were collected for analysis of SVOCs and metals on select wells installed during Phase II (RIMW-1, RIMW-3 through RIMW-16, RIMW-18, RIMW-19, and RIPZ-3). These analyses were performed to validate whether or not the groundwater plume of concern is associated with VOCs only. Additional groundwater monitor wells were installed in Phase III based solely on VOC detections, and therefore only VOC analyses were performed on Phase III wells (RIMW-20 through RIMW-30). Groundwater sampling results for SVOCs and metals are provided in Table 4-6. The SVOC results show that only one location (RIMW-8) had detections of SVOCs at reportable concentrations.

VOC concentration contours in groundwater were estimated for the three VOC classes (BTEX, chlorinated ethenes/ethanes, and chlorinated benzenes) in both regolith/PWR and bedrock. These concentration contour maps are shown in **Figures 4-16** through **4-21.**

Based on information derived from the cross sections in Section 4-1 and the concentration contours, groundwater areas of concern were identified. These areas of concern are shown on **Figure 4-22** and include the following:

- GW Area #1 - Incinerator / Drum Repackaging Area – The incinerator area was chosen because this is the area in regolith (shallow) groundwater and soil with the highest concentrations of chlorinated benzenes (6.9 mg/L in MW-123A). This area also includes the southern end of the warehouse where soil concentrations of BTEX exceed 1,000 mg/kg and CEE soil concentrations are close to 300 mg/kg.

- GW Area #2 - Solvent Ditch Area – Groundwater in the solvent ditch area contains the highest concentrations of chlorinated ethenes in regolith, and the highest concentrations of all three VOC classes were detected in bedrock in this area. This area also appears to contribute high concentrations of VOCs to bedrock groundwater (refer to cross sections). This area extends into the North Drum Storage location because detected compounds in groundwater there are consistent with concentrations in the solvent area, possibly indicating one source or contiguous sources.

- GW Area #3 - Burn Pits – Although a removal action previously occurred in this area in 1983, groundwater concentrations in this area do not suggest that VOCs in this area are a result of migration from other areas.

- GW Area #4 - Fuel Oil Area – The fuel oil area remains an area of concern because free product is still present in this location.

The groundwater results for each VOC class and area of concern are discussed below. Please note that when reviewing the bedrock groundwater data, some bedrock wells installed during Phase III in September 2007 may not have been fully equilibrated when they were sampled. Bedrock wells RIMW-21, -23, -26, and -28 did not recharge adequately during development of the wells. In addition, when sampling these wells, they became dry before purging three well volumes.

4.2.2.1 GW Area #1 - Incinerator / Drum Repackaging Area

Shallow Horizon

The shallow wells that are in the Incinerator Area include RIMW-1, RIMW-3, RIMW-11, MW-123A, and OB-109. All wells except RIMW-11 and OB-109 had detections of benzene above MCLs but total BTEX did not exceed 150 ug/L for any well.

CEE concentrations were detected above MCLs for all wells in this area. RIMW-11 had over 680 ug/L of CEE, which consisted primarily of tetrachloroethene (PCE) and trichloroethane (TCA) degradation product dichloroethane (DCA). On the southeast side of the warehouse, RIMW-1 had 21,000 ug/L of CEE, which consisted mainly of trichloroethene (TCE), PCE, and DCE. Also on the southeast side of the warehouse, OB-109 had 68 ug/L of CEE, which consisted mainly of 1,2-DCE. On the north end of the drum repackaging area at RIMW-3, the total concentration of CEE was 14,000 ug/L and contained 13,000 ug/L of 1,2-DCA. Near the former incinerator, MW-123A had a total CEE concentration of 6,250 ug/L and contained 4,900 ug/L of 1,2-DCA and 1,100 ug/L of 1,2-DCE. PCE was not detected in this well, unlike the three up gradient wells.

None of the wells in the drum repackaging area (RIMW-1, RIMW-3, and RIMW-11) had concentrations of chlorinated benzenes exceeding MCLs. MW-123A had over 6,900 ug/L of CB, with concentrations over 1,000 ug/L for 1,2-dichlorobenzene, 1,4-dichlorobenzene, and chlorobenzene.

Bedrock Horizon

The bedrock wells in the Incinerator and Drum Repackaging Area include RIMW-18, OB-109B, and RIMW-28. MCLs were not exceeded for BTEX in any of these wells.

CEE concentrations exceeded MCLs for at least one constituent in all three wells. Total CEE in OB-109B was 347 ug/L and consisted mainly of PCE (210 ug/L). RIMW-18 has a total CEE concentration of 33.5 ug/L and consisted primarily of PCE. RIMW-28 had a total CEE concentration of 78 ug/L and contained mainly 1,2-DCA and 1,2-DCE.

4.2.2.2 GW Area #2 - Solvent Ditch Area

Shallow Horizon

The wells near this area that are screened in regolith are RIMW-4, -5, -6, -8, -16, OB-110A, OB-8A, P-1, and P-3. BTEX concentrations are highest on site in this area (with exception to the fuel oil area where free product is present), with total BTEX concentrations in the mg/L range for RIMW-8, OB-8A, and OB-110A. Benzene was also above MCLs for RIMW-4, -5, -6, and -16, but overall BTEX concentrations in these wells were below 0.1 mg/L. All BTEX compounds were below MCLs for P-1 and P-3.

CEE concentrations in the Solvent Ditch Area were higher than BTEX, and total CEE concentrations were above 1 mg/L for all wells. The highest concentrations of CEE were 53 mg/L and 89 mg/L at RIMW-5 and RIMW-8, respectively. CEE concentrations included parent compounds 1,1,1-TCA, PCE, and TCE in all wells, indicating that multiple parent compounds (PCE and 1,1,1-TCA) are present in this area.

Chlorinated benzene concentrations were detected in all of the wells in this area except RIMW-6. Chlorobenzene was the only chlorinated benzene detected above MCLs (in wells RIMW-4, RIMW-8, and OB-8A).

Bedrock Horizon

Bedrock wells in this area include RIMW-25 (located just south of the solvent ditch), OB-110B (also south of the solvent ditch), RIMW-19 (just north of the ditch), and

RIMW-22 (northeast of RIMW-19). The top of bedrock for these wells are 495 ft, 492 ft, 479 ft, and 412 ft for RIMW-25, OB-110B, RIMW-19, and RIMW-22, respectively. Although a cross section was not made for this specific area, top of bedrock elevations noted above indicate that there is a steep gradient in bedrock elevation from RIMW-25 to RIMW-22.

BTEX concentrations were detected 14 mg/L at RIMW-25, the highest concentrations in bedrock. However, BTEX were not detected above MCLs in the three other wells. CEE concentrations were also the highest on site in bedrock at RIMW-25 (11 mg/L). CEE were detected above MCLs in the other three wells as well. CB concentrations follow a similar trend with CB concentrations the highest on site in bedrock at RIMW-25 (2.3 mg/L). CB were not detected in the other three wells.

4.2.2.3 GW Area #3 - Burn Pits Area

Shallow Horizon

The shallow wells that are near the former Burn Pit Area include BP-1A, MW-103, and RIMW-24. TCE was detected above its MCL in BP-1A but no CEE compounds were detected above MCLs in upgradient well MW-103. RIMW-24 had concentrations of PCE, TCE, 1,2-DCE, and 1,1-DCE above MCLs, and in general, these concentrations were at least ten times higher than the concentrations in BP-1A.

Bedrock elevations shown in Cross Section CS1 (Figure 4-4) indicate that depth to bedrock rises sharply from RIMW-16 to BP-1A although the depth to bedrock in RIMW-24 (Figure 4-6) is similar to BP-1A. The concentrations detected in BP-1A appear to indicate that either a source exists in this area or that chlorinated ethenes have a preferential flow path in a cross gradient direction from RIMW-24 to BP-1A. Neither BTEX nor chlorinated benzenes were detected above MCLs in this area.

Bedrock Horizon

The bedrock wells near the Burn Pit Area include EW-3 (extraction well), BP-1B (screened in PWR and bedrock), and RIW-23. PCE, TCE, 1,2-DCE, and 1,2- DCA were detected above MCLs in EW-3 (Figure 4-5), and similarly 1,1-DCE, PCE, TCE, 1,2-DCE, and vinyl chloride (VC) were all detected above MCLs for adjacent well BP-1B. The concentrations in EW-3 and BP-1B detected are also similar in magnitude. No VOC concentrations exceeded MCLs in RIMW-23. Neither BTEX nor chlorinated benzenes were detected above MCLs in this area.

Downgradient of the burn pit area, similar CEEs (PCE, TCE, 1,2-DCE) were detected in bedrock well MW-121B across the creek. This is the only location where MCLs are exceeded across the creek as TCE was detected at 7.5 ug/L.

4.2.2.4 GW Area #4 - Fuel Oil Area

Shallow Horizon

The shallow monitor wells in the Free Product Area include MW-104, MW-118, MW-119, RIMW-27, RIPZ-3, OB-11, OB-12, OB-13, OB-21, OB-22, OB-23, OB-900, OB-901, OB-902, and P-2.

Product thickness data collected in January 2007 (shown in **Table 4-7)** indicate that the greatest thickness of oil product in the fuel oil area is around wells OB-12, -13, -22, and -900. These are also the areas with the highest concentrations of BTEX. BTEX concentrations do not appear to extend very far in the downgradient direction, as concentrations are orders of magnitude lower at MW-118, and are below MCLs at MW-119 and RIMW-27.

Concentrations in CEE are below MCLs in the area of highest fuel oil thickness. Significant degradation may be occurring at this location because of the abundance of electron donor (as BTEX). The closest bedrock well, RIMW-26, also is below MCLs for all CEE compounds, indicating that either the CEE observed in the upgradient wells is not “sinking” to the bedrock horizon, degradation is occurring at this well, or preferential flow paths do not transmit water from the fuel oil area to this well. MCLs are exceeded for CEE only in downgradient well RIMW-27. Chlorinated benzene concentrations are also below MCLs in regolith in this area.

Bedrock Horizon

Only RIMW-26 is screened in bedrock in the immediate vicinity of the fuel oil area. Concentrations of all VOCs were below MCLs in this well. RIMW-29, located southeast of the fuel oil area, contained 1,2-DCA, 1,2-DCE, PCE, TCE, and VC above MCLs.

4.2.3 Surface Soil Sampling across Wildcat Creek

The surface soil sampling locations in the undeveloped portion of the site across Wildcat Creek are shown in Figure 3-2. The only constituent detected above soil screening criteria was arsenic. This compound was detected in all ten locations at approximately the same concentration as that detected in background sample RI-BCK1. The highest arsenic concentration detected was 2.5 mg/kg at RISS-4, and the arsenic concentration at RI-BCK1 was 1.6 mg/kg.

4.2.4 Sediment Sampling

Sediment samples were collected as described in Section 3. Sediment sample detections above ESVs are shown in **Table 4-8**. Complete analytical results are provided in Appendix D, Table D-3.

4.2.4.1 Catch Basin / Water Collection Area Sampling

One catch basin was sampled on site at RICB-3. This location was upgradient of stormwater outflow No. 2, as shown in Figure 3-2. RICB-3 was sampled for VOC, SVOC, and metals analyses. Bis(2-ethylhexyl)phthalate and several metals were detected above ESVs at this location.

An additional sediment sample (RI-WASTE) was obtained from a water collection area within the warehouse building at the direction of SCDHEC. The sample was also analyzed for VOCs, SVOCs, and metals. Several SVOCs and metals were detected above ESVs at this location, as shown in Table 4-8.

4.2.4.2 Creek Sediment Sampling

Five sediment samples were collected along the two creeks that border the main area of the site, and one background sample was collected from each creek. The locations of each sample correspond to a stormwater outflow from the site, as shown in Figure 3-2. Some polycyclic aromatic hydrocarbons (PAHs) were detected above screening criteria at these locations. However, the highest observed concentrations of PAHs were detected in the background sample (RISD-WCBK) collected from Wildcat Creek. Three metals (copper, lead, and mercury) were also detected above ESVs at a few creek sediment locations. These metals were not detected in the background sampling locations above ESVs.

4.3 Hydraulic Analysis

This section presents the results of the hydraulic analysis conducted during Phase II of the RI. The objective of the hydraulic analysis of the aquifer was to provide engineering data to evaluate groundwater remediation technologies. To do this, the extraction system was turned off for two weeks so that the aquifer could return to static (non-pumping) equilibrium. Site-wide groundwater elevations were collected prior to and following the equilibration period.

Once post-equilibration groundwater levels were recorded, a series of aquifer tests were conducted at wells EW-2 and EW-3. Based on analysis of the potentiometric surface data and pumping data, information was derived to estimate extraction well capacities and aquifer transmissivity. Regolith and bedrock potentiometric surfaces were also prepared from the data.

4.3.1 Potentiometric Surface

As stated above, site-wide groundwater elevations were collected before and after aquifer equilibrium occurred. **Figures 4-23** and **4-24** show the potentiometric surfaces in regolith pre- and post-equilibrium, respectively. The groundwater elevations in Figure 4-23 indicate that pumping at EW-2 has an effect on regolith groundwater, but the large variations between MW-119/RIPZ-3 and MW-113A and MW-114 indicate that the system is not in equilibrium because of inconsistent pumping that preceded the data collection event.

Immediately prior to the equilibrium period, the extraction wells were operating intermittently, with the pumps running at a flow rate greater than the aquifer could supply. Therefore, the pumps would cavitate, with flow rates varying between 0 and 6 gpm. This caused the groundwater elevations in the aquifer to be in a constant state of flux. The pre-equilibration groundwater potentiometric surface maps were not evaluated in detail for these reasons. The September 2007 potentiometric surface maps (Figures 4-1 and 4-2) are used to describe groundwater flow patterns during pumping conditions.

Post-equilibrium groundwater maps are shown in **Figures 4-25** and **4-26**. In the regolith, it appears that equilibrium still had not been reached based on the variations in groundwater levels between MW-119/RIPZ-3 and MW-113A and MW-114. However, it is noteworthy that the hydraulic gradient is lower in this area than in the rest of the site, which may indicate an area of higher transmissivity. Post-equilibrium bedrock elevations show a similar pattern to regolith, with groundwater elevations relatively flat between MW-110B, MW-113B, and MW-120B.

4.3.2 Aquifer Performance Tests

Aquifer performance test (APT) results for EW-2 and EW-3 are shown in Tables 4-9 and 4-10, respectively. APT results are also included in **Appendix E.** The aquifer performance tests were performed as described in Section 3 and resulted in estimated aquifer transmissivities for different wells surrounding the extraction wells. The aquifer test data were analyzed according to the Theis method. Data curves were also prepared for qualitative comparisons to other type curves for leaky, delayed yield, and fractured rock aquifers. However, the magnitude of the “noise” in the water level data generally masked the transient effects of these aquifer variations, if such variations were present at all.

The well capacity test for EW-2 shown in **Figure 4-27** indicates a flow rate of about 3 gpm is sustainable. The APT at EW-2 was conducted at a flow rate of 2.7 gpm. EW-2 APT results indicate that EW-2 pumping has an influence on wells that are over 200 feet away, indicating that hydraulic conductivity in the area is moderately high. However, it appears that preferential flow paths are present because PWR well RIPZ-3 has an estimated transmissivity that is almost ten times higher than MW-118, which is located approximately between EW-2 and RIPZ-3. This indicates that although there is hydraulic communication between saprolite and PWR, they differ in transmissivity, and preferential pathways may be present in this area. The transmissivity observed at RIMW-14 also indicates that there is communication between PWR and bedrock in this area.

The well capacity test results for EW-3 presented in **Figure 4-28** indicate that a flow rate of about 3.5 gpm is sustainable. The APT at EW-3 was conducted at a flow rate of 3 gpm. EW-3 APT results yielded similar results to EW-2, except that two of the wells did not appear to have significant effects from the pump tests. One of these wells was RIMW-15, which is screened in bedrock, is lower than any other well in the test, and was over 200 feet away. The other well that did not respond to the test was MW-120B, located across the creek and approximately 300 feet away from EW-3.

These results indicate that pumping of EW-3 does not have a radius of influence over 225 feet. Pumping at EW-3 does appear to be influencing wells in the shallow zone that are within 100 feet. The data also indicate communication between regolith and bedrock in this area.

4.4 MPE Pilot Test

This section presents the results of two short term MPE pilot tests performed during Phase II activities by KEMRON Environmental Services, Inc. (KEMRON). The MPE tests are described in Section 3. One test was performed in a chlorinated VOC source area (solvent ditch area) and another was performed in the fuel oil source area as shown in Figure 3-6. KEMRON's full MPE report is provided as **Appendix F.**

4.4.1 Solvent Ditch Area

The results from the first pilot test indicate that MPE in this area may capture VOCs in the vadose zone within a 50-foot radius. Approximately 580 gallons of water were extracted during the 6-hour pilot test. However, less than 0.01 lb of VOCs were captured in the vapor phase during this time.

4.4.2 Fuel Oil Area

The results from this pilot study indicated that MPE in this area would have a radius of influence of 50-75 feet from the extraction well in the vadose zone. Approximately 900 gallons of water were extracted during the eight hour test. Additionally, the VOC extraction rate from the vapor was approximately 3.8 lbs/day at the higher induced vacuum pressure.

4.5 Biochemical and Geochemical Data

Biogeochemical and geochemical data were collected during Phase II activities to support the evaluation of remedial alternatives during the FS. The results from the biochemical and geochemical data analysis are presented in **Table 4-11.**

The biochemical and geochemical data collected indicate that methane reducing conditions exist on the site in regolith in the Incinerator (MW-123A), Solvent Ditch (OB-110A), and Fuel Oil (OB-11) Areas.

Wells in all other areas, including bedrock wells in the Incinerator, Solvent Ditch, and Fuel Oil Areas, did not appear to be methane reducing.

4.6 Monitor Well Inventory

The results of the well inventorying task are shown on Table 4-4. This table includes well construction details, free product information, and groundwater levels from September 2007. The table also identifies whether certain parameter classes (e.g., VOCs) were historically detected in each well. Some of the well construction data could not be verified because documentation could not be found and/or conflicting data existed between two different sets of records. Some of the data presented in the table cannot be verified without additional field verification, such as using a downhole camera.

The wells in Table 4-4 are shown to be in one of three geologic zones: regolith, PWR, and bedrock. As previously mentioned, the regolith and PWR zones are believed to be within the same hydrogeologic zone (i.e., in full hydraulic connection), and these two zones are referred to collectively as the shallow zone.

Some wells were reclassified during this task based on information found in available boring logs, geophysical logs, and/or well construction details. For example, MW-113B and MW-115B were reclassified from bedrock wells to PWR-Bedrock (or transition) wells. MW-113B includes saprolite, fractures, and one weathered rock layer to a depth of about 42 feet based on its geophysical log. The boring log contains insufficient detail to otherwise make a determination. The well sand pack is from 30.5 feet to 48 feet, placing it apparently in the PWR. Similarly, drilling for MW-115B encountered dense gabbro at a depth of about 29 feet based on the geophysical log and 32 feet based on the drilling notes. The boring log contains insufficient detail to otherwise make a determination. The well sand pack is from 19 feet to 34 feet, placing it apparently in the PWR.

4.7 Data Validation and Quality Control Summary

As part of the RI, CDM performed data validation on the data received from Analytical Services, Inc. The validation activities were conducted in accordance with the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review (October 1999) (organic guidelines) and USEPA CLP National Functional Guidelines for Inorganic Data Review (July 2002) (inorganic guidelines), and any applicable specific analytical method guidelines.

As required by the Quality Assurance Project Plan (CDM, December 2006), 90% of the data were evaluated (Level III) and one of the CLP data packages (approximately 10% of the data) was validated (Level IV) following the organic guidelines.

4.7.1 Data Usability Summary

As a result of the data evaluation performed by CDM on the analytical data, some results were qualified as estimated "J" or "UJ", or rejected "R" because of one or more field or laboratory quality control (QC) outliers. The qualified data should be considered estimated and used with caution. The rejected data are not usable for project objectives. However, these data represent a very small population of the total data set, and all other RI analytical data are considered usable.

The data presented in Tables 4-5, 4-6, 4-8, and Appendix D are as reported by the laboratory. The qualifiers to be applied to these data based on the data validation are summarized below. Rejected data were not carried forward into the risk assessment.

4.7.2 Evaluation Procedure

The following quality control items were evaluated according to the applicable organic and inorganic guidelines to determine the quality of analytical data provided during the investigation. The non-CLP laboratory data packages were summary only (Level III), so not all quality control items could be evaluated for those data packages. The items evaluated include:

- Holding times
- Method detection limits
- Laboratory blanks
- Laboratory control samples
- Matrix spikes/matrix spike duplicates
- Inductively Coupled Plasma (ICP) Serial Dilution
- Laboratory duplicates/precision
- Surrogate recoveries
- Calibrations (organic only)
- Preservation criteria
- Internal standards
- ICP Interference Check Samples

In addition to the above items, CDM also evaluated the results of field duplicate samples, trip blanks, and equipment blanks. The individual data evaluation reports are included in **Appendix G**. The qualified Form I's are included on the enclosed CD-ROM.

4.7.3 Data Quality Indicators

The items identified for evaluation were grouped in terms of the quantitative data quality indicators (DQIs). These include precision, accuracy, completeness, and sensitivity. In addition, qualitative DQIs including representativeness and comparability were also evaluated, as summarized below.

4.7.3.1 Precision

The precision of a measurement is an expression of mutual agreement among individual measurements taken under prescribed similar conditions. Precision is quantitative and most often expressed in terms of relative percent difference (RPD). Precision of reported results is a function of inherent field-related variability plus laboratory analytical variability. The acceptable RPD limit for water field duplicates for this project is less than 20% and less than 30% for soil samples.

Field Duplicate Precision

Field duplicate samples were collected to provide a measure of the contribution to overall variability of field-related sources. During the RI, 22 field duplicate samples were collected:

Duplicate	Parent Sample
Groundwater Samples	
MW-1175	MW-117
RIMW-54	RIMW-4
RIMW-55	RIMW-5
RIMW-58	RIMW-8

RIMW-59	RIMW-9
RIMW-515	RIMW-15
DUP-01	RIMW-25
DUP-02	RIMW-27
RIPZ-53	RIPZ-3
Soil Samples	
RIMW-51:12-14	RIMW-1 (12-14 ft)
RIMW-58:10-12	RIMW-8 (10-12 ft)
RISB-92	RISB-2 (0-1 ft)
RISB913	RISB-13 (5-9 ft)
RISB914	RISB-14 (5-9 ft)
RISB-533	RISB-33 (17-20 ft)
RISB935	RISB-35 (5-9 ft)
RISB-946	RISB-46 (0-1 ft)
RISB-951	RISB-51 (9-13 ft)
RISB-559:12-14	RISB-59 (12-14 ft)
RISB-562:12-14	RISB-62 (12-14 ft)
RISS-510	RISS-10 (0-1 ft)
Sediment Samples	
RISD-54	RISD-4

According to the guidelines, the field duplicate criteria between the sample pair results for water samples is a RPD < 20, and for soil samples < 35. If the parent sample or duplicate sample result is less than 5 times the Contract Required Quantitation Limit (CRQL) for waters and less than 2 times the CRQL for soils, than the control limit becomes the absolute difference of the CRQL. If the difference between the parent sample and the duplicate sample results is less than the CRQL (waters) or less than 2 times the CRQL (soils), then no qualifications are required. An RPD is not calculated if one sample result for either the duplicate or the parent sample is non-detect. **Table 4-12** shows the RPDs outside of appropriate control limits.

Laboratory Duplicate Precision
Contribution of laboratory-related sources to overall variability was measured by calculating the RPD between matrix spike and matrix spike duplicate (MS/MSD) results, laboratory duplicate results, and laboratory control sample and laboratory control sample duplicate (LCS/LCSD) results, where available.

Table 4-13 contains a summary of laboratory precision outliers. All samples of similar matrix were qualified estimated "J" or "UJ" based on laboratory precision results. Individual qualified sample results are on the enclosed CD-ROM.

4.7.3.2 Accuracy

Accuracy is defined as the degree of agreement between a measurement and an accepted reference or true value and is a measure of bias in a system. Use of the specified analytical methods, evaluation of blank contamination, verification of acceptable instrument calibration, and adherence to the required sample holding times and chain-of-custody procedures also help ensure the accuracy of the resultant data.

Each analytical data package included either the original signed and executed chain-of-custody forms or a copy, indicating that custody of the samples was maintained as required from sample collection to receipt at the laboratory and during sample analysis.

4.7.3.2.1 Evaluation of Blanks

Trip Blanks

Trip blanks were prepared by the laboratory, transported to the field with the VOC sample containers, and returned to the laboratory with the VOC samples for analysis. Analysis of trip blanks is performed to assess whether cross-over contamination is occurring between samples during handling and transport. Detected concentrations of toluene, acetone, methylene chloride, 1,2-dichoroethane, trichloroethene, and vinyl chloride were present in some of the trip blanks. Sample results were qualified when the sample result was less than 5 times the value detected in the trip blank. **Table 4-14** summarizes the sample result qualified on the basis of a trip blank.

Trip blanks were not included with samples in SDG 229401, SDG 237552, SDG 238041, SDG 238119, SDG 238907, and SDG 239396.

Method, Calibration, and Equipment Blanks

Analysis of method blanks ensures that no carryover of contaminants between samples exists because of residual contamination on the instrument or from contaminants introduced in the laboratory. At least one method blank was prepared and analyzed with each batch of samples analyzed using each analytical method.

Several metals and VOCs were detected in the method blanks. Analyses were all method compliant in that target analytes were not detected in the method blanks or calibration blanks at levels greater than the reporting limits. Sample results were qualified when the sample result was less than 5 times the value detected in the blank.

The highest concentration detected in an applicable blank is used to determine this reportable concentration. This practice decreases the possibility of false positives, particularly at levels near the reporting limits. Calibration blanks for inorganic analyses were not provided with the data packages and hence were not evaluated. Equipment rinsate blank results were all non-detect.

Table 4-15 summarizes the qualifiers applied on the basis of laboratory blanks.

4.7.3.2.2 Laboratory Control Sample, Matrix Spike/Matrix Spike Duplicate, and Surrogate Recoveries

LCSs and MSs were prepared and analyzed with all applicable methods. System monitoring compounds, or surrogates, were also added to the organic analyses. Recoveries of these QC samples are discussed below.

Accuracy is quantitative and usually expressed as the percent recovery (%R) of a sample result. Acceptable QC limits are 80 to 120 percent for LCS recoveries and 75 to 125 percent for MS/MSD analyses for the inorganic methods. Organic method acceptable ranges are laboratory-defined based on past statistics maintained to document method performance.

Laboratory Control Sample Recoveries

LCSs were prepared for all sample analyses to evaluate the ability of the analytical process to recover a known concentration of an analyte. All LCS recoveries were within QC limits.

Matrix Spike/ Matrix Spike Duplicate Recoveries

MS and, for specific methods, MSDs were prepared for all applicable sample analyses to evaluate matrix interference effects. **Table 4-16** summarizes the MS/MSD outliers. Results listed in this table required qualification as estimated "J" or "UJ" as a result of recoveries outside the QC criteria. Undetected results were not qualified when MS/MSD recoveries were above the QC limit.

Organic analyses guidelines do not qualify sample results based on matrix spike recoveries. Some of the organic matrix spike recoveries were outside of appropriate criteria but no qualification is required.

For the inorganic analyses, qualifiers are applied to the appropriate associated samples for matrix spike recoveries that are outside of appropriate criteria. Qualifiers are not added when the sample concentration is greater than 4 times the matrix spike concentration. Table 4-16 identifies the SDG and the affected analytes. Specific qualified samples are identified on the evaluation reports in Appendix G.

Surrogate Recoveries

Surrogate recoveries met accuracy criteria for all samples except for those listed in **Table 4-17**. Qualified sample results are included in Appendix G and on the enclosed CD-ROM.

The non-detect results for analytes associated with the surrogate tetrachloro-m-xylene in sample RISB-946 were rejected "R" and are not usable. The positive detected results were estimated "J" and are usable.

4.7.3.2.3 Internal Standard Areas and Retention Times

Retention times and recoveries for the internal standards for SDG 249441 were within the acceptance limits. No internal standard information was provided with the other data packages for review.

4.7.3.2.4 Instrument Calibration

Calibration criteria are method-defined. The laboratory followed the prescribed calibration techniques. Relative Response Factor (RRF) and Relative Standard Deviation or Percent Difference (%D) criteria were met for VOC and SVOC sample analyses except for those listed in **Table 4-18**. Qualified associated sample results are identified in Appendix G and on the enclosed CD-ROM. Calibration information was not provided for inorganic analyses; thus, no evaluation was performed. Specific calibration qualification details are included in Appendix G.

Some of the non-detect sample results for methyl acetate, bromomethane, and chloroethane were rejected "R" due to initial and continuing calibration. These results are not usable for project goals.

4.7.3.2.5 Inductively Coupled Plasma Serial Dilution

An ICP serial dilution is to be performed for each batch of metal samples analyzed. The method limit of 10 percent difference between the sample and the serial dilution is defined as acceptable. This criterion is only applied to analytes greater than 50 times the instrument detection limit (IDL). All serial dilutions met required criteria for SDG 239401. No other serial dilution information was provided for the other data packages.

4.7.3.3 Completeness

Completeness is a measure of the amount of usable data that are obtained compared to the amount that was expected to be obtained during project planning. Evaluating the precision and accuracy parameters (above) assessed the usability of the data. Those data that were evaluated and needed no qualification, or were qualified as estimated "J" or "UJ," are considered usable. Rejected data are not considered usable. The rejected non-detect results for methyl acetate, bromomethane, chloroethane, and the associated PCB sample results for RISB-946 are considered not usable. All other data are considered usable for its intended purposes.

4.7.3.4 Sensitivity

Sensitivity is related to the ability to compare analytical results with project-specific levels of interest, such as cleanup levels or action levels. Analytical practical quantitation limits (PQLs) for the various sample analytes should be below the level of interest to allow an effective comparison. Required method detection limits are presented in the QAPP. The laboratory met the required sensitivity levels.

4.7.3.5 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent: (1) a characteristic of a population, (2) parameter variations at a sampling point, and/or (3) an environmental condition. Representativeness is a qualitative parameter that addresses the proper design of the sampling plan and the absence of cross contamination. Good representativeness was achieved through:

- Careful, informed selection of sampling sites
- Selection of analytical parameters and methods that adequately define and characterize the extent of possible contamination and provide the required sensitivity
- Proper gathering and handling of samples to avoid interference and prevent contamination and loss
- Collection of a sufficient number of samples to allow representative characterization of the site

Representativeness is a consideration that was employed during data collection design, and the data that were collected during the field investigation are believed to be representative of actual field conditions. All data collected except for the rejected results are considered representative of the actual field conditions at the time of collection.

4.7.4 Conclusion

In the course of data review, some “J” and “UJ” qualifiers were added to the results, indicating these data are estimated and should be used with caution. A small fraction of results was also rejected (“R”) and is not usable for project objectives.

Appendix G presents the individual data evaluation reports. Qualified Form I’s are included on the enclosed CD-ROM. Overall, the majority of the data were determined to be of acceptable quality for determining that data quality objectives (DQOs) were met and are representative of environmental conditions at the time of collection. The additional qualifiers added and the inability to use the rejected data are not expected to affect the evaluation of the nature and extent of contamination, the risk assessment, or the evaluation of remedial alternatives in the feasibility study.

Section 5
Human Health Risk Assessment

5.1 Introduction

This section presents the human health risk assessment (HHRA) for the PSC site. The assessment is based on concentrations of contaminants detected in soil and groundwater at the site, exposure assumptions, and toxicity information, which together are used to characterize risks to human receptors. Risks are estimated based on existing (baseline) conditions in the absence of any further remedial action or institutional controls.

The objective of the HHRA is to assess potential current and foreseeable future risks associated with exposures to potential human receptors including workers, residents, trespassers, and recreational receptors at the site. Specifically, the objectives of the HHRA are to:

- Identify chemicals of potential concern (COPCs).
- Identify human receptors of concern.
- Evaluate all potentially complete exposure pathways.
- Determine the extent and likelihood of actual or potential risks/hazards to human health.
- Describe the uncertainty associated with the risk and hazard estimates.
- Help determine chemicals of concern (COCs) and whether additional response actions are necessary.

Exposures to soils and groundwater were evaluated quantitatively for relevant receptors. This HHRA estimates cancer and noncancer risks for all potentially complete exposure pathways. This HHRA is consistent with EPA's Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A) (RAGS, EPA 1989) and is organized as follows:

- Section 5.2 - Data Summary;
- Section 5.3 - Selection of COPCs;
- Section 5.4 - Exposure Assessment;
- Section 5.5 - Toxicity Assessment;
- Section 5.6 - Risk Characterization;
- Section 5.7 – Uncertainty Assessment; and

- Section 5.8 – Summary and Conclusions.

5.2 Data Summary

Phase I, Phase II, and Phase III investigations included collection and analysis of samples from surface soil, subsurface soil, and groundwater. A small number of sediment samples were also collected but because of generally low detections, they were not used in the risk assessment. Details of the investigations and sample analyses are summarized and discussed in Sections 3 and 4. A summary of data used in this risk assessment is discussed below.

5.2.1 Surface Soil

Surface soil samples were collected at 71 locations (RISB-1 through -52, RISB-56 through -59 and RISB-61 through -67, RIMW-1, -5 through 8, -13, -19, and RIPZ-3) from varying depth intervals. For purposes of this characterization, all samples with a sampling depth beginning at ground surface (zero inches) to one foot below ground surface (bgs) were included in the surface soil data set. In general, each of the surface samples was sent to Analytical Services Inc. (ASI) for analysis of EPA's Target Compound List (TCL) of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), and EPA's Target Analyte List (TAL) for metals. Two offsite locations (RI-BCK1 and RI-BCK2) were used as background samples and analyzed for TCL VOCs, SVOCs, and TAL metals. Three duplicate samples were collected from surface soil locations RISB-2, RISB-46, and RISS-10. Where duplicate samples were collected, the average concentration of the parent and duplicate sample was used as a representative concentration for that location.

Surface soil data are divided into two data sets to address current and future land uses. The dataset for assessing current land-use scenarios does not include sample locations RISB-11 through RISB-17, RISB-20, RISB-21, RISB-45, RISB-62 and RISB-64 through RISB-67. These locations are currently under a concrete foundation, precluding exposure. The dataset for assessing future land-use scenarios includes all surface soil samples, assuming the concrete foundation might not be maintained or could be removed in the future. Sampling locations are shown on Figures 3-1 through 3-4.

5.2.2 Subsurface Soil

Subsurface soil samples at 71 locations (RISB-1 through -52, RISB-56 through -59 and RISB-61 through -67, RIMW-1, -5 through 8, -13, -19, and RIPZ-3) were collected from varying depth intervals (one foot through a maximum depth of 27 feet bgs). Any sample with a beginning depth greater than one foot bgs was considered subsurface soil. However, samples collected from locations RISB- RISB-64, RISB-65, RISB-66, and RISB-67 were collected from zero to five feet bgs and were classified as subsurface soil. In general, each of the subsurface samples was sent to ASI for analysis of TCL VOCs, SVOCs, and TAL Metals. Some samples were also analyzed for PCBs. Two offsite locations (RI-BCK1 and RI-BCK2) were used as background samples and analyzed for TCL VOCs, SVOCs, and TAL Metals. Nine duplicate samples were collected from subsurface soil locations RISB-13, RISB-14, RISB-33, RISB-35, RISB-51, RISB-59, RISB-62, RIMW-1, and RIMW-8. Where duplicate samples were collected, the average concentration of the parent and duplicate sample was used as a representative concentration for that location.

Surface soil and subsurface soil datasets are combined into one current/future dataset for evaluating risks to excavation workers who may come into contact with soil both at the surface and subsurface regardless of the presence of a concrete foundation. If construction work were to take place either currently or in the future, the foundation would be removed, exposing the construction worker to all soil. In addition, the current/future surface and subsurface dataset was used for the future resident scenario. If homes were to be erected, subsurface soil could be brought to the surface. The list of the surface and subsurface soil samples used in the risk assessment is provided in Appendix D tables, and sampling locations are shown on Figures 3-1 through 3-4.

Surface soil and subsurface soil datasets are combined and collectively referred to as “subsurface soil” for the remainder of the document for construction workers and residents who may come into contact with soil both at the surface and at depth.

5.2.3 Groundwater

The groundwater data set consists of analytical results from samples from 60 monitoring wells, including temporary wells. These wells are classified by various hydrologic units (i.e., saprolite, partially weathered rock (PWR), or bedrock) and are shown on Figure 3-1. All samples were analyzed for VOCs. Additional analyses of SVOCs and metals were also performed on a subset of these wells. Eight duplicate samples were collected from monitoring wells RIMW-4, RIMW-5, RIMW-8, RIMW-9, RIMW-15, RIMW-27, MW-117, and RIPZ-3. Where duplicate samples were collected, the average concentration of the parent and duplicate sample was used as a representative concentration for that location.

For the evaluation of potable water, data from all hydrologic units were used. However, for the vapor intrusion evaluation, groundwater data collected from “bedrock” wells were excluded. This dataset is referred to as “shallow groundwater” for the remainder of the characterization. It should be noted that three wells (BP-1B, MW-116, and PW-2A) were screened in both PWR and bedrock and therefore, the data from these wells were included in the both the potable water evaluation and the vapor intrusion evaluation.

Data excluded from the risk assessment includes samples associated with packer tests at RIMW-18 and RIMW-19. In addition, a sample collected from OB-13 was also excluded because it contained predominantly product and was analyzed on a per weight basis.

The list of the groundwater samples used in the risk assessment is provided in Appendix D tables. Well locations are shown in Figures 3-1, 3-4, and 3-5.

5.2.4 Quality Control

All data were subjected to the data validation process, as previously discussed in Section 4.7. Considering laboratory and field QA/QC, data employed in the risk characterization are considered of sufficient quality to support quantitative risk characterization.

5.3 Selection of COPCs

Tables presented in **Appendix H-1** summarize analytical data by medium and identify COPCs for the risk assessment. The range of detected concentrations, detection frequency, and the range of reporting limits presented in these tables were evaluated using sitewide datasets. These datasets are identified as current surface soil, future surface soil, subsurface soil, shallow (excluding bedrock) groundwater, and all groundwater data, as described above in Section 5.2.3.

Maximum detected concentrations of chemicals were compared, by medium, to risk-based screening levels to identify COPCs for each medium. Screening levels were taken from EPA Region 9 PRGs for residential soil and tap water (EPA 2004b), using a target cancer risk of 10^{-6} (one in one million) and a target hazard quotient of 0.1. Chemicals were considered COPCs if their maximum detected concentration exceeded their respective screening levels. It should be noted that while Region IV EPA recommends the use of industrial PRGs for subsurface soil screening, residential PRGs were used based on the conservative assumption the property could be redeveloped for future residential use.

Risk-based screening levels were not available for the following chemicals: calcium, lead (groundwater only), magnesium, potassium, sodium, 2-chloronaphthalene, 2-methylnaphthalene, 2-nitrophenol, 3+4-methylphenol (soil only), 4-bromophenyl phenyl ether, 4 chlorophenyl phenyl ether, 4-nitrophenol, acenaphthylene, acetophenone, benzo(g,h,i)perylene, bis(2-chloroethoxy)methane, di-n-butylphthalate, p-chloro-m-cresol, phenanthrene, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,2,3-trichlorobenzene, 2-hexanone, bromochloromethane, cis-1,3-dichloropropene, and trans-1,3-dichloropropene.

Calcium, magnesium, potassium, and sodium are essential metals and were not selected as COPCs. Di-n-butylphthalate and 1,1,2-trichloro-1,2,2-trifluoroethane were not selected as COPCs because no toxicity information is available for assessment.

Local ambient levels (background) of inorganic constituents were also considered in the selection of COPCs. Per Region IV guidance, twice the average background results were used to screen metals. Two background samples were available for this analysis (RI-BCK1 and RI-BCK2), and twice the average detected concentrations are presented in the COPC selection tables.

5.3.1 Exposure Units

To address potential soils exposures, a hot spot analysis was conducted and the site was divided into the following exposure units (EUs):

Current Surface Soil (0 to 1 ft bgs):

- All soil, excluding samples collected beneath structures and hot spots;
- Hot Spot 1 (sampling locations RISB-6, RISB-19, RISB-26 and RISB-46); and
- Hot Spot 2 (sampling location RIMW-6).

Future Surface Soil (0 to 1 ft bgs)

- All soil, excluding samples collected from hot spots;
- Hot Spot 1 (sampling locations RISB-6, RISB-19, RISB-26 and RISB-46);
- Hot Spot 2 (sampling location RIMW-6); and
- Hot Spot 3 (sampling location RISB-16).

It should be noted that Hot Spot 3 was only evaluated as a future exposure unit, as it is currently under a structure.

Subsurface Soil

- All soil, excluding samples collected from hot spots;
- Hot Spot RIMW-6;
- Hot Spot RISB-12;
- Hot Spot RISB-18;
- Hot Spot RISB-25; and
- Hot Spot RISB-64.

The results of the hot spot evaluation are presented in **Table 5-1**.

Groundwater

- Sitewide shallow groundwater; and
- Sitewide all groundwater.

5.4 Exposure Assessment

Exposure assessment involves the selection of receptor populations, exposure pathways for quantitative evaluation, and exposure point concentrations for selected COPCs for all relevant media. The methods and assumptions used to calculate exposure intake values for use in quantifying cancer risk and noncancer hazard are presented here. Environmental media that were addressed in exposure and risk/hazard calculations include surface soils (0 to 1 foot below ground surface or bgs), subsurface soils (all soil below ground surface), and groundwater. A site conceptual exposure model is presented in **Figure 5-1** and is summarized below.

5.4.1 Receptors

The following receptors and corresponding exposure pathways are relevant to the risk assessment and were addressed in either a quantitative or qualitative manner.

Known and Potential Current Receptors

O&M Worker – The O&M worker is an individual that currently operates and maintains the groundwater treatment system on the PSC site. His/her work involves running the treatment system from inside a building, administrative work from an office inside the building, and site maintenance outdoors (e.g., mowing the grass). The O&M worker is on site 3 days per week, 8 hours per day, and may be exposed to constituents in the surface soil through volatilization, fugitive dust generation, ingestion, and dermal contact. He/she may inhale constituents from volatilization of chemicals in groundwater to indoor air. It is assumed that he/she will not be exposed, via direct contact, to soils contained underneath the current concrete foundation of the existing buildings, or subsurface soils elsewhere on the site.

Trespasser – The trespasser is a hypothetical adolescent individual who could obtain access to the site without permission. This individual would be unsupervised and unaware of the potential exposure pathways of chemicals in the surface soil and groundwater. The trespasser may be on the site at anytime, but most likely not for long periods of time, and is assumed to trespass only in outside areas at the site with no potential for indoor exposure. The trespasser may potentially be exposed to constituents in the surface soil through volatilization, inhalation of fugitive dust, incidental ingestion, and dermal contact. It is assumed that he/she will not be exposed to soils, via direct contact, contained underneath the current concrete foundation of the existing buildings, or subsurface soils anywhere on the site. It is also assumed that since the current buildings on the site are either open air (i.e., no doors, no walls) or secured by an alarm, a trespasser will not be exposed to volatilization of chemicals in soil and groundwater to indoor air.

Potential Future Receptors

Potential Future Excavation Worker – Excavation workers are individuals who may be involved in the razing of buildings on the site and excavation or moving of surface and subsurface soil. Potential exposures associated with excavating soil on this site include the inhalation of chemicals through volatilization and fugitive dust generation, and the incidental ingestion of and dermal contact with both surface and subsurface soils on the property. While working in a trench, a construction worker may also be exposed to constituents in groundwater that volatilize into ambient air.

Potential Future Industrial Worker – Industrial workers are individuals who may be working in a manufacturing or industrial facility, both indoors and out, on the site. He/she may inhale chemicals through volatilization and fugitive dust generation, and incidentally ingest and have dermal contact with soils on the property. Soil exposure may be to soils that are currently at the surface or with soils that are currently at the subsurface but may be brought to the surface during construction if a new facility is built on the site. The industrial worker may also inhale constituents from volatilization of chemicals in groundwater that migrate into indoor air. It is assumed that the industrial facility operating on the site may be using groundwater for drinking and hand washing.

Potential Future Recreational User – Recreational users are individuals who may perform activities such as baseball, walking or hiking, and picnicking. Potential exposures associated with performing recreational activities on this site include the inhalation of chemicals through volatilization and fugitive dust generation, and the ingestion of and dermal contact with surface soils on the property. Even if there is some type of clubhouse or restroom facilities on the property, exposure to constituents in groundwater through either ingestion of drinking water and via dermal absorption while washing hands or the inhalation of constituents from volatilization of chemicals in groundwater to indoor air would be insignificant based on low exposure potential. In addition, it is assumed that he/she will not be exposed to subsurface soils on the site.

Potential Future Trespasser - The trespasser is an adolescent individual who obtains access to site without permission. This individual would be unsupervised and unaware of the potential exposure pathways of chemicals in the surface soil and groundwater. He may inhale chemicals through volatilization and fugitive dust generation, and ingest and have dermal contact with surface soils on the property. It is assumed that the trespasser will not be able to access future buildings on the site and therefore, will not be exposed to volatilization of chemicals in soil and groundwater to indoor air. It is also assumed that a trespasser will not be exposed to subsurface soils anywhere on the site.

Potential Future Residents – Potential future residential receptors are assumed to have their primary place of residence on the site. Potential exposures associated with living on this site include the inhalation of contaminants through volatilization, incidental ingestion of and dermal contact with soils, and inhalation of fugitive dust generated from soils on the property. Soil exposure may be to soils that are currently at the surface or with soils that are currently at the subsurface that may be brought to the surface during construction of a new home with a basement.

In the event that residential receptors use groundwater at the site, they have potential to ingest groundwater contaminants through drinking water and experience dermal contact through hand washing. Other potential exposures include both dermal contact and inhalation of volatile groundwater contaminants while showering (relating to dermal absorption and inhalation of volatiles in shower air, but assessed as being equivalent to ingestion of 2 L of water per day, consistent with EPA Region 4 guidance (EPA 2000)).

5.4.2 Exposure Scenarios

Appendix H-2 summarizes the exposure factors used in exposure intake and risk/hazard calculations for each of the receptors at the site. Each exposure scenario is discussed below.

5.4.2.1 Current O&M Worker Exposure Assumptions

The current O&M workers at the site are assumed to be exposed to surface soil via incidental ingestion, dermal contact, inhalation of soil vapor and inhalation of fugitive dust, and to groundwater via inhalation of vapors in indoor air.

An incidental ingestion rate for soil for an O&M worker is assumed to be 50 mg/day (EPA 1997a). For dermal contact with soil, the O&M worker is assumed to wear a short-sleeved shirt, pants, and shoes; therefore, the exposed skin surface is limited to the face, forearms and hands. The exposed skin surface area for an O&M worker is 3,300 cm^2, the average of the 50th percentile for adult males and females (EPA 2002). A dermal adherence factor of 0.2 mg/cm^2 per event was assumed for the O&M worker (EPA 2004a).

An inhalation rate of soil vapors of 1 m^3/hour was assumed for the O&M worker (EPA 1997a). O&M workers are assumed to be exposed to soil at the PSC site for 250 days/year over 25 years (EPA 2002).

A life expectancy of 25,550 days (70 years) (EPA 1989) was used for outdoor workers as the averaging time for exposure to carcinogenic contaminants. The averaging time for noncarcinogenic effects is equal to the exposure duration, or 9,125 days (25 years) for this scenario. A body weight of 70 kg for adults was used (EPA 1991, 2002) based on the mean 50th percentile body weight for the age group.

5.4.2.2 Trespasser/Recreational Visitor Exposure Assumptions

Current and future trespassers and future recreational visitors at the site are assumed to be exposed to surface soil during recreational activities, such as playing, via incidental ingestion, dermal contact, and inhalation of soil dust and vapors.

A teen/adolescent (ages 6 to 18 years old) was evaluated for both carcinogenic and noncarcinogenic hazards. For the assessment of soil for teen/adolescent recreational visitors/trespassers, an incidental ingestion rate for soil was assumed to be 100 mg/day (EPA 1997a). For dermal contact with soil, the teen/adolescent recreational visitors/trespasser was assumed to wear a short-sleeved shirt and shorts; therefore, the exposed skin surface is limited to the face, forearms, hands, lower legs and feet. The exposed skin surface area for children is 7,605 square centimeters (cm^2), (mean surface area for children 6-16 (head, arms, hands, legs); (EPA 1997a). A dermal adherence factor of 0.2 mg/cm^2 per event was also employed (EPA 2004a).

Teen/adolescent recreational visitors/trespassers were assumed to be exposed for 144 days per year. One hundred and forty-four days is the equivalent of about 12 days per month , year round (Professional Judgment). Exposure is expected to occur over 12 years (Professional Judgment). The averaging time for noncarcinogenic effects is equal to the exposure duration, 4,380 days. A body weight of 42 kg was employed (EPA 2007a).

For the assessment of cancer risks, a 12 year exposure scenario was employed. Mutagenic compounds, such as 1,2-DCA, were assessed following the approach in EPA's *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* (EPA, 2005a). The default risk approach was modified for mutagenic compounds to incorporate differential risk of early lifestage exposure.

5.4.2.3 Future Excavation Worker Exposure Assumptions

Future excavation workers are assumed to be exposed to surface and subsurface soils for the duration of a single project involving excavation. If multiple non-concurrent construction projects are anticipated, different workers are assumed to be employed for each project. Activities for this receptor typically involve substantial, though short-term, exposures to soils via incidental ingestion, dermal contact, inhalation of fugitive dust and vapors, and the inhalation of vapors from shallow groundwater to the ambient air.

A soil incidental ingestion rate for a construction worker is assumed to be 330 mg/day (EPA 2002), appropriate for short-term but intense contact with soil. For dermal contact with soil, construction workers are assumed to wear a short-sleeved shirts, pants, and shoes; therefore, the exposed skin surface is limited to the head, hands and forearms. The exposed skin surface area for construction workers is 3,300 cm^2, the average of the 50^{th} percentile for adult males and females (EPA 2002). A dermal adherence factor of 0.2 mg/cm^2 per event was assumed (EPA 2004a).

An inhalation rate of 20 m^3/day was assumed for the construction worker for the inhalation of soil and groundwater vapors and inhalation of fugitive dust (EPA 2004a). The derivation of volatilization factors for excavation worker groundwater inhalation risks are included in the applicable risk calculations. The frequency with which construction workers were assumed to be exposed to soil at the site was 250 days with an exposure duration of one year.

A life expectancy of 25,550 days (70 years) (EPA 2004a) was used for excavation workers as the averaging time for exposure to carcinogenic contaminants. The averaging time for noncarcinogenic effects is equal to the subchronic exposure duration, or 365 days. A body weight of 70 kg for adults was employed (EPA 1991a, 2002a) based on the mean 50th percentile body weight for the age group.

5.4.2.4 Future Industrial Worker Exposure Assumptions

Future industrial workers at the site are assumed to be exposed to surface soil via incidental ingestion, dermal contact, inhalation of soil vapor and inhalation of fugitive dust. In addition, it is assumed that they would be exposed to groundwater through ingestion and dermal contact through future potable use of groundwater as well as through inhalation of vapors in indoor air.

An incidental ingestion rate for soil for an industrial worker is assumed to be 50 mg/day (EPA 1997a). For dermal contact with soil, an outdoor worker is assumed to wear a short-sleeved shirt, pants, and shoes; therefore, the exposed skin surface is limited to the face, forearms and hands. The exposed skin surface area for an outdoor worker is 3,300 cm^2, the average of the 50th percentile for adult males and females (EPA 2002). A dermal adherence factor of 0.2 mg/cm^2 per event was assumed for the industrial worker (EPA 2004a).

An inhalation rate of soil vapors of 1 m^3/hour was assumed for the industrial worker (EPA 1997a). Outdoor industrial workers are assumed to be exposed to soil at the site for 250 days/year over 25 years (EPA, 2002).

A life expectancy of 25,550 days (70 years) (EPA 2004a) was used for industrial workers as the averaging time for exposure to carcinogenic contaminants. The averaging time for noncarcinogenic effects is equal to the exposure duration, or 9,125 days (25 years) for this scenario. A body weight of 70 kg for adults was used (EPA 1991, 2002) based on the mean 50th percentile body weight for the age group.

5.4.2.5 Future Residential Exposure Assumptions

Future residents are assumed to be exposed to soil during recreational activities such as playing or gardening via incidental ingestion, dermal contact, inhalation of soil vapors and dust. If the home is built on a slab, it is assumed that the residents would only have exposure to surface soils; however, if a home is constructed with a basement, then exposure to subsurface soils would be possible. It is also assumed that future residents would be exposed to groundwater through ingestion and dermal contact and inhalation of vapors in indoor air.

For noncarcinogenic hazards, children receive the highest daily exposures because of lower body weight and higher contact rates, particularly for incidental soil ingestion. Only young children, therefore, are quantitatively assessed for exposure to noncarcinogens.

Cancer risks for nonmutagenic chemicals were evaluated employing a 30-year cumulative scenario that calculated risks for children and adults ages 1-31 years old.

Cancer risks for mutagenic chemicals were evaluated employing a 30-year cumulative scenario that calculated risks for four age groups: children ages 0-2 years old; children 2-6 years old; older children 6-15 years old; and adults ages 15-30 years old. Cancer risks are evaluated over long time periods because cancer risks are proportional to cumulative exposure.

For the assessment soil, an incidental ingestion rate for soil was assumed to be 200 mg/day (EPA 2007a) for young children. The soil ingestion rate for adults was assumed to be 50 mg/day (EPA, 1997a). For dermal contact with soil, the child resident was assumed to wear a short-sleeved shirt and shorts; therefore, the exposed skin surface is limited to the face, forearms, hands, lower legs and feet. The exposed skin surface area for children is 2,800 square centimeters (cm^2), the average of the 50^{th} percentile for males and females between the ages of one and six (EPA 2002). For adult dermal contact with soil, the exposed skin surface area was calculated based on the average of the 50^{th} percentile for males and females assuming exposure to the face, forearms, hands and lower legs. A dermal adherence factor of 0.2 mg/cm^2 per event was assumed (EPA 2004a) for both children and adults.

For groundwater related noncancer hazards, an ingestion rate for water was assumed to be 2 L/day for adults and 1 L/day for young children (EPA 2007a). For dermal contact and inhalation of vapors while showering, the risk was assumed to be equivalent to ingestion risk (EPA 2007a).

Child and adult residents were assumed to be exposed for 350 days per year. The exposure duration was six years (EPA 2002) for young children and 30 years for child/adult carcinogenic exposure. The averaging time for noncarcinogenic effects was equal to the exposure duration, 2,190 days (six years). Averaging time for carcinogenic effects was over a life expectancy of 25,550 days (70 years). A body weight of 15 kg was employed for young children and 70 kg for child/adults (EPA 2002).

5.4.3 Exposure Point Concentrations

An EPC is an estimate of the concentration of a COPC at points of exposure for different groups of receptors. This concentration term is calculated as the lower of the maximum detected concentration or the 95 percent upper confidence limit (UCL) of the arithmetic mean. This approach provides a conservative (protective) estimate of average COPC concentrations to account for uncertainties in the risk assessment dataset (EPA 1989). EPCs may be estimated by (1) using environmental data alone, or (2) using a combination of environmental data and environmental fate and transport models. In this assessment, EPCs for soil and groundwater were estimated using environmental data only.

5.4.3.1 Calculation of Exposure Point Concentrations

EPCs represent concentrations of COPCs to which receptors may be exposed. EPCs serve as input into risk calculations and are derived for all COPCs for each area of concern. EPCs can be used, along with appropriate exposure assumptions, to reflect a range of potential exposures (average, reasonable upper range, worst case). Most often where data quantity allow, single EPCs are used to represent possible exposure concentrations. Typically, EPCs are estimated as the lower concentration of the maximum detected concentration or the upper one-sided 95% confidence limit of the arithmetic mean concentration (95% UCL) to help ensure the actual average concentration is not underestimated. The choice of the arithmetic mean as an appropriate statistic for characterizing exposure at an exposure point is based on the assumption of random exposure within the exposure area (EPA 1989).

For each chemical with 10 or more samples, a 95%UCL on the arithmetic mean concentration was calculated and compared to the maximum detected concentration for that chemical. The lower value of the UCL and the maximum detected value was then selected as the EPC, as recommended by EPA (EPA 1992). For chemicals with less than 10 samples, the maximum detected concentration was used.

Different statistical methods can be used to estimate the 95% UCL of a data set, depending upon the data distribution. Therefore, two key steps are required to estimate the 95% UCL of a data set:

- Determine the distribution of the data (i.e., normal, lognormal, gamma or other).
- Compute the 95% UCL using the appropriate procedure for the data distribution.

In this assessment, both steps were performed with the ProUCL statistical software Version 4.0 developed for EPA (2007b). The ProUCL program contains rigorous parametric and nonparametric (including bootstrap methods) statistical methods (instead of simple *ad hoc* or substitution methods) that can be used on full data sets without nondetects (NDs) and on data sets with below reporting limit (RL) or ND observations.

ProUCL computes the 95%UCL using state-of-the-art parametric and nonparametric methods that can be used on full-uncensored data sets without NDs and also on data sets with below RL observations. ProUCL also provides goodness-of-fit tests for normal, lognormal, and gamma distributions where the ND values can be extrapolated (estimated) based upon normal regression on statistics (ROS), gamma ROS, and lognormal ROS (robust ROS) methods.

For highly censored datasets (i.e., if the percentage of NDs within a data set is greater than 80%), the maximum RL for ND data is compared to the maximum detected concentration. If the maximum RL for the NDs is greater or equal to the maximum concentration, then all NDs with RLs greater than the maximum concentration are excluded from the data set. Otherwise, the RL is used as the substitute for ND values.

Using the data set generated from the ND evaluation, percentiles of the data set are determined, and the 95th percentile is selected as the EPC.

Tables presented in **Appendix H-3** provide EPC summaries for each COPC in each medium and identify the statistical procedure used to calculate UCLs. ProUCL Version 4.0 output tables are provided in **Appendix H-4**.

5.4.4 Modeling Techniques Used to Estimate EPCs

Modeling was used to estimate exposure point concentrations and/or risk estimates that involve the transfer of contaminants from one medium to another: soil particulates released into ambient air, contaminants in groundwater that volatilize into ambient air in a trench, and contaminants from groundwater that volatilize into indoor air.

Soil Particulates

In order to evaluate the inhalation of fugitive dust for the various surface and subsurface data sets, a particulate emission factor (PEF) was derived employing soil modeling equations provided in *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (EPA 2002). A standard PEF is developed based on physical features of the soil and site that affect the resuspension of soil particulates as well as local climatic conditions that influence dispersion of particulates. EPA default values were used in the calculation of the PEF with the exception the Q/C variable that was adjusted for a 50 acre site. The resulting PEF factor for the site was calculated as 6.8E+08. Fugitive dust EPCs were calculated by dividing soil concentrations by the PEF.

Vapors in Excavation

In order to evaluate the inhalation of vapors from groundwater in a trench for construction workers, a volatilization factor (VF) was calculated for each shallow groundwater COPC. The equations used to estimate the groundwater-to-air VF for each COPC are presented Appendix H-5. The equation is a simple vadose zone model used to estimate volatilization of vapors from contaminated groundwater in a trench and dispersion of the contaminants into ambient trench air. Chemical specific properties for each chemical such as Henry's Law Constant, carbon-to-water sorption coefficient (Koc), diffusion coefficient in air and diffusion coefficient in water used in the calculations and were obtained from *User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings* (EPA 2004c). The VF for each COPC was multiplied the concentration in shallow groundwater to obtain the construction worker EPC in ambient air.

Vapor Intrusion Modeling

The Johnson and Ettinger model for subsurface vapor intrusion into buildings was used to evaluate potential worker and residential inhalation exposures to VOCs in indoor air originating from shallow groundwater contamination.

EPCs for the shallow groundwater plume were inserted into the model to yield risk/hazard estimates for a current O&M worker, future industrial worker and future resident. The model defaults were used for all parameters except the following site-specific parameters:

- Depth below grade to water table – 15 feet
- Depth below grade to bottom of enclosed floor space – 200 cm
- Depth below grade to top of contamination – 200 cm
- Soil type directly above water table – typically clayey silt, silt and sandy silt and silty clay (Silt Loam specified in the model runs)
- Average soil/groundwater temperature – 61° F (16° C)

5.5 Toxicity Assessment

A toxicity assessment identifies chemical specific criteria that reflect the intrinsic toxicity of COPCs to humans. These criteria are used, along with estimates of exposure, to estimate potential cancer risks and noncancer hazards for receptors identified in Section 5.4. Risk and hazard estimates are provided in Section 5.7.

Toxicity criteria used in this risk assessment were obtained from a variety of sources according to a hierarchy established in the Office of Solid Waste and Emergency Response (OSWER) Directive 9285.7-53 (EPA 2003). The toxicity value hierarchy is as follows:

- Tier 1—EPA's Integrated Risk Information System (IRIS) (EPA 2007c).
- Tier 2—EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs): The Office of Research and Development/NCEA/Superfund Health Risk Technical Support Center (STSC) develops PPRTVs on a chemical-specific basis when requested by EPA's Superfund program (EPA 2007d).
- Tier 3—Other Toxicity Values: Tier 3 includes additional EPA and non-EPA sources of toxicity information. Priority should be given to those sources of information that are the most current, the basis for which is transparent and publicly available, and which have been peer-reviewed.

5.5.1 Health Effects Criteria for Non-carcinogens

For chemicals that exhibit non-carcinogenic (e.g., systemic) effects, organisms have repair and detoxification capabilities that must be exceeded by some critical concentration (threshold) before the health effect is manifested. This threshold view holds that a range of exposures from just above zero to some finite value can be tolerated by the organism without an appreciable hazard of adverse effects.

Health criteria for chemicals exhibiting non-carcinogenic effects for use in risk assessment are generally EPA-derived reference doses (RfDs) and reference concentrations (RfCs). The RfD or RfC is an estimate of average daily exposure to an individual (including sensitive individuals) that is likely to be without appreciable risk of deleterious effects during a lifetime. The RfD is expressed in units of milligram (mg) chemical per kilogram (kg) body weight per day (mg/kg-day); while the RfC is expressed in units of mg chemical per cubic meter (m^3) of air (mg/m^3). RfDs and RfCs are usually derived either from human studies involving work-place exposures or from animal studies, and are adjusted using uncertainty factors to ensure that they are unlikely to underestimate the potential for adverse non-carcinogenic effects to occur.

Uncertainty factors reflect scientific judgment regarding the various types of data used to estimate the RfD/RfC and generally consist of multiples of factors ranging from 1 to 10. For example, a factor of 10 may be introduced to account for possible differences in response between humans and animals in prolonged exposure studies. Other factors may be used to account for variation in susceptibility among individuals in the human population, use of data from a study with less-than-lifetime exposure, and/or use of data from a study that did not identify a no-observed-adverse-effect level (NOAEL).

RfDs and RfCs provide benchmarks against which estimated doses (i.e., those projected from human exposures to various environmental conditions) are compared. Doses that are significantly higher than the RfD/RfC may indicate an increased potential of hazard from the exposure, while doses that are less than the RfD/RfC are not likely to be associated with adverse health effects. It should be noted that an exceedance of the RfD/RfC does not provide an estimate of the likelihood of adverse effects. It only reflects an increased potential hazard for noncancer health effects.

5.5.2 Health Effects Criteria for Potential Carcinogens

For chemicals that exhibit carcinogenic effects, EPA recognizes that more than one molecular event must occur to transform a cell from its normal state into a cancerous one. However, EPA regulates carcinogens using a non-threshold concept that assumes that a single change to the genome of a cell can initiate the carcinogenesis process. This non-threshold theory of carcinogenesis therefore assumes that any level of exposure to a carcinogen is associated with some finite possibility of causing cancer. Generally, regulatory agencies assume that the non-threshold hypothesis for carcinogens holds regardless of information concerning mechanisms of carcinogenic action for the chemical.

The carcinogenic potential of a chemical is expressed as a cancer slope factor (CSF) [in units of (mg/kg body weight-day)$^{-1}$], which estimates the risk of cancer per unit dose. When a slope factor is multiplied by an estimate of lifetime average daily dose (ADD) of a potential carcinogen (in mg/kg body weight-day), the result is an estimate of the lifetime excess cancer risk associated with exposure at that dose. EPA develops CSFs in a conservative manner, and risk estimates using slope factors are considered to be upper bound estimates of those possible. Risks estimated using slope factors are considered unlikely to underestimate actual risks and may substantially overestimate risks for a given exposure.

Excess lifetime cancer risks (ELCRs) are generally expressed in scientific notation and are probabilities. An ELCR of 1×10^{-6} (one in one million), for example, represents the incremental probability that an individual will develop cancer as a result of exposure to a carcinogenic chemical over a 70-year lifetime under specified exposure conditions. In addition, CSFs are developed for a specific route of exposure, either oral or inhalation, and ELCRs are estimated separately for these two routes of exposure.

In practice, CSF estimates are derived from the results of human epidemiology studies or chronic animal bioassays. The animal studies are conducted for a range of doses, including a high dose, in order to detect possible adverse effects. Since humans are expected to be exposed at lower doses than those used in animal studies, the data are adjusted via mathematical models. The data from animal studies are typically fitted to the linearized multistage model to obtain a dose-response curve. EPA evaluates a range of possible models based on the available data before conducting the extrapolation. The most appropriate model to reflect the data is selected based on an analysis of the data set.

The 95% UCL slope of the dose-response curve, subject to various adjustments and an inter-species scaling factor, is applied to derive the health protective CSF estimate for humans. Dose-response data from human epidemiological studies are fitted to dose-time-response curves. These models provide rough, but reasonable, estimates of the upper limits on lifetime risk. CSF estimates based on human epidemiological data are also derived using health protective assumptions and, as such, they too are considered unlikely to underestimate risks. Therefore, while actual risks associated with exposures to potential carcinogens are unlikely to be higher than the risks calculated using a slope factor estimate, they could be considerably lower.

In addition, there are varying degrees of confidence in the weight of evidence for carcinogenicity of a given chemical. EPA (1989) has proposed a system for characterizing the overall weight of evidence based on the availability of animal, human, and other supportive data. The weight-of-evidence classification is an attempt to determine the likelihood that an agent is a human carcinogen and thus qualitatively affects the estimation of potential health risks.

Three major factors are considered in characterizing the overall weight of evidence for human carcinogenicity: (1) the availability and quality of evidence from human studies, (2) the availability and quality of evidence from animal studies, and (3) other supportive information which is assessed to determine whether the overall weight of evidence should be modified. Carcinogens have often been grouped into the following five categories based on strength of this evidence:

- human Carcinogen: There is at least sufficient evidence from human epidemiological studies to support a causal association between an agent and cancer;

- probable Human Carcinogen: There is at least limited evidence from epidemiological studies of carcinogenicity in humans (Group B1) or, in the absence of adequate data in humans, there is sufficient evidence of carcinogenicity in animals (Group B2);

- possible Human Carcinogen: There is inadequate evidence of carcinogenicity in humans;

- not Classified: There is inadequate data or no existing data for the chemical; and

- no Evidence of Carcinogenicity in Humans: There is no evidence for carcinogenicity in at least two adequate animal tests in different species or in both epidemiological and animal studies.

The EPA 2005 Cancer Guidelines (EPA 2005b) update previous versions and suggest a slightly different approach to categorizing carcinogens. These guidelines emphasize the value of understanding the biological changes a chemical can cause and how these changes might lead to the development of cancer. They also discuss methods to evaluate and use such information, including information about an agent's postulated *mode-of-action*. Mode-of-action data, when available and of sufficient quality, may be useful in drawing conclusions about the potency of an agent, its potential effects at low doses, whether findings in animals are relevant to humans, and which populations or life stages may be particularly susceptible. In the absence of mode-of-action information, default options are available to allow the risk assessment to proceed.

The 2005 Cancer Guidelines (EPA 2005b) recommend an agent's human carcinogenic potential be described in a *weight-of-evidence narrative* rather than the previously identified categories. The narrative summarizes the full range of available evidence and describes any conditions associated with conclusions about an agent's hazard potential. For example, the narrative may explain that an agent appears to be carcinogenic by some routes of exposure but not others (e.g., by inhalation but not ingestion). Similarly, a hazard may be attributed to exposures during sensitive life stages of development but not at other times. The narrative also summarizes uncertainties and key default options that have been invoked.

The following five standard hazard descriptors are still used in the newest guidelines:

- carcinogenic to humans;

- likely to be carcinogenic to humans;

- suggestive evidence of carcinogenic potential;
- inadequate information to assess carcinogenic potential; and
- not likely to be carcinogenic to humans.

However, requirements for in-depth analysis of "mode-of-action data" and other modifying information preclude the use of these descriptors to place chemicals into categories as was done previously.

The 2005 Cancer Guidelines (EPA 2005b) also include Supplemental Guidance (EPA 2005a) on the evaluation of early lifetime exposures. For example, where data are available that indicate a chemical is mutagenic, the Supplemental Guidance recommends either developing age-specific slope factors or generic age dependent adjustment factors. Application of the supplemental guidance for this risk assessment is explained in text of the exposure assessment (Section 5.4), and, where appropriate, was used to adjust cancer risk estimates.

5.5.3 Toxicological Assessment

Tables 5-2 and **5-3** summarize the chronic RfDs and RfCs used to estimate non-carcinogenic effects for the COPCs, and **Tables 5-4** and **5-5** summarize the CSFs used to estimate cancer risks for the COPCs. These criteria are the most current data, obtained from the 2007 on-line version of IRIS and current NCEA recommendations.

5.6 Risk Characterization

In this section of the risk assessment, human health risks potentially associated with complete human exposure pathways identified in Section 5.4 are characterized, integrating toxicity and exposure assessments into quantitative expressions of carcinogenic risk and noncancer hazards. Potential risks due to exposures to soil and groundwater via incidental ingestion, dermal contact, and inhalation were quantitatively evaluated. Cancer risk and noncancer hazard calculations for all COPCs for all scenarios are summarized and presented in **Appendix H-5.** Total cancer risk and noncancer hazard for each dataset and receptor are summarized in **Table 5-6**.

The potential for noncancer health hazards was evaluated by comparing ADDs with reference doses applicable for chronic (long-term) and subchronic (shorter-term) exposure. This ratio of exposure to toxicity is referred to as a hazard quotient (HQ). A hazard index (HI) is the sum of HQs from individual chemicals. An RfD or RfC defines an ADD below which it is unlikely even for sensitive populations to experience adverse health effects. Thus, if an HI exceeds unity (1), the ADD is higher than a “safe” exposure level and some concern for potential noncancer effects exists. An HI is not, however, an expression of probability of noncancer effects occurring. Generally, the greater the HI above unity, the greater the level of concern. HQs are typically only added together to estimate HIs for chemicals that affect the same target organ(s) or tissue(s).

Cancer risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The upper-bound ELCR is estimated by multiplying the lifetime average daily dose (LADD) by an appropriate CSF. ELCRs are generally expressed in scientific notation as incremental probabilities. An ELCR of 1×10^{-6} (1 in 1,000,000), for example, represents the incremental probability that an individual will develop cancer as a result of exposure to a carcinogenic chemical over a 70-year lifetime under specified exposure conditions. This increment is in addition to the risk of developing cancer from causes unrelated to the exposure. Typical cancer rates in the United States are in the range of 1 in 4 to 1 in 2.

Generally, EPA uses a target cancer risk range of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) to evaluate the need for remediation or mitigation at a site (EPA 1991b). Cancer risks below 1 in 1,000,000 are typically assumed to be *de minimis* and would require no remediation or mitigation. Decisions on whether to remediate or mitigate risk for risks that fall in this range are made on a site-specific basis. Risks that exceed 1 in 10,000 often require remediation and/or mitigation; however, no "bright line" has been established at the upper end of the risk range, and, again, risk management decisions are made on a site-by-site basis. The South Carolina Department of Health and Environmental Control's policy is to use 10^{-6} as the basis for whether a risk is acceptable or unacceptable.

Estimates of cancer risk and hazard indices are compared to the above targets to put the magnitude of cancer risks and noncancer hazards into perspective for the risk manager.

5.6.1 Results of Risk Calculations

Potential risks were estimated for each area of concern for applicable receptors. In some instances, the site was considered as a whole (single exposure unit). Exposure to all groundwater was considered a single exposure unit for future residents and industrial workers, employing EPCs from the most impacted area of the plume. Cancer risks and noncancer health hazards for each receptor in each area under current/future, current, and future land use conditions are discussed in the following sections. Estimates of total cancer and noncancer hazards by exposure route and medium are summarized by receptor in Table 5-6. Risk and Hazard calculations and summaries by receptor and chemical can be found in Appendix H-5.

5.6.2 Risk and Hazard Results

5.6.2.1 Surface Soil (Excluding Hot Spots and Beneath Structures) and Groundwater

Current O&M Worker

The total estimated cancer risk for current O&M workers (9×10^{-5}) is within EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to inhalation of volatiles in indoor air from shallow groundwater (99%). Trichloroethene

(TCE), 1,2-dichloroethane (1,2-DCA), tetrachlorothene (PCE), and vinyl chloride (VC) are the primary contributors to risk associated with groundwater exposure.

The total HI for current O&M workers (0.8) is below EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to inhalation of volatiles in indoor air from shallow groundwater (45%), ingestion of surface soil (33%) and dermal contact with surface soil (22%). PCE and xylenes are the primary contributors to groundwater exposure hazard, and thallium is the primary contributor to soil exposure hazards.

Current Teen/Adolescent Trespasser

The total estimated cancer risk for current trespassers (1×10^{-6}) meets the *de minimus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to ingestion of surface soil (67%) and dermal contact with surface soil (32%). Arsenic is the primary contributor to risk associated with soil exposures.

The total HI for current trespassers (1) meets EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to ingestion of surface soil (57%) and dermal contact with surface soil (43%). Thallium is the primary contributor to soil exposure hazards.

5.6.2.2 Surface Soil (Hot Spot 1) and Groundwater

Current O&M Worker

The total estimated cancer risk for current O&M workers (9×10^{-5}) is within EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to inhalation of volatiles in indoor air from shallow groundwater (99%). TCE, 1,2-DCA, PCE, and VC are the primary contributors to risk associated with groundwater exposure.

The total HI for current O&M workers (0.8) is below EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to inhalation of volatiles in indoor air from shallow groundwater (41%), ingestion of surface soil (35%) and dermal contact with surface soil (23%). PCE and xylenes are the primary contributors to groundwater exposure hazard, and thallium is the primary contributor to soil exposure hazards.

Future Industrial Worker

The total estimated cancer risk for future industrial workers (9×10^{-3}) exceeds EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. PCE, 1,2-DCA, and TCE are the primary contributors to risk associated with groundwater exposure.

The total HI for future industrial workers (63) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater.

Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE, cis-1,2-dichloroethene (cis-1,2-DCE), PCE, and toluene are the primary contributors to risk associated with groundwater exposure.

Future Residents

The total estimated cancer risk for future residents (3×10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the risk. TCE, 1,2-DCA, PCE, VC, and benzene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk is within EPA's target risk range, with arsenic and PCE as the primary contributors.

The total HI for future residents (409) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 48% of the hazard. TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, soil exposures do not significantly impact overall hazard, it should be noted that when assessed by only this medium, hazard exceeds the noncancer threshold of 1. Thallium and vanadium are the primary contributors to risk associated with soil exposures.

Current/Future Teen/Adolescent Trespasser

The total estimated cancer risk for current/future trespassers (1×10^{-6}) meets the *de minimus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to ingestion of surface soil (62%) and dermal contact with surface soil (32%). Arsenic and PCE are the primary contributors to risk.

The total HI for current trespassers (2) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to ingestion of surface soil (57%) and dermal contact with surface soil (43%). Thallium is the primary contributor to soil exposure hazards.

5.6.2.3 Surface Soil (Hot Spot 2) and Groundwater

Current O&M Worker

The total estimated cancer risk for current O&M workers (9 x 10^{-5}) is within EPA's target cancer risk range of 1 × 10^{-6} to 1 × 10^{-4}. The cancer risk is predominately due to inhalation of volatiles in indoor air from shallow groundwater (100%). TCE, 1,2-DCA, PCE, and VC are the primary contributors to risk associated with groundwater exposure.

The total HI for current O&M workers (0.3) is below EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to inhalation of volatiles in indoor air from shallow groundwater (100%). PCE and xylenes are the primary contributors to groundwater exposure hazard.

Future Industrial Worker

The total estimated cancer risk for future industrial workers (9 x 10^{-3}) exceeds EPA's target cancer risk range of 1 × 10^{-6} to 1 × 10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. PCE, 1,2-DCA, and TCE are the primary contributors to risk associated with groundwater exposure.

The total HI for future industrial workers (62) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the hazard. TCE, cis-1,2-DCE, PCE, and toluene are the primary contributors to risk associated with groundwater exposure.

Future Residents

The total estimated cancer risk for future residents (3 x 10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1 × 10^{-6} to 1 × 10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the risk. TCE, 1,2-DCA, PCE, VC, and benzene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater does not significantly impact overall risk, it should be noted that when this medium is assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors.

The total HI for future residents (395) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the hazard. TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure.

Current/Future Teen/Adolescent Trespasser

The total estimated cancer risk for current/future trespassers (2 x 10^{-7}) is below EPA's target cancer risk range of 1 × 10^{-6} to 1 × 10^{-4}. The cancer risk is predominately due to ingestion of surface soil (46%), dermal contact with surface soil (39%) and inhalation of fugitive dust and vapors from surface soil (15%). Arsenic and PCE are the primary contributors to risk.

The total HI for current trespassers (0.0007) is well below EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to inhalation of fugitive dust and vapors from surface soil (84%) and ingestion of surface soil (10%).

5.6.2.4 Surface Soil (Hot Spot 3) and Groundwater

Future Teen/Adolescent Trespasser

The total estimated cancer risk for future trespassers (1 x 10^{-6}) meets the *de minimus* of EPA's target cancer risk range of 1 × 10^{-6} to 1 × 10^{-4}. The cancer risk is predominately due to ingestion of surface soil (61%) and dermal contact with surface soil (32%). Arsenic and PCE are the primary contributors to risk associated with soil exposures.

The total HI for future trespassers (4) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to ingestion of surface soil (57%) and dermal contact with surface soil (43%). Thallium is the primary contributor to soil exposure hazards.

Future Industrial Worker

The total estimated cancer risk for future industrial workers (9 x 10^{-3}) exceeds EPA's target cancer risk range of 1 × 10^{-6} to 1 × 10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. PCE, 1,2-DCA and TCE are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater does not significantly impact overall risk, it should be noted that when this medium is assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, and VC as primary contributors.

The total HI for future industrial workers (63) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE and cis-1,2-DCE are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, soil exposures do not significantly impact overall risk, it should be noted that when this medium is assessed individually, soil exposure hazard exceeds EPA's noncancer threshold, with thallium as the primary contributor.

Future Residents

The total estimated cancer risk for future residents (3×10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the risk. TCE, 1,2-DCA, PCE, VC, and benzene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk is within EPA's target risk range, with arsenic and PCE as the primary contributors.

The total HI for future residents (419) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 47% of the hazard. TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, soil exposures do not significantly impact overall risk, it should be noted that when this medium is assessed individually, soil exposure hazard exceeds EPA's noncancer threshold, with thallium, manganese, and iron as the primary contributors.

5.6.2.5 Surface Soil (Excluding Hot Spots) and Groundwater

Future Industrial Worker

The total estimated cancer risk for future industrial workers (9×10^{-3}) exceeds EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. PCE, 1,2-DCA, and TCE are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater does not significantly impact overall risk, it should be noted that when this medium is assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, and VC as primary contributors.

The total HI for future industrial workers (62) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE, cis-1,2-DCE, PCE, and toluene are the primary contributors to risk associated with groundwater exposure.

Future Teen/Adolescent Trespasser

The total estimated cancer risk for future trespassers (1×10^{-6}) meets the *de minimus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to ingestion of surface soil (62%) and dermal contact with surface soil (32%). Arsenic is the primary contributor to risk associated with soil exposures.

The total HI for future trespassers (1) meets EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to ingestion of surface soil (57%) and dermal contact with surface soil (43%). Thallium is the primary contributor to soil exposure hazards.

Future Residents

The total estimated cancer risk for future residents (3×10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the risk. 1,2-DCA, TCE, and VC are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, soil exposures do not significantly impact overall risk, it should be noted that when assessed by only this medium, risk is with EPA's target risk range. Arsenic and 1,2-DCA are the primary contributors to risk associated with soil exposures.

The total HI for future residents (408) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 48% of the hazard. TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, soil exposures do not significantly impact overall hazard, it should be noted that when assessed by only this medium, hazard exceeds the noncancer threshold of 1. Thallium and vanadium are the primary contributors to risk associated with soil exposures.

5.6.2.6 Subsurface Soil (Excluding Hot Spots) and Groundwater

Future Industrial Worker

The total estimated cancer risk for future industrial workers (9×10^{-3}) exceeds EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. PCE, 1,2-DCA, and TCE are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater does not significantly impact overall risk, it should be noted that when this medium is assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, and VC as primary contributors.

The total HI for future industrial workers (67) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 46% of the hazard. TCE, cis-1,2-DCE, PCE, and toluene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, soil exposures do not significantly impact overall risk, it should be noted that when this medium is assessed individually, soil exposure hazard exceeds EPA's noncancer threshold, with vanadium as the primary contributor.

Future Excavation Worker

The total estimated cancer risk for future excavation workers (3×10^{-7}) is below EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to inhalation of ambient air from shallow groundwater (42%), followed by ingestion of surface soil (45%) and inhalation of fugitive dist and vapors from soil (11%).

The total HI for future excavation workers (5) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to ingestion of soil (90%). Vanadium and thallium are the primary contributors to subsurface soil exposure hazard.

Future Residents

The total estimated cancer risk for future residents (3×10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the risk. TCE, 1,2-DCA, PCE, VC, and benzene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk is within EPA's target risk range, with arsenic, 1,2-DCA, and TCE as the primary contributors.

The total HI for future residents (486) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 41% of the hazard, followed by ingestion of soil (16%). TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure, while vanadium and thallium are the primary contributors associated with soil exposures.

5.6.2.7 Subsurface Soil (Hot Spot RIMW-6) and Groundwater

Future Industrial Worker

The total estimated cancer risk for future industrial workers (9×10^{-3}) exceeds EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. PCE, 1,2-DCA, and TCE are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater does not significantly impact overall risk, it should be noted that when this medium is assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, and VC as primary contributors.

The total HI for future industrial workers (62) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the hazard. TCE, cis-1,2- DCE, PCE, and toluene are the primary contributors to risk associated with groundwater exposure.

Future Excavation Worker

The total estimated cancer risk for future excavation workers (8×10^{-7}) is below EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to inhalation of fugitive dist and vapors from soil (62%), ingestion of surface soil (22%), and inhalation of ambient air from shallow groundwater (15%).

The total HI for future excavation workers (0.1) is below EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to inhalation of ambient are from shallow groundwater (36%), ingestion of soil (33%), and inhalation of fugitive dust and vapors from soil (29%).

Future Residents

The total estimated cancer risk for future residents (3×10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. TCE, 1,2-DCA, PCE, VC, and benzene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk is within EPA's target risk range, with TCE, VC, and PCE as the primary contributors.

The total HI for future residents (395) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the hazard. TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure.

5.6.2.8 Subsurface Soil (Hot Spot RISB-12) and Groundwater

Future Industrial Worker

The total estimated cancer risk for future industrial workers (9 x 10^{-3}) exceeds EPA's target cancer risk range of 1 × 10^{-6} to 1 × 10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. PCE, 1,2-DCA, and TCE are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater does not significantly impact overall risk, it should be noted that when this medium is assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, and VC as primary contributors.

The total HI for future industrial workers (63) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE, cis-1,2-DCE, PCE, and toluene are the primary contributors to risk associated with groundwater exposure.

Future Excavation Worker

The total estimated cancer risk for future excavation workers (3 x 10^{-7}) is below EPA's target cancer risk range of 1 × 10^{-6} to 1 × 10^{-4}. The cancer risk is predominately due to ingestion of surface soil (37%), inhalation of ambient air from shallow groundwater (33%), and inhalation of fugitive dist and vapors from soil (28%).

The total HI for future excavation workers (3) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to ingestion of soil (81%) and inhalation of fugitive dust and vapors from soil (10%). Thallium is the primary contributor to soil exposure hazards.

Future Residents
The total estimated cancer risk for future residents (3×10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the risk. TCE, 1,2-DCA, PCE, VC, and benzene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk is within EPA's target risk range, with benzene, arsenic and TCE as the primary contributors.

The total HI for future residents (412) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 48% of the hazard. TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure,. Although, relatively speaking, soil exposures do not significantly impact overall risk, it should be noted that when this medium is assessed individually, soil exposure hazard exceeds EPA's noncancer threshold, with thallium, vanadium, iron, and xylenes as the primary contributors.

5.6.2.9 Subsurface Soil (Hot Spot RISB-18) and Groundwater

Future Industrial Worker
The total estimated cancer risk for future industrial workers (9×10^{-3}) exceeds EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. PCE, 1,2-DCA, and TCE are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater does not significantly impact overall risk, it should be noted that when this medium is assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, and VC as primary contributors.

The total HI for future industrial workers (62) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE, cis-1,2-DCE, PCE, and toluene are the primary contributors to risk associated with groundwater exposure.

Future Excavation Worker

The total estimated cancer risk for future excavation workers (4×10^{-7}) is below EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to inhalation of fugitive dist and vapors from soil (47%), inhalation of ambient air from shallow groundwater (28%), and ingestion of surface soil (24%).

The total HI for future excavation workers (1) meets EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to ingestion of soil (89%).

Future Residents

The total estimated cancer risk for future residents (3×10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 50% of the risk. TCE, 1,2-DCA, PCE, VC, and benzene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk is within EPA's target risk range, with 1,2-DCA, TCE, and arsenic as the primary contributors.

The total HI for future residents (401) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, soil exposures do not significantly impact overall risk, it should be noted that when this medium is assessed individually, soil exposure hazard exceeds EPA's noncancer threshold, with thallium as the primary contributor.

5.6.2.10 Subsurface Soil (Hot Spot RISB-25) and Groundwater

Future Industrial Worker

The total estimated cancer risk for future industrial workers (9×10^{-3}) exceeds EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. PCE, 1,2-DCA, and TCE are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk is within EPA's target risk range, with 1,2-DCA, TCE, and arsenic as the primary contributors.

The total HI for future industrial workers (62) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE, cis-1,2-DCE, PCE, and toluene are the primary contributors to risk associated with groundwater exposure.

Future Excavation Worker

The total estimated cancer risk for future excavation workers (2×10^{-6}) is within EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to inhalation of fugitive dist and vapors from soil (70%) and ingestion of surface soil (22%). 1,2-DCA is the primary contributor to risk associated with soil.

The total HI for future excavation workers (2) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to ingestion of soil (88%). Thallium is the primary contributor to hazard associated with soil.

Future Residents

The total estimated cancer risk for future residents (3×10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the risk. TCE, 1,2-DCA, PCE, VC, and benzene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk is within EPA's target risk range, with 1,2-DCA, arsenic, TCE, and chloroform as the primary contributors.

The total HI for future residents (402) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure,. Although, relatively speaking, soil exposures do not significantly impact overall risk, it should be noted that when this medium is assessed individually, soil exposure hazard exceeds EPA's noncancer threshold, with thallium, as the primary contributor.

5.6.2.11 Subsurface Soil (Hot Spot RISB-64) and Groundwater

Future Industrial Worker

The total estimated cancer risk for future industrial workers (1×10^{-2}) exceeds EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 46% of the risk. PCE, 1,2-DCA, and TCE are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk is within EPA's target risk range, with TCE, PCE, and 1,2-DCA as the primary contributors.

The total HI for future industrial workers (63) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE, cis-1,2-DCE, PCE, and toluene are the primary contributors to risk associated with groundwater exposure.

Future Excavation Worker

The total estimated cancer risk for future excavation workers (3×10^{-5}) is within EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to inhalation of fugitive dist and vapors from soil (81%) and ingestion of surface soil (18%). TCE and PCE are the primary contributors to risk associated with soil.

The total HI for future excavation workers (2) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to ingestion of soil (66%) and inhalation of fugitive dust and vapors from soil (28%). TCE is the primary contributor to hazard associated with soil.

Future Residents
The total estimated cancer risk for future residents (4×10^{-2}) exceeds the *de maximus* of EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}. The cancer risk is predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 47% of the risk. TCE, 1,2-DCA, PCE, VC, and benzene are the primary contributors to risk associated with groundwater exposure. Although, relatively speaking, inhalation of volatiles in indoor air from shallow groundwater and soil exposures do not significantly impact overall risk, it should be noted that when these media are assessed individually, inhalation of volatiles in indoor air from shallow groundwater exceeds the risk range, with TCE, 1,2-DCA, PCE, VC, and benzene as primary contributors; and soil exposure risk also exceeds EPA's target risk range, with TCE, PCE, 1,2-DCA, VC, benzene, and chloroform as the primary contributors.

The total HI for future residents (405) exceeds EPA's noncancer threshold of 1. Noncancer health hazards are predominately due to potable uses of groundwater. Since dermal contact with potable water was conservatively estimated to be equivalent to the calculated risk for ingestion of all groundwater, each of these pathways contributed 49% of the hazard. TCE, cis-1,2-DCE, PCE, toluene, VC, xylenes, benzene, ethylbenzene, and manganese are the primary contributors to risk associated with groundwater exposure,. Although, relatively speaking, soil exposures do not significantly impact overall risk, it should be noted that when this medium is assessed individually, soil exposure hazard exceeds EPA's noncancer threshold, with TCE as the primary contributor.

5.6.3 Final COCs

The results of the HHRA risk characterization were used to identify the final COCs for the site. In accordance with Region 4 guidance, COCs are those COPCs that either exceed a $1\text{x}10^{-4}$ cumulative cancer risk or exceed a noncarcinogenic hazard quotient of unity. A summary of COCs by exposure medium and receptor are presented below.

Surface Soil Data Sets

Surface Soil Excluding Hot Spots (no soil beneath buildings)

- Current O&M Worker – none selected
- Current Trespasser – none selected

Surface Soil Hot Spot 1

- Current O&M Worker – none selected
- Future Industrial Worker – none selected
- Future Resident - **thallium**

- Current/Future Child Trespasser/Recreational User – **thallium**

Surface Soil Hot Spot 2
- Current O&M Worker – none selected
- Future Industrial Worker – none selected
- Future Resident - none selected
- Current/Future Child Trespasser/Recreational User - none selected

Surface Soil Hot Spot 3
- Future Industrial Worker – none selected
- Future Resident – **iron, manganese, thallium**
- Current/Future Child Trespasser/Recreational User - **thallium**

Subsurface Soil Data Sets

Subsurface Soil Excluding Hot Spots
- Future Industrial Worker – **vanadium**
- Future Excavation Worker – **vanadium, thallium**
- Future Resident – **vanadium, thallium**

Subsurface Soil Hot Spot RIMW-6
- Future Industrial Worker – none selected
- Future Excavation Worker – none selected
- Future Resident – none selected

Subsurface Soil Hot Spot RISB-12
- Future Industrial Worker – none selected
- Future Excavation Worker – **thallium**
- Future Resident – **thallium, vanadium**

Subsurface Soil Hot Spot RISB-18
- Future Industrial Worker – none selected
- Future Excavation Worker – none selected
- Future Resident – **thallium**

Subsurface Soil Hot Spot RISB-25
- Future Industrial Worker – none selected
- Future Excavation Worker – none selected
- Future Resident – **1,2-DCA**, **thallium**

Subsurface Soil Hot Spot RISB-64
- Future Industrial Worker – **TCE**
- Future Excavation Worker – **TCE**

- Future Resident – **PCE, TCE**

Groundwater Data Sets

All Groundwater – Shallow and Bedrock

- Future Industrial Worker – **1,2-DCA, cis-1,2-DCE, PCE, TCE, VC**
- Future Resident – **1,2-DCA, cis-1,2-DCE, benzene, chloroethane, ethylbenzene, isopropylbenzene, manganese, methylene chloride, PCE, TCE, toluene, VC, xylenes**

Shallow Groundwater

- Current O&M Worker – none selected
- Future Industrial Worker – **TCE**
- Future Resident **– TCE**

In accordance with EPA Region 4 guidance, in addition to those chemicals that exceed calculated risk levels, any chemicals that exceed applicable or relevant and appropriate requirements (ARARs) are also considered COCs. Any COPC in groundwater that exceeds state or federal MCLs is considered a COC. Per SCDHEC guidance, chemicals that exceed EPA Region 9 Soil Screening Levels (SSLs) are considered COCs. **Table 5-7** presents the final COC list based on these criteria.

Of the VOCs in groundwater that exceed MCLs, six (1,1,1-TCA, 1,1,2-TCA, 1,1-DCE, 1,2,4-TCB, carbon tetrachloride, and 1,2-DCB) were not previously identified as COCs based on calculated risks. Of the chemicals in soil that exceed SSLs, 19 (all but 1,2-DCA, PCE, and TCE) were not previously identified as COCs based on calculated risks.

5.7 Uncertainty Assessment

Uncertainties can arise from several sources in a human health risk assessment including data collection and interpretation, assumptions used to characterize exposures, and toxicity values. To compensate for uncertainty surrounding input variables, conservative assumptions are often made that tend to overestimate rather than underestimate risk. In cases where data are limited, assumptions may be based on professional judgment or subjective estimates that may under or over estimate risks.

5.7.1 Types of Uncertainty

Three primary sources of uncertainty include:

- scenario uncertainty;
- parameter uncertainty; and
- model uncertainty.

Scenario uncertainty results from missing or incomplete information needed to fully define exposure and dose. This uncertainty may include errors or gaps in site characterization, professional judgment, assumptions regarding exposed populations, and steady-state conditions. Sources of parameter uncertainty include measurement and sampling errors, inherent variability in environmental and exposure-related parameters, and the use of generic surrogate data or default assumptions when site-specific data are not available. Parameter uncertainty often leads to model uncertainty. One source of modeling uncertainty is relationship errors, such as errors in correlations among chemical properties or limitations in mathematical expressions used to define environmental processes. Errors due to the use of mathematical or conceptual models as simplified representations of reality are also sources of modeling uncertainty.

Analysis of uncertainties is often divided in "true uncertainty" and "variability." The former is uncertainty due to lack of knowledge of data. Variability is uncertainty due to irresolvable variation in physical, chemical, and biological process, human behavioral patterns, seasonal changes, and data for site characterization. An example of uncertainty in this HHRA involves selection of an exposure frequency for recreational site users. No site-specific information is available and this parameter is based on professional judgment.

These three types of uncertainty have been identified in each of the four parts of this risk assessment: data evaluation, toxicity assessment, exposure assessment, and risk characterization. Uncertainty within each of these components is discussed below.

5.7.2 Data Evaluation

Uncertainty is present in the data before it is even evaluated for risk assessment. This includes potential sampling bias, errors in laboratory extraction and analysis, and the protocol employed to assess contaminants identified as “nondetect.” A higher level of confidence is placed on the analytical results. Sampling errors and biases and assumptions for use of nondetect data are almost always more important from uncertainty considerations.

5.7.3 Dose-Response Assessment

The dose-response section involves estimating the toxicological effects of a compound on humans usually based upon laboratory animal studies. A potentially substantial source of uncertainty occurs when dose-response relationships in humans are derived from animal to human extrapolation. These associations often result from high-dose to low-dose extrapolations as well. Health effects criteria are derived with margins of safety relative to the degree of uncertainty in the value.

Another source of uncertainty in the risk assessment is the absence of toxicity criteria for certain chemical constituents. Without numerical toxicity criteria, potential noncancer hazard and/or cancer risk cannot be quantified for a given constituent.

5.7.4 Exposure Assessment

The exposure assessment step involves many assumptions about "typical people" and "typical exposure scenarios" to arrive at an average daily dose. For example, a body weight of 70 kg is used for adult residents. Body weight varies for each individual, so these assumptions likely overestimate or underestimate the true dose that people are likely to receive.

Many exposure factors are chosen to err on the side of protectiveness for human health. Exposure duration, frequency, and time are set at reasonable maximum exposure values. They likely overestimate the exposures that typically occur.

The computation of the EPC for chemicals in a number of media may have resulted in an overestimate or underestimate of risks and hazards. Averages of site data exposure point concentrations may underestimate risks and hazards for some receptors while use of the maximums from site data exposure point concentration may overestimate risks and hazards for some receptors. Risks and hazards from both types of EPCs are provided in this assessment to try to bracket potential site-related impacts.

Uncertainty also exists in the use of toxicity criteria based on oral exposures to assess the risk/hazard associated with dermal exposures. In absence of a thorough understanding of the proportional difference in absorption for oral versus dermal exposures for each COPC, the dermal absorption factor inherent to the dermal exposure equation was used to account for dermal absorption of each COPC.

5.7.5 Risk Characterization

Assumptions are made using best professional judgment and the scientific literature on site risk assessments. In general, assumptions made throughout this risk assessment are conservative in that they tend to overestimate exposure and resultant risk rather than underestimate it. The overall risk to public health attributable to the site is an upper-bound probability of adverse health effects. True health effects may be lower. However, it should be noted that the individual errors from different sources might be propagated into larger errors by mathematical manipulation in the risk assessment.

5.8 Summary and Conclusions

The risk calculations indicate that site-related environmental contamination posing potential cancer risks and noncancer hazard are related to contaminated groundwater, surface soil, and subsurface soils. The pathways of principal concern are exposure to chlorinated VOCs in groundwater though drinking water ingestion, and inhalation of VOCs in indoor air originating from groundwater. COCs in soil based on calculated risk levels are primarily the metals thallium and vanadium, with chlorinated VOCs limited to subsurface soils in hot spot locations RISB-25 and RISB-64**.** Nineteen additional chemicals were identified as COCs in soil based on SSL exceedances. Sixteen VOCs along with manganese were identified as COCs in groundwater based on calculated risks as well as a comparison to drinking water standards.

Section 6
Conclusions

6.1 Summary of Findings and Conclusions

6.1.1 Hydrogeology

The hydrogeologic conditions of the PSC site and resulting contaminant migration and fate characteristics are controlled by four dominant hydrogeologic features. These features are summarized below and conclusions are provided for each feature with regard to contaminant migration/fate and implications to the future FS.

Saprolite

This zone includes all identified potential source areas. As a result, the vadose zone of the saprolite is important to contaminant loading to groundwater in addition to direct contact exposures. In western portions of the site, the water table does not reside in saprolite and the vadose zone extends into the underlying PWR. Based on the MPE tests performed in the western portion of the site, the FS will be required to consider technologies applicable to lower permeability materials for these vadose zone conditions.

VOCs occur in groundwater and in the vadose zone, and extraction well performance in this zone exhibits a relatively small area of groundwater capture. Based on visual observation, well performance tests, and monitor well purging, the saprolite zone is relatively low in transmissivity. Groundwater migrating in the saprolite flows toward Wildcat Creek where it is intercepted by the more permeable stream alluvium. Ultimately, this groundwater discharges to Wildcat Creek from the alluvium. Otherwise, groundwater in the saprolite provides localized recharge to the underlying PWR and bedrock zones.

Alluvium

Source areas were not identified in the alluvium with the exception of the fuel oil area. Because the alluvium is more permeable than the saprolite, and likely more permeable than the PWR and bedrock, this feature exerts a high degree of control over the site hydrogeology. In general, groundwater migrates into the alluvium from saprolite, PWR, and bedrock from the west portion of the site. Once in the alluvium, the contaminant concentrations are diluted by the higher flux of groundwater through the alluvium as compared to the adjacent zones. Groundwater in the alluvium ultimately discharges to Wildcat Creek. However, contaminants may spread throughout the alluvium while migrating in the downstream direction before actually discharging to Wildcat Creek.

Based on the water table surface and bedrock surface mapping, and the results of the aquifer performance testing, it is probable that a significant volume of the groundwater being collected by the existing extraction wells may be derived from the alluvium and Wildcat Creek.

Partially Weathered Rock

The configuration of the PWR zone is highly variable, as indicated in the cross sections presented in Section 4. The hydraulic testing also indicates that the transmissivity of the PWR is highly variable. This is to be expected as the degree of fracturing of the parent rock and nature of the weathered by products of the rock is highly variable. The PWR and regolith represent a common hydrogeologic zone with groundwater migrating within each unimpeded, but at different rates. Groundwater in PWR not migrating into the alluvium at the site will recharge the bedrock. This appears to be the case in the western portions of the site.

Bedrock

Groundwater occurrence and migration in the bedrock is controlled by fractures. Small-scale fractures occurred at many investigation locations while very little fracturing was evident at others. The location of RIMW-22 provides an exception to relatively low fracture density at the site. The relatively thick sequence of PWR and frequent fracturing in the bedrock indicate that this location could supply a large quantity of groundwater to an extraction well as compared to the existing extraction wells that produce about 3 gallons per minute. The lateral extent of this fracture zone was not determined in detail during the RI, but if the fracture zone represents a linear feature across the site, it may allow an opportunity to gain a high degree of hydraulic control. Three wells (RIMW-20, RIMW-21, and RIMW-30) in the vicinity of RIMW-22 also revealed significant fracturing and weathering.

The potentiometric surface mapped for bedrock and observation well responses during the APTs indicate the possibility for two preferential flow zones in the bedrock. One of these flow zones exists in the vicinity of EW-2 and extends northeast into the alluvial deposits at RIPZ-3. A second may also exist in a nearly parallel orientation to the north in the vicinity south of RIMW-22 and leading into the alluvium toward MW-121B. However, the evidence for this feature is not as compelling because the APT results did not provide information in this area. Interceding between these two possible preferential flow zones are several bedrock monitor wells that exhibit very low transmissive conditions (as observed during development and purging). In any case, groundwater in the bedrock horizon migrates into the alluvium deposits and subsequently discharges to Wildcat Creek. However, some bedrock groundwater also appears to migrate underneath Wildcat Creek, as evidenced by the concentrations detected in bedrock well MW-121B across the creek.

6.1.2 Environmental Media Sampling Results

The RI sampling results revealed that VOCs were the compounds most prevalently detected above regulatory screening criteria in soil and groundwater at the site. Three classes of VOCs and their typical degradation products were identified as having the highest concentrations in both soil and groundwater site wide: BTEX, chlorinated ethenes/ethanes, and chlorinated benzenes.

Soil Sampling Results

Surface soil sampling results revealed concentrations exceed the EPA Region 9 PRGs for industrial soil and/or EPA Region 9 SSLs for all three of the VOC classes identified above. The highest concentrations of these compounds were primarily confined to four areas of the site: North Drum Storage Area, Solvent Ditch Area, Incinerator/Drum Repackaging Area, and South Drum Storage Area. Within these areas, the Incinerator Area had the highest concentrations of all three classes of compounds. The South Drum Storage Area had the lowest average concentrations in surface soil.

Subsurface soil sampling results revealed that concentrations also exceed industrial soil PRGs and/or SSLs in the subsurface of the four identified areas. The detected concentrations were generally higher than surface soil in all four areas, and in some cases, exceeded surface soil detections by ten times. Subsurface samples also contained detections of the three VOC classes below the water table in each area.

The presence of several VOCs above SSLs in each soil focus area indicates that ongoing sources of groundwater contamination may exist in these areas. These potential sources are likely isolated to portions of each area. The potential sources and their extent will be evaluated further in the FS.

Groundwater Sampling Results

The groundwater sampling results for the RI are consistent with the observed soil sampling results. In the areas with the highest concentrations of VOCs in soil, groundwater concentrations were comparably high. Two additional areas of concern exist for groundwater: the former Burn Pit Area and the Fuel Oil Area. Soil concentrations may not be as high in these areas because soil excavation was previously performed in the burn pit area and because the fuel oil product is in the subsurface. The fuel oil product is associated with a former underground leak, meaning that the oil did not have to migrate through a large depth of soil to reach the groundwater.

Regolith groundwater concentrations are highest in the Solvent Area for BTEX and chlorinated ethenes and ethanes. Concentrations are above EPA MCLs throughout a large part of the site from the warehouse to Wildcat Creek, although no constituents were detected in regolith groundwater on the other side of the creek. Chlorinated benzenes are highest in the Incinerator Area, and this plume is not as large as that for the other two VOC classes.

Bedrock groundwater concentrations for BTEX and chlorinated benzenes are highest in the Solvent Ditch area, but the plume size is smaller than in regolith. The chlorinated ethene and ethane concentrations are also highest in the Solvent Ditch area, but concentrations are also high in the Burn Pit area. Chlorinated ethene/ethane concentrations appear from the west boundary of the site to Wildcat Creek, and concentrations were detected above MCLs in one well across the creek.

Groundwater concentrations are likely to be from the primary areas of concern identified for soil, and it is believed that there are plumes originating from the Solvent Ditch area, Drum Management Area, Incinerator Area, North Drum Storage Area (although co-mingled with the Solvent Ditch area), Burn Pit Area, and Fuel Oil Area. The only soil area of concern that does not correspond to higher concentrations in groundwater is the South Drum Storage Area.

Sediment and Surface Soil (Across Wildcat Creek) Sampling Results

Sediment sample results from Wildcat Creek and Fishing Creek, and surface soil sample results from across Wildcat Creek, revealed that although some compounds were detected above laboratory quantitation limits, the results were either below regulatory criteria or were consistent with concentrations detected in the background samples. In addition, compounds detected were not consistent with compounds identified to be constituents of concern in the industrial portion of the PSC site.

6.1.3 Hydraulic Analysis Results

The results from the hydraulic analysis indicate that the radius of influence for extraction is less than 200 feet in bedrock at EW-3 but is greater than 200 feet in PWR at EW-2. In the southern extraction well (EW-2), there appears to be good communication between the regolith and bedrock zones. The northern extraction well (EW-3) appears to have direct hydraulic communication with the regolith also, even though it is screened in bedrock.

Sustainable pumping rates for the extraction wells are fairly low, at around 3 gallons per minute for both the bedrock and PWR wells. Based on potentiometric surface maps, the extraction wells do not appear to have significant impact on the overall potentiometric surfaces of either regolith or bedrock.

6.1.4 Human Health Risk Assessment

The risk calculations indicate that site-related environmental contamination posing potential cancer risks and noncancer hazard are related to contaminated groundwater, surface soil, and subsurface soils. The pathways of principal concern are exposure to chlorinated VOCs in groundwater though drinking water ingestion, and inhalation of VOCs in indoor air originating from groundwater. The final COCs in soil related to potential human exposure risks are primarily metals (thallium and vanadium), with chlorinated VOCs limited to subsurface soils in hot spot locations RISB-25 and RISB-64**.** However, 19 additional chemicals were identified as COCs for soil based on SSL exceedances. These compounds are present in soil at concentrations that could act as an ongoing source of groundwater contamination. Sixteen VOCs along with manganese were identified as COCs in groundwater based on calculated risks as well as a comparison to drinking water standards.

6.2 Recommendations for Further Action

The results from the RI will be used to develop remedial alternatives for surface soil, subsurface soil, and groundwater in the FS. Details regarding the evaluation of remedial alternatives based on the RI results will be presented in the FS.

Section 7
References

CDM, 2004. *Summary Report – Initial Site Investigation*. Atlanta, GA. October 2004.

CDM, 2006a. *Quality Assurance Project Plan – PSC Site, Rock Hill, SC*. Atlanta, GA. May 2006.

CDM, 2006b. *Field Sampling Plan – PSC Site, Rock Hill, SC*. Atlanta, GA. May 2006.

CDM, 2006c. *Phase I Technical Memorandum and Phase II Work Plan*. Atlanta, GA. October 2006.

CDM, 2007. *Interim Report – Phase II Sampling Results and Hydrogeologic Findings.* Atlanta, GA. May 2007.

Cleveland, T.G., *Type-Curve Matching Using a Computer Spreadsheet*. 2006. Ground Water. Vol. 24, No. 2. pp. 554-562.

Code of Federal Regulations. *National Oil and Hazardous Substances Pollution Contingency Plan*. 40 CFR Part 300.

EPA 1989. United States Environmental Protection Agency. *Risk Assessment Guidance for Superfund (RAGS): Human Health Evaluation Manual Part A*. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington DC. EPA/540/1-89/002. OSWER Directive 9285.701A. NTIS PB90-155581.

EPA 1991. *RAGS Volume I: Human Health Evaluation Manual Supplemental Guidance. Standard Default Exposure Factors*. Office of Solid Waste and Emergency Response Directive 9285.6-03. March 25, 1991.

EPA 1992. Supplemental Guidance to RAGS; Calculation of the Concentration Term. Office of Solid Waste and Emergency Response.

EPA 1997a. *Exposure Factors Handbook*, Volumes I, II, and III. Office of Research and Development. EPA/600/P-95/002Fa, -002Fb, and 002Fc.

EPA 1997b. *Health Effects Assessment Summary Tables*. FY 1997 Update. Office of Solid Waste and Emergency Response. EPA-540-R-97-036. July.

EPA, 2001. *Risk Assessment Guidance for Superfund*. Office of Solid Waste and Emergency Response, Washington, D.C. December 2001.

EPA 2002. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*. Office of Emergency and Remedial Response. OSWER 9355.4-24. December.

EPA 2004a. *Risk Assessment Guidance For Superfund: Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim*. Office of Emergency and Remedial Response. OSWER 9285.7-02EP. EPA/540/R/99/005. September.

EPA 2004b. Region 9 Preliminary Remediation Goals. Accessed via the INTERNET: http://www.epa.gov/region09/waste/sfund/prg/index.htm

EPA 2004c. *User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings*. Prepared by Environmental Quality Management, Inc. February.

EPA 2005a. *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens*. Risk Assessment Forum, U.S. Environmental Protection Agency. EPA/630/R-03/003F. March.

EPA 2005b. *Guidelines for Carcinogen Risk Assessment*. Final. NCEA. F-0644A. March.

EPA 2007a. *Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment (Interim Guidance)*. Waste Management Division, Office of Health Assessment.

EPA 2007b. ProUCL Version 4.0. A Statistical Software. National Exposure Research Labs, EPA, Las Vegas Nevada.

EPA 2007c. Integrated Risk Information System (IRIS). Accessed via the INTERNET: http://www.epa.gov/iris.

EPA 2007d. EPA-NCEA: USEPA Region III Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV).

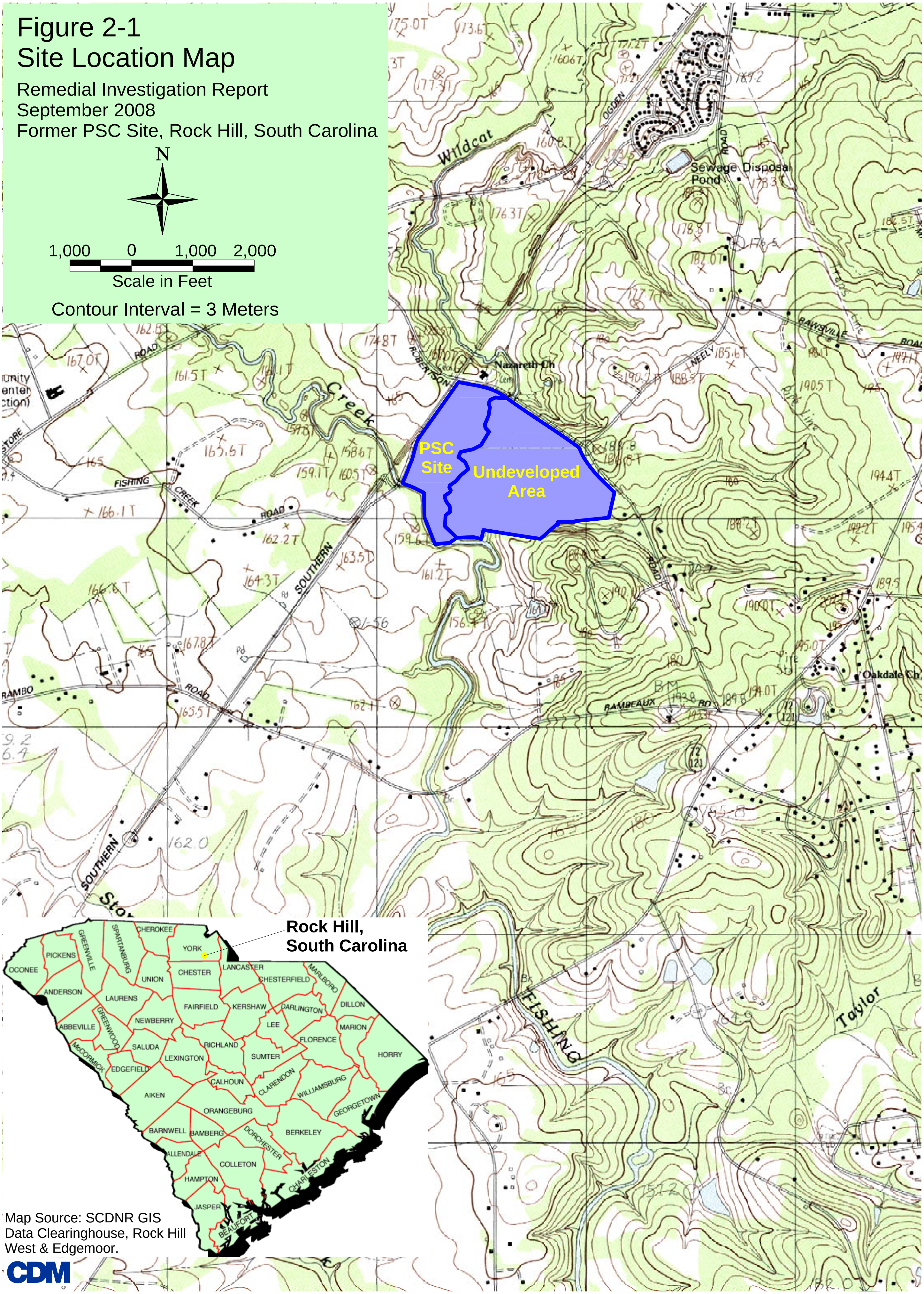
Kruseman, G.P, de Ridder, N.A., *Analysis and Evaluation of Pumping Test Data.* International Institute for Land Reclamation and Improvement (ILRI). 1991.

Philip Services Corp. *Petro-Chem SC SCD 044 442 333 RCRA Facility Investigation Part 1 Report*. Columbia, IL. August 23, 1999.

Figures

Figure 2-1
Site Location Map

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina



Map Source: SCDNR GIS Data Clearinghouse, Rock Hill West & Edgemoor.

CDM

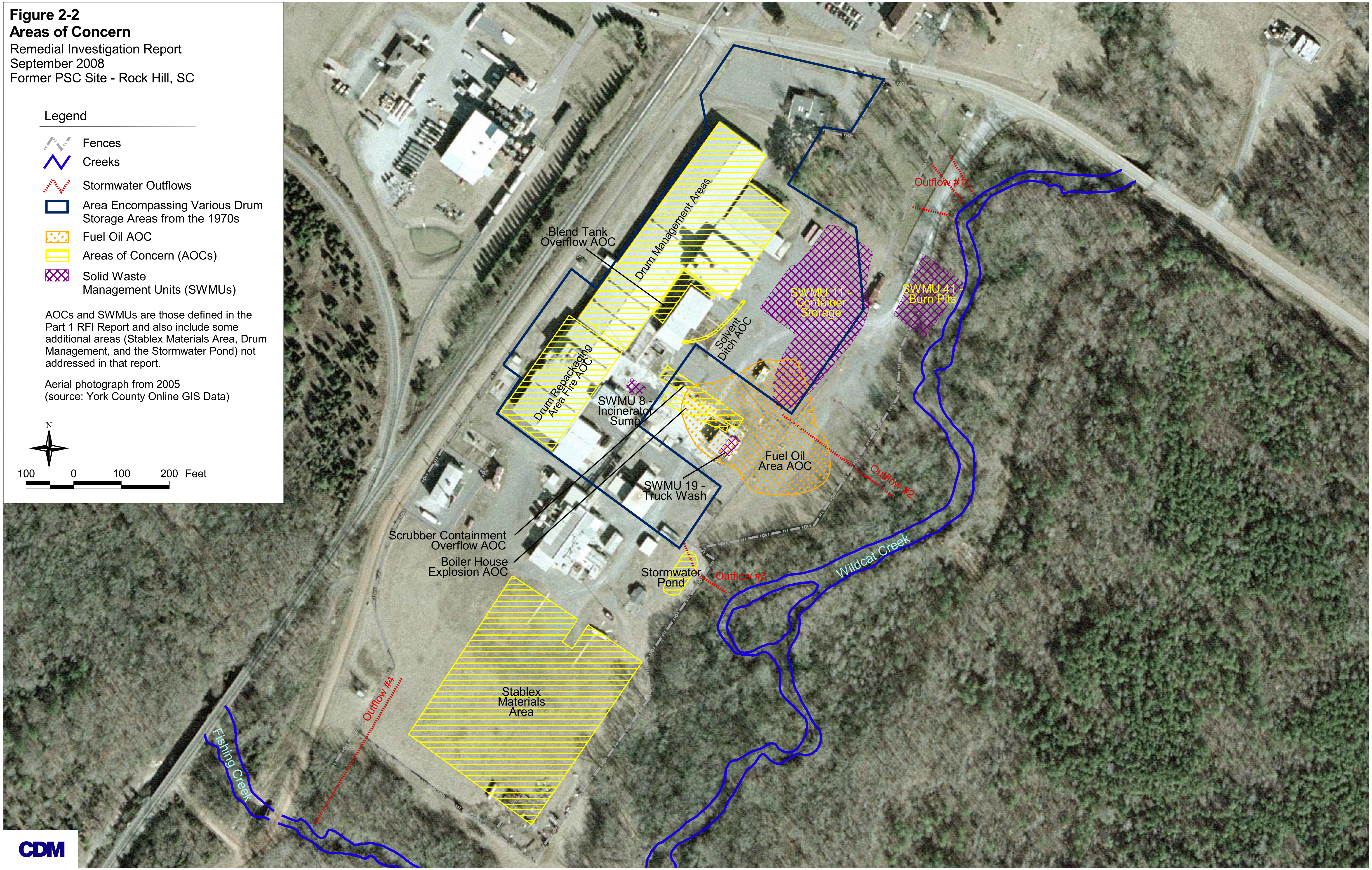


Figure 2-2
Areas of Concern
Remedial Investigation Report
September 2008
Former PSC Site - Rock Hill, SC

Legend
- Fences
- Creeks
- Stormwater Outflows
- Area Encompassing Various Drum Storage Areas from the 1970s
- Fuel Oil AOC
- Areas of Concern (AOCs)
- Solid Waste Management Units (SWMUs)

AOCs and SWMUs are those defined in the Part 1 RFI Report and also include some additional areas (Stablex Materials Area, Drum Management, and the Stormwater Pond) not addressed in that report.

Aerial photograph from 2005
(source: York County Online GIS Data)

N

100 0 100 200 Feet

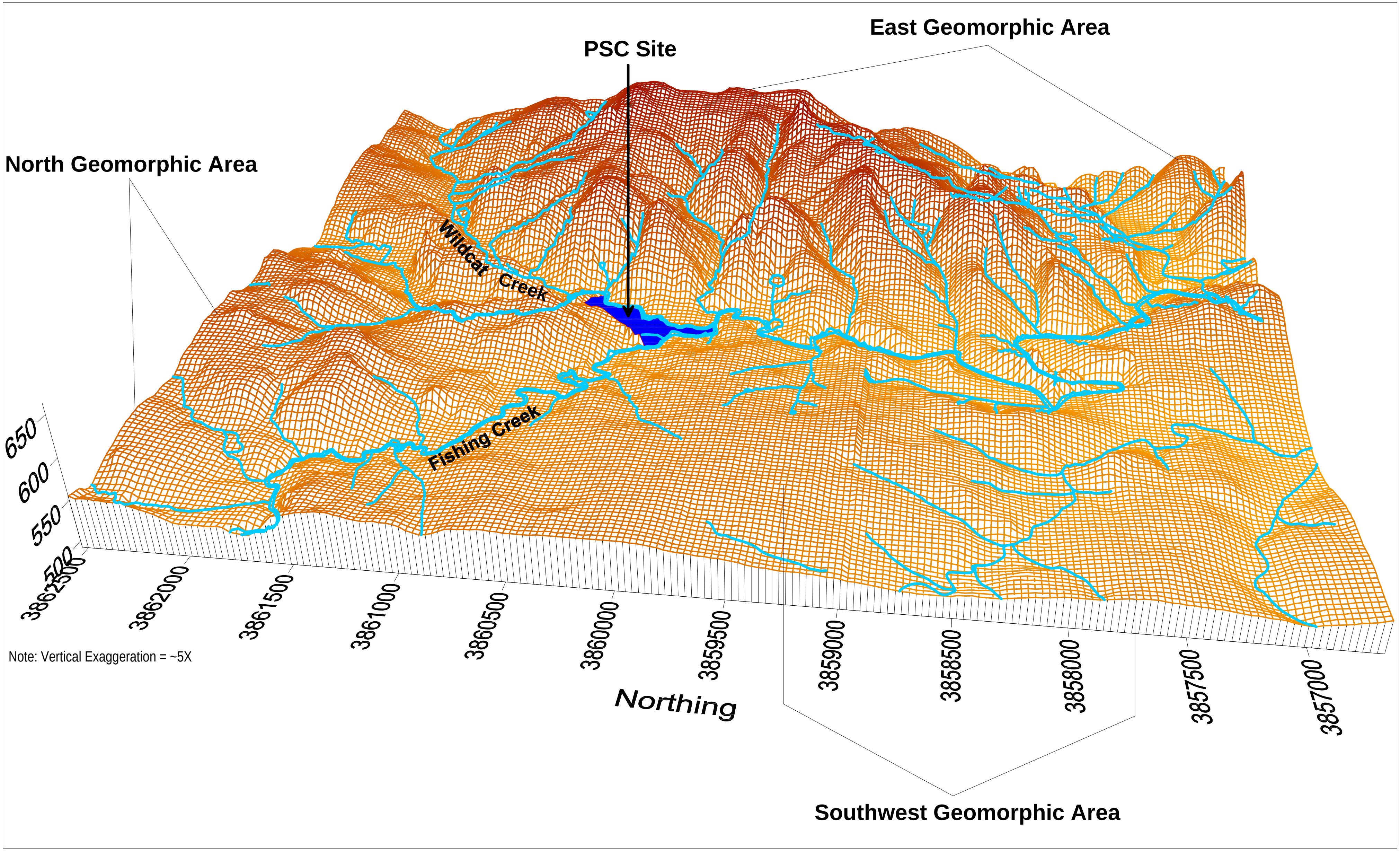


Figure 2-3
Regional Geomorphology

Remedial Investigation Report
September 2008
PSC Site, Rock Hill, South Carolina

CDM

Figure 2-4
1979 USGS Aerial Photograph

CDM

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

Figure 2-5
1984 USGS Aerial Photograph

CDM

Figure 2-6
1989 USGS Aerial Photograph

Figure 3-1
Sample Location Map
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

Figure 3-2
Phase I Sample Location Map

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

Figure 3-3
Phase I Sampling Locations in Undeveloped Area and Background Sample Locations

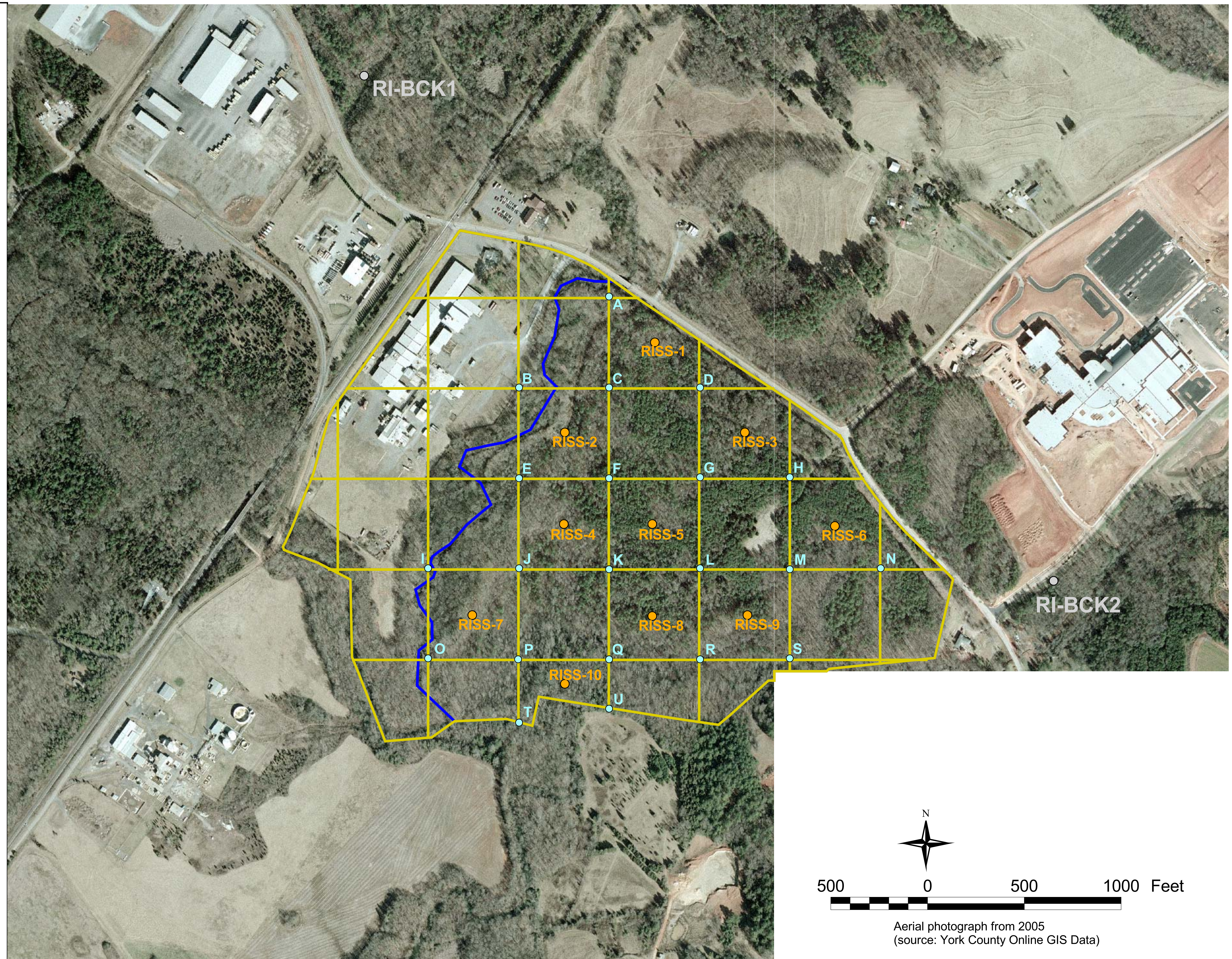
Remedial Investigation Report
September 2008
Former PSC Site,
Rock Hill, South Carolina

Legend

- Background Soil Sample
- Surface Soil Sample Location (3-point composite across associated 5-acre grid)
- Coordinate Identification Point
- 5-Acre Grid
- Wildcat Creek Boundary

ID	Latitude	Longitude
A	34.889307	-81.069522
B	34.888018	-81.071070
C	34.888018	-81.069522
D	34.888018	-81.067956
E	34.886730	-81.071070
F	34.886730	-81.069522
G	34.886730	-81.067956
H	34.886730	-81.066405
I	34.885450	-81.072633
J	34.885450	-81.071070
K	34.885450	-81.069522
L	34.885450	-81.067956
M	34.885450	-81.066405
N	34.885450	-81.064840
O	34.884163	-81.072633
P	34.884163	-81.071070
Q	34.884163	-81.069522
R	34.884163	-81.067956
S	34.884163	-81.066405
T	34.883262	-81.071070
U	34.883459	-81.069522

CDM



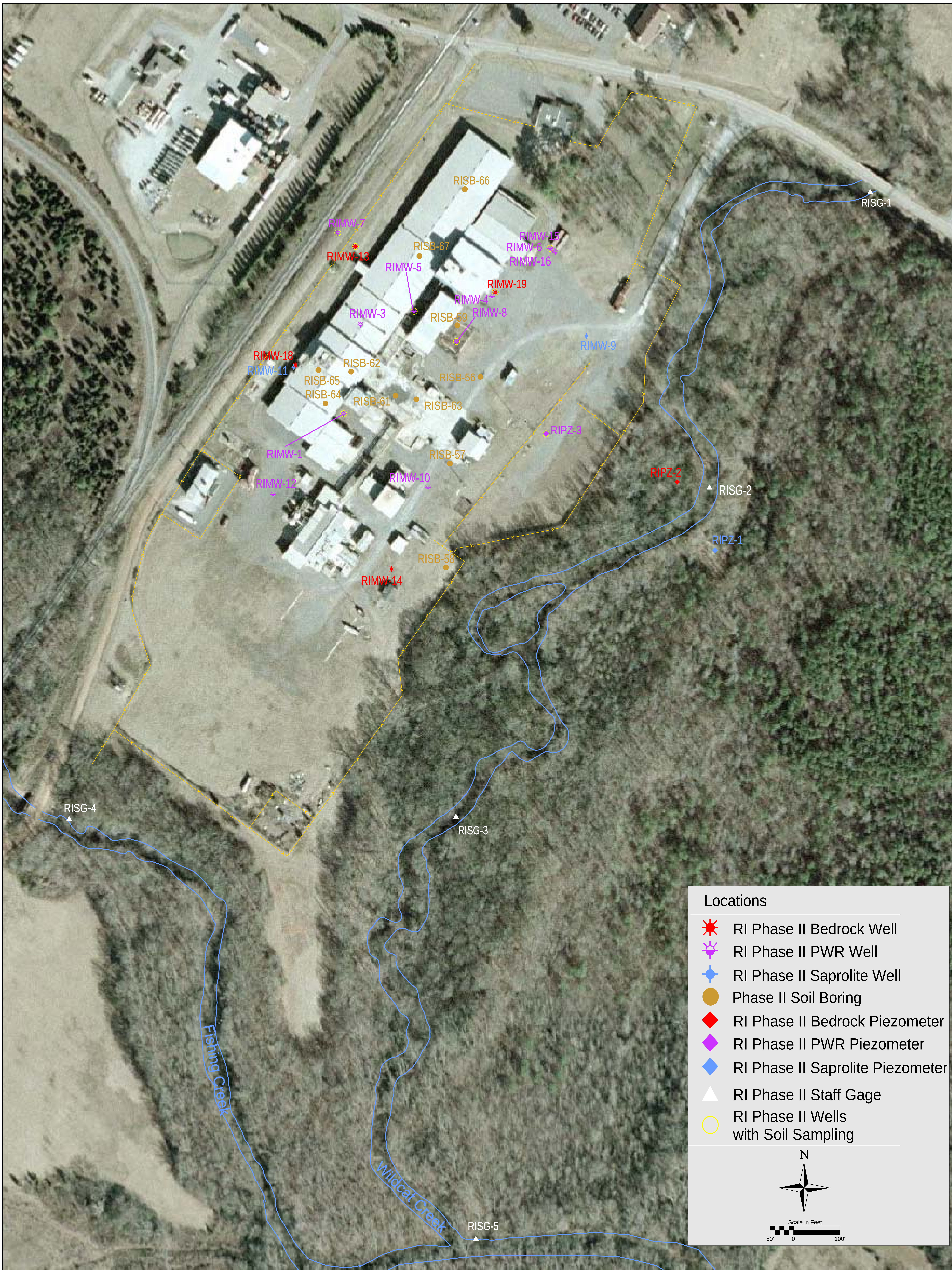


Figure 3-4
Phase II Sample Location Map

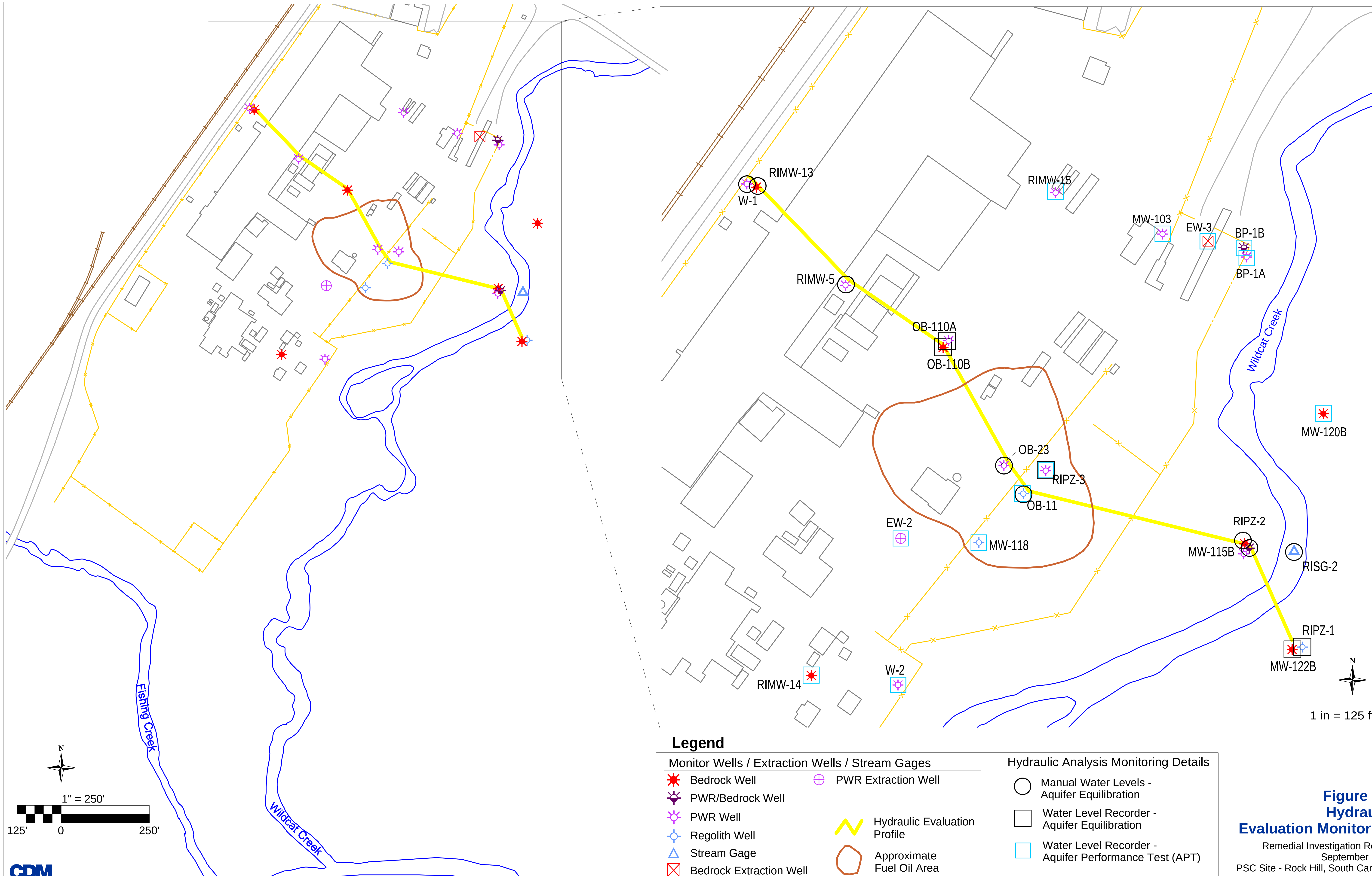


Figure 3-5
Hydraulic Evaluation Monitoring

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

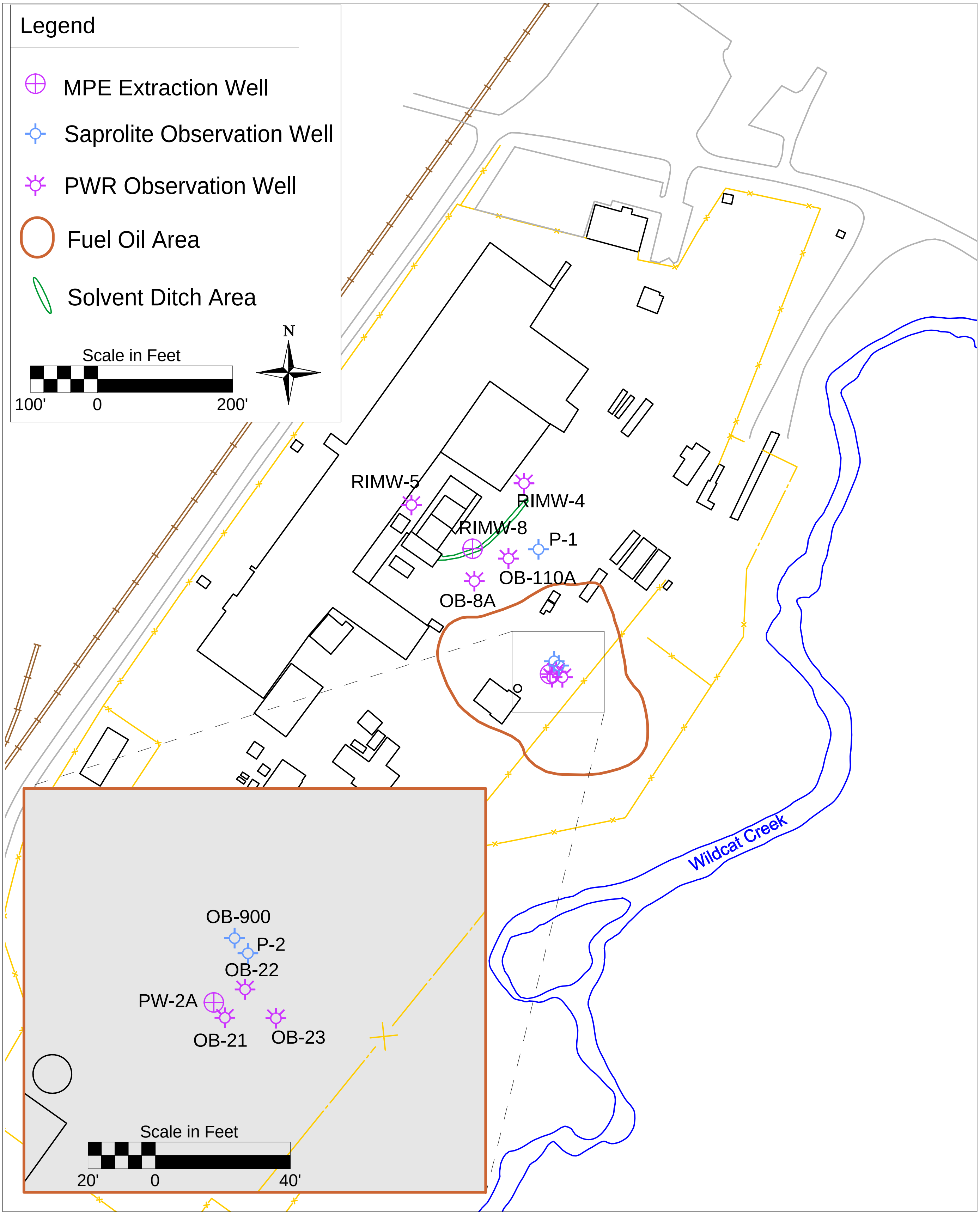


Figure 3-6
MPE Pilot Study Locations

CDM

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

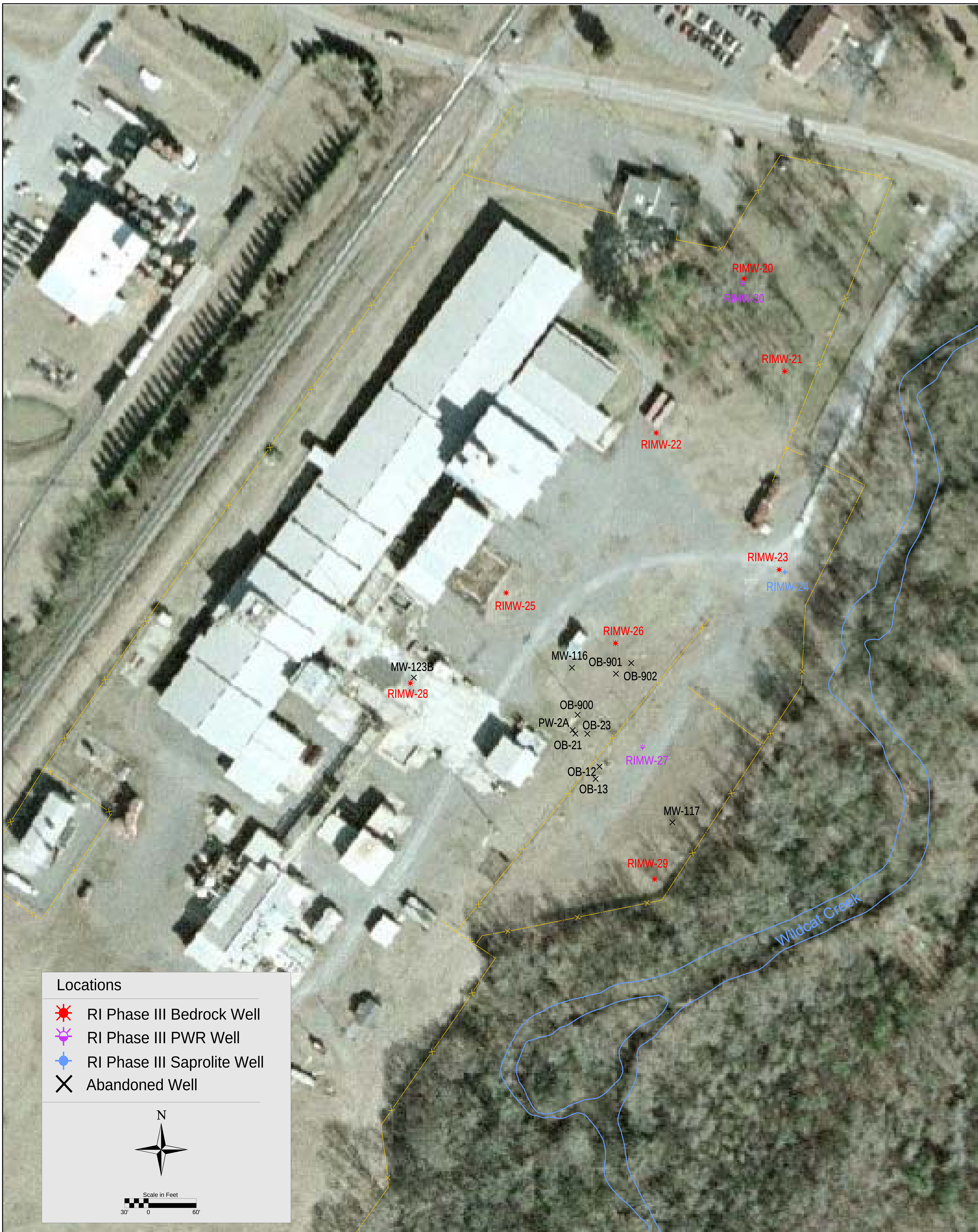


Figure 3-7
Phase III Well Installation Locations

CDM

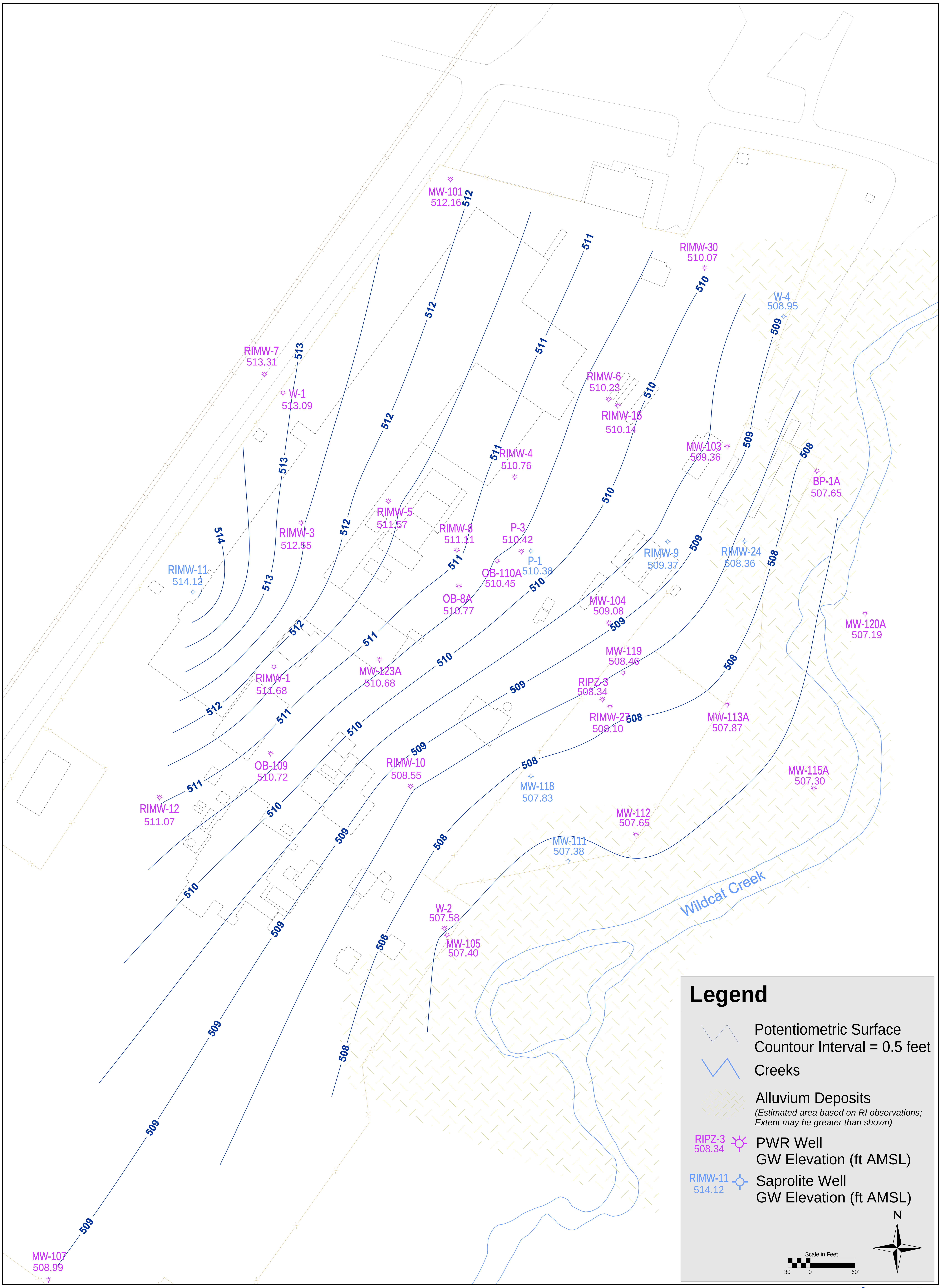


Figure 4-1
Regolith Potentiometric Surface Map

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

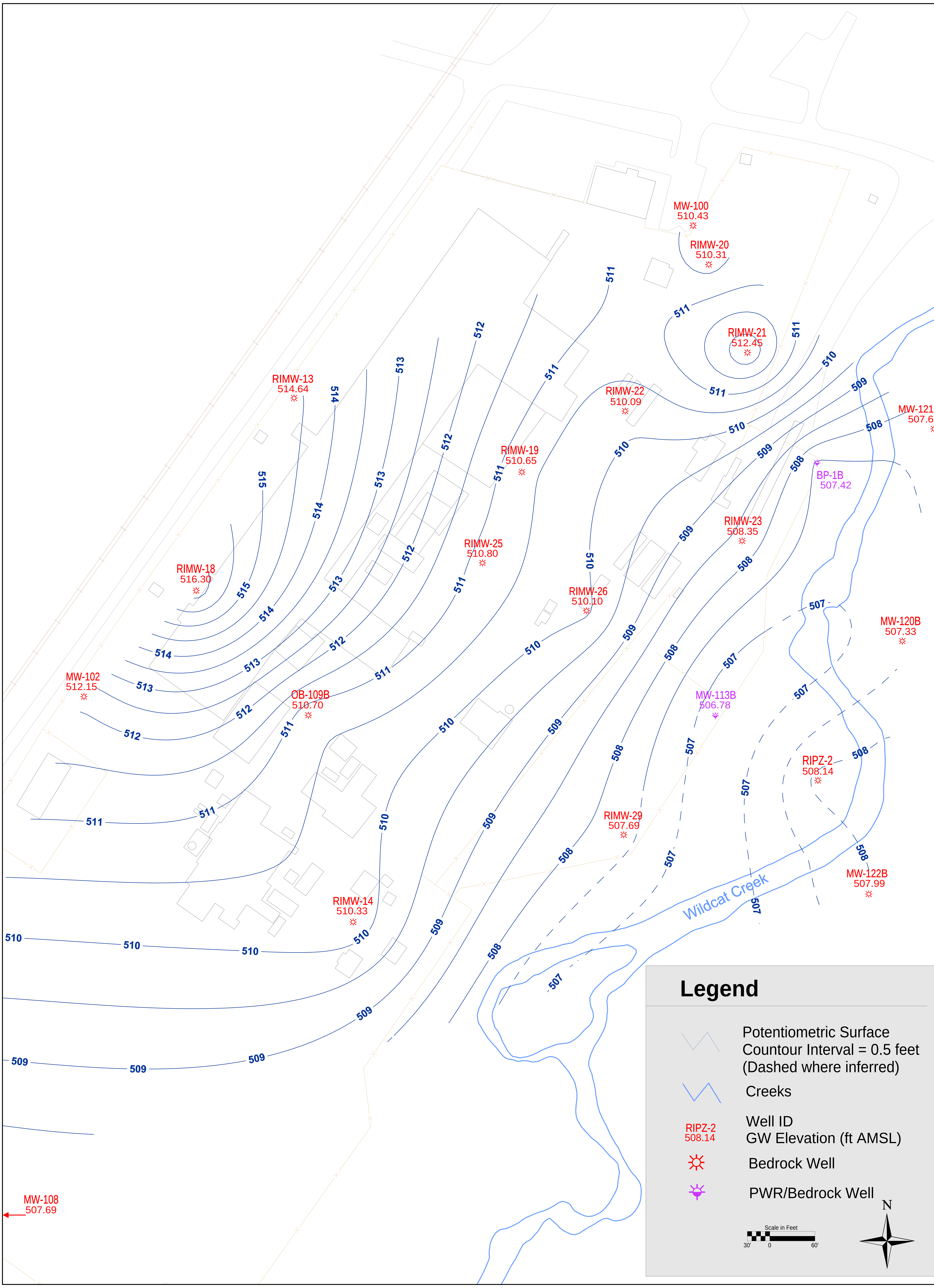


Figure 4-2
Bedrock Potentiometric Surface Map

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

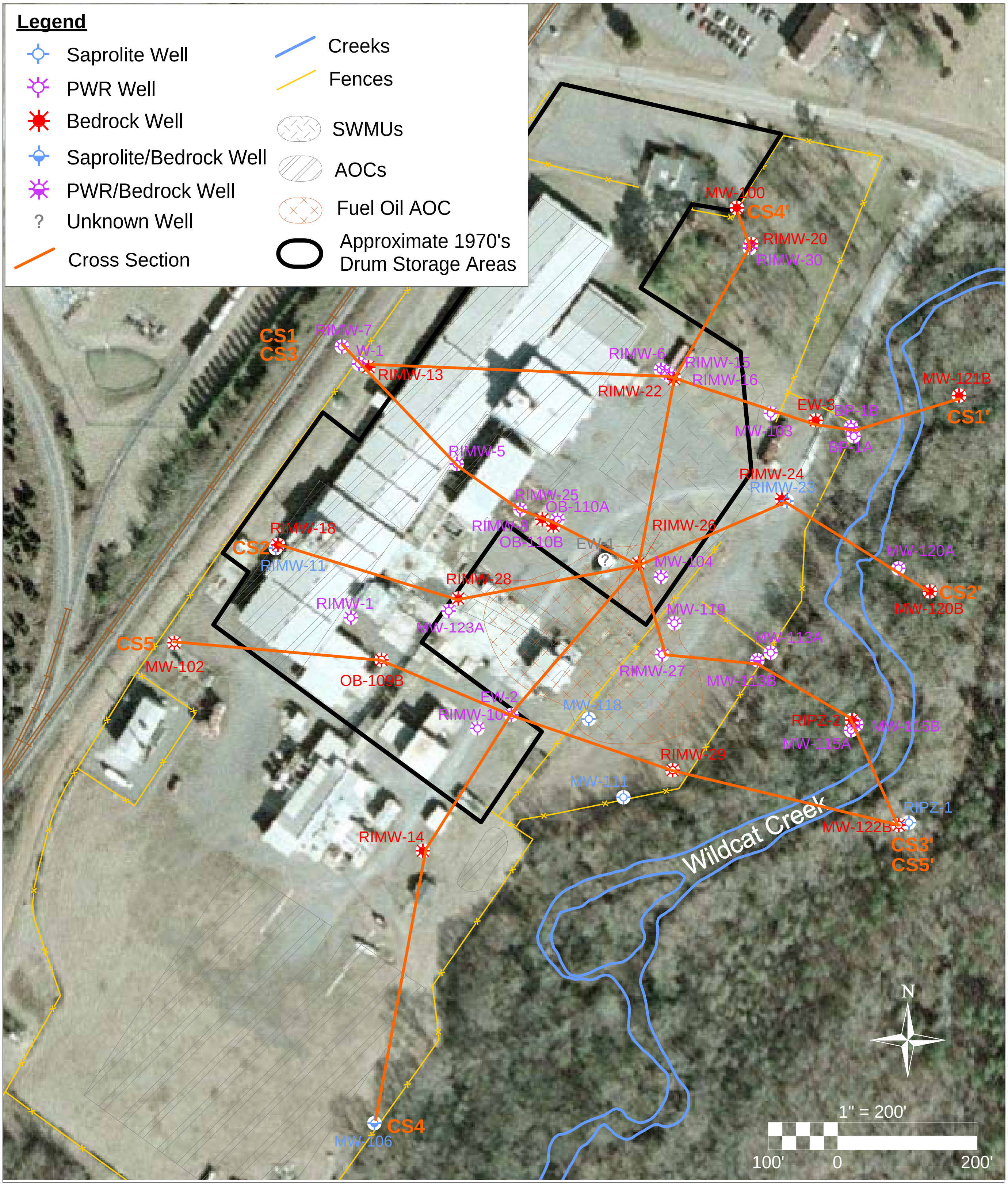
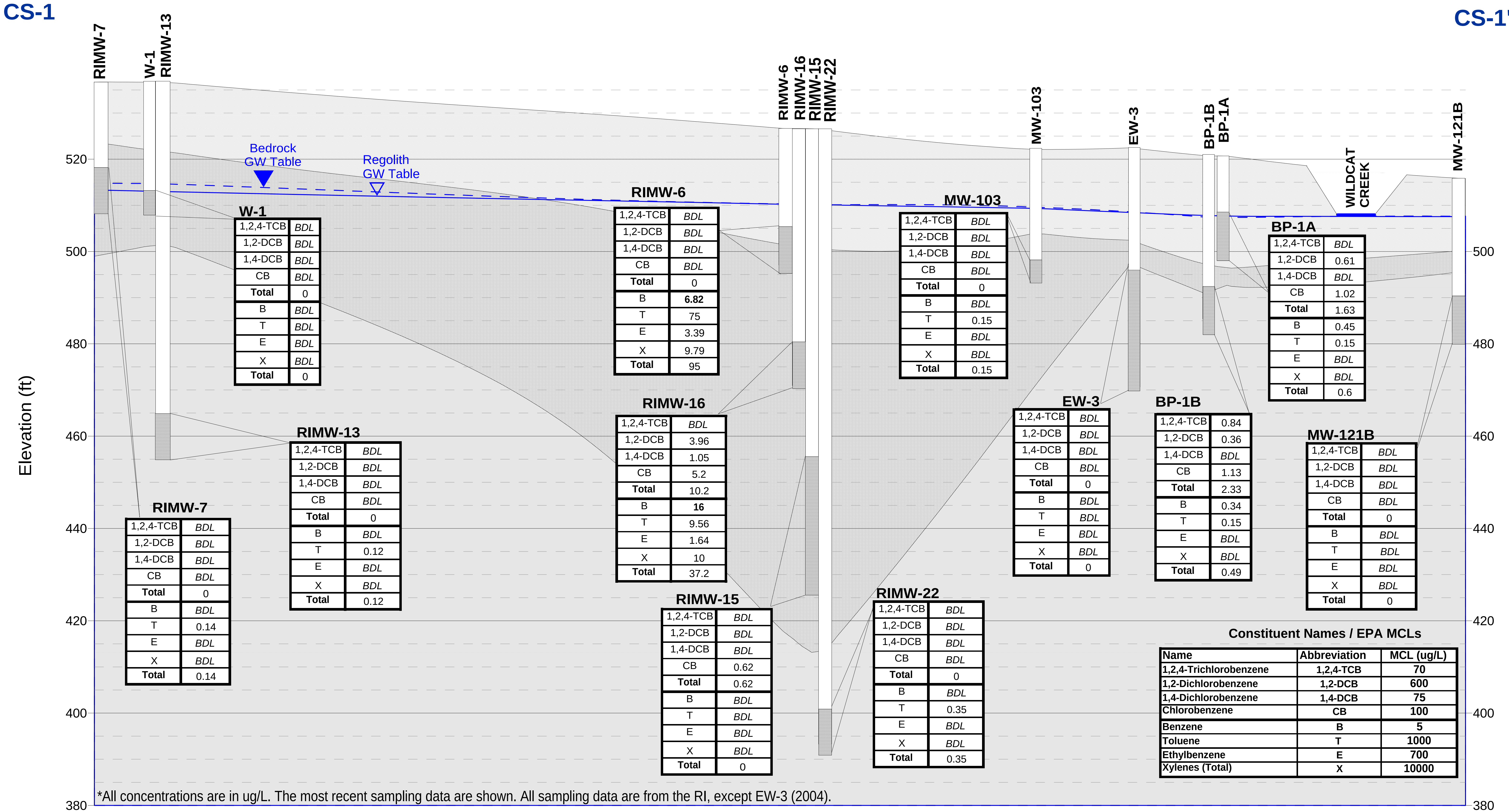


Figure 4-3
Cross Section Location Map
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

CDM



W-1

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	*BDL*
E	*BDL*
X	*BDL*
Total	0

RIMW-6

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	**6.82**
T	75
E	3.39
X	9.79
Total	95

MW-103

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.15
E	*BDL*
X	*BDL*
Total	0.15

BP-1A

1,2,4-TCB	*BDL*
1,2-DCB	0.61
1,4-DCB	*BDL*
CB	1.02
Total	1.63
B	0.45
T	0.15
E	*BDL*
X	*BDL*
Total	0.6

RIMW-16

1,2,4-TCB	*BDL*
1,2-DCB	3.96
1,4-DCB	1.05
CB	5.2
Total	10.2
B	**16**
T	9.56
E	1.64
X	10
Total	37.2

RIMW-13

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.12
E	*BDL*
X	*BDL*
Total	0.12

EW-3

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	*BDL*
E	*BDL*
X	*BDL*
Total	0

BP-1B

1,2,4-TCB	0.84
1,2-DCB	0.36
1,4-DCB	*BDL*
CB	1.13
Total	2.33
B	0.34
T	0.15
E	*BDL*
X	*BDL*
Total	0.49

MW-121B

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	*BDL*
E	*BDL*
X	*BDL*
Total	0

RIMW-7

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.14
E	*BDL*
X	*BDL*
Total	0.14

RIMW-15

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	0.62
Total	0.62
B	*BDL*
T	*BDL*
E	*BDL*
X	*BDL*
Total	0

RIMW-22

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.35
E	*BDL*
X	*BDL*
Total	0.35

Constituent Names / EPA MCLs

Name	Abbreviation	MCL (ug/L)
1,2,4-Trichlorobenzene	1,2,4-TCB	70
1,2-Dichlorobenzene	1,2-DCB	600
1,4-Dichlorobenzene	1,4-DCB	75
Chlorobenzene	CB	100
Benzene	B	5
Toluene	T	1000
Ethylbenzene	E	700
Xylenes (Total)	X	10000

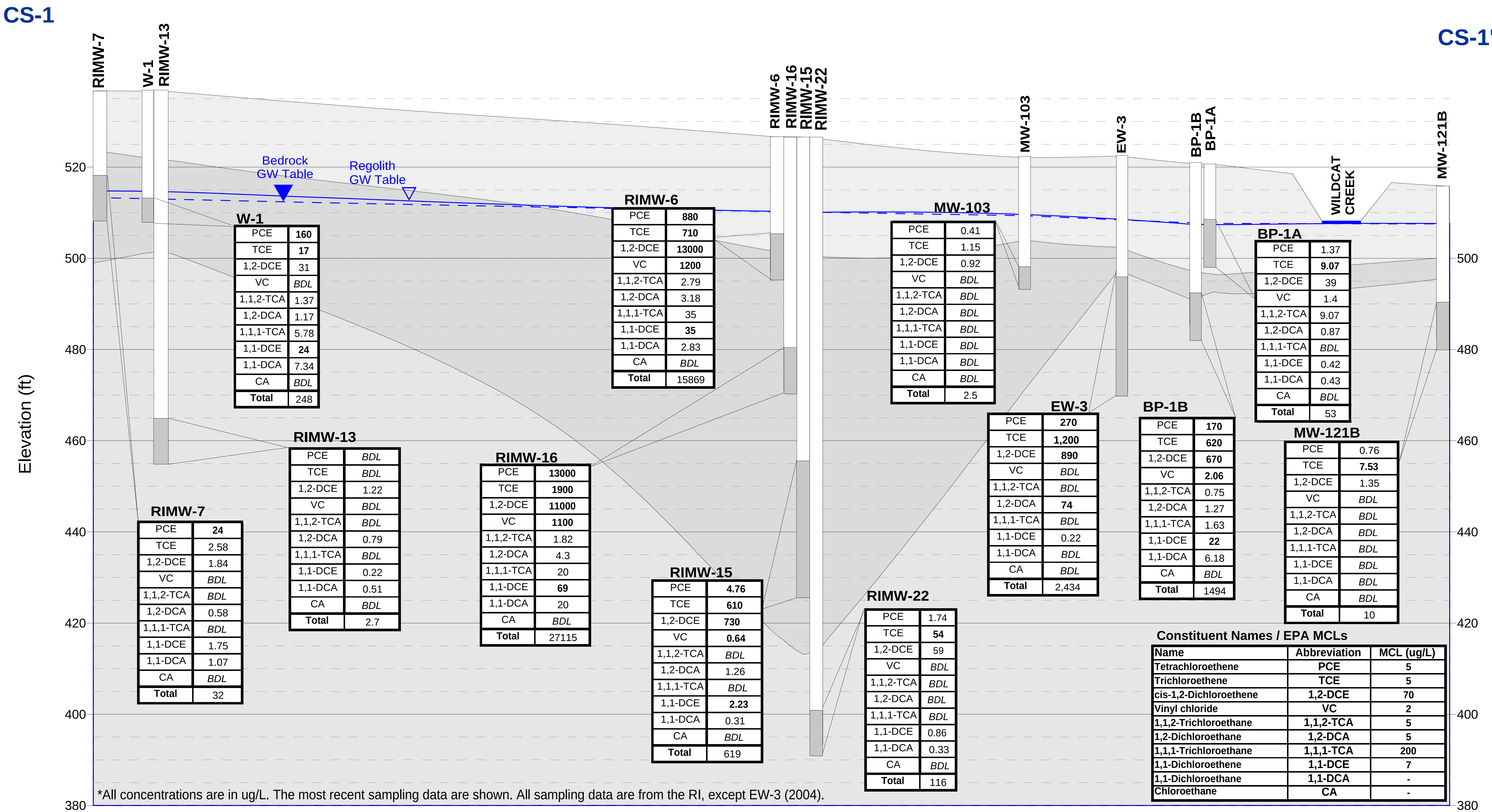
*All concentrations are in ug/L. The most recent sampling data are shown. All sampling data are from the RI, except EW-3 (2004).

Saprolite
Partially Weathered Rock (PWR)
Bedrock

CDM

Figure 4-4
Cross Section 1
BTEX / Chlorinated Benzenes

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina



W-1

PCE	160
TCE	17
1,2-DCE	31
VC	BDL
1,1,2-TCA	1.37
1,2-DCA	1.17
1,1,1-TCA	5.78
1,1-DCE	24
1,1-DCA	7.34
CA	BDL
Total	248

RIMW-6

PCE	880
TCE	710
1,2-DCE	13000
VC	1200
1,1,2-TCA	2.79
1,2-DCA	3.18
1,1,1-TCA	35
1,1-DCE	35
1,1-DCA	2.83
CA	BDL
Total	15869

MW-103

PCE	0.41
TCE	1.15
1,2-DCE	0.92
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	2.5

BP-1A

PCE	1.37
TCE	9.07
1,2-DCE	39
VC	1.4
1,1,2-TCA	9.07
1,2-DCA	0.87
1,1,1-TCA	BDL
1,1-DCE	0.42
1,1-DCA	0.43
CA	BDL
Total	53

RIMW-13

PCE	BDL
TCE	BDL
1,2-DCE	1.22
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	0.79
1,1,1-TCA	BDL
1,1-DCE	0.22
1,1-DCA	0.51
CA	BDL
Total	2.7

RIMW-16

PCE	13000
TCE	1900
1,2-DCE	11000
VC	1100
1,1,2-TCA	1.82
1,2-DCA	4.3
1,1,1-TCA	20
1,1-DCE	69
1,1-DCA	20
CA	BDL
Total	27115

EW-3

PCE	270
TCE	1,200
1,2-DCE	890
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	74
1,1,1-TCA	BDL
1,1-DCE	0.22
1,1-DCA	BDL
CA	BDL
Total	2,434

BP-1B

PCE	170
TCE	620
1,2-DCE	670
VC	2.06
1,1,2-TCA	0.75
1,2-DCA	1.27
1,1,1-TCA	1.63
1,1-DCE	22
1,1-DCA	6.18
CA	BDL
Total	1494

MW-121B

PCE	0.76
TCE	7.53
1,2-DCE	1.35
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	10

RIMW-7

PCE	24
TCE	2.58
1,2-DCE	1.84
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	0.58
1,1,1-TCA	BDL
1,1-DCE	1.75
1,1-DCA	1.07
CA	BDL
Total	32

RIMW-15

PCE	4.76
TCE	610
1,2-DCE	730
VC	0.64
1,1,2-TCA	BDL
1,2-DCA	1.26
1,1,1-TCA	BDL
1,1-DCE	2.23
1,1-DCA	0.31
CA	BDL
Total	619

RIMW-22

PCE	1.74
TCE	54
1,2-DCE	59
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	0.86
1,1-DCA	0.33
CA	BDL
Total	116

Constituent Names / EPA MCLs

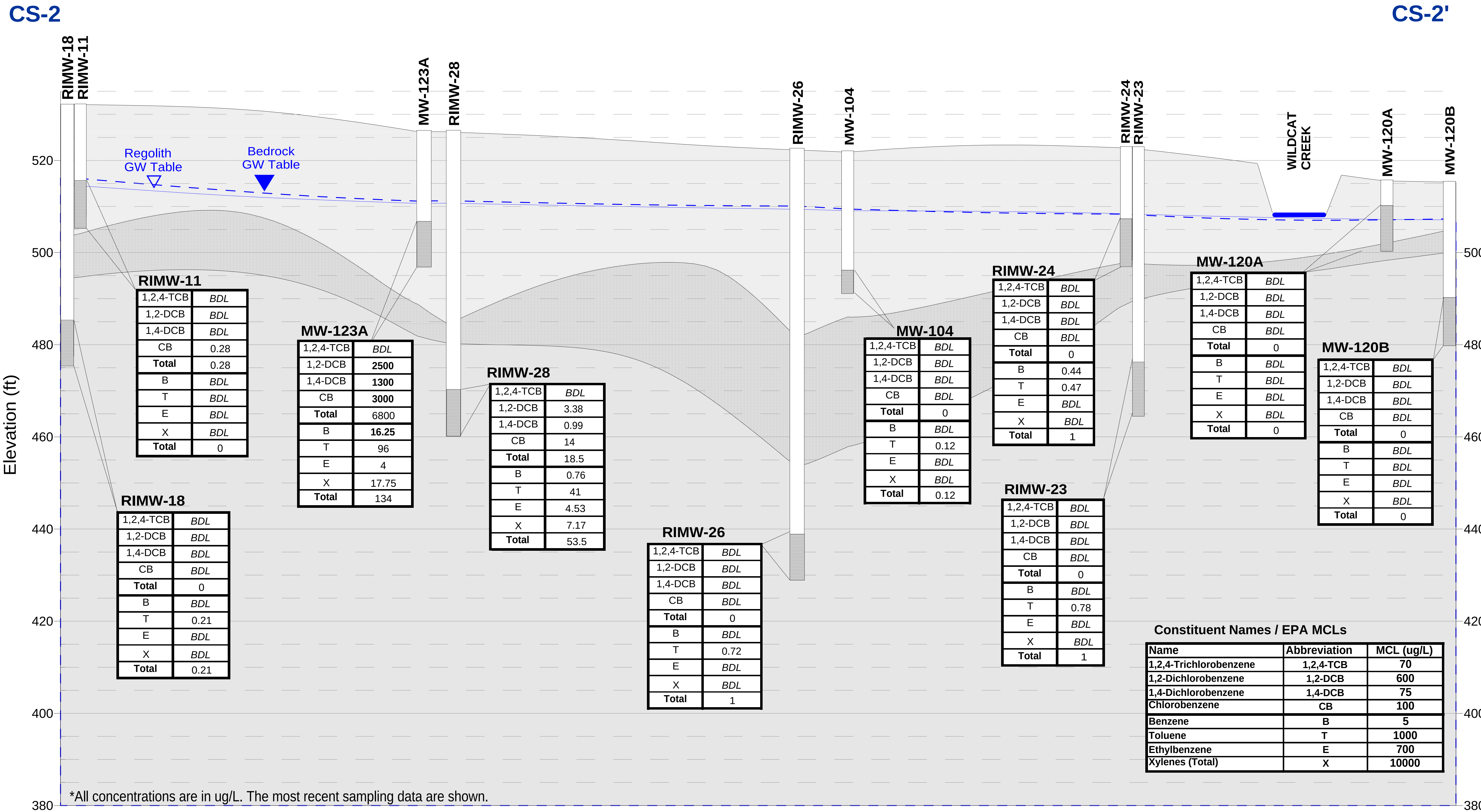
Name	Abbreviation	MCL (ug/L)
Tetrachloroethene	PCE	5
Trichloroethene	TCE	5
cis-1,2-Dichloroethene	1,2-DCE	70
Vinyl chloride	VC	2
1,1,2-Trichloroethane	1,1,2-TCA	5
1,2-Dichloroethane	1,2-DCA	5
1,1,1-Trichloroethane	1,1,1-TCA	200
1,1-Dichloroethene	1,1-DCE	7
1,1-Dichloroethane	1,1-DCA	-
Chloroethane	CA	-

*All concentrations are in ug/L. The most recent sampling data are shown. All sampling data are from the RI, except EW-3 (2004).

Saprolite
Partially Weathered Rock (PWR)
Bedrock

CDM

Figure 4-5
Cross Section 1
Chlorinated Ethenes/Ethanes
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina



RIMW-11

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	0.28
Total	0.28
B	*BDL*
T	*BDL*
E	*BDL*
X	*BDL*
Total	0

RIMW-18

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.21
E	*BDL*
X	*BDL*
Total	0.21

MW-123A

1,2,4-TCB	*BDL*
1,2-DCB	**2500**
1,4-DCB	**1300**
CB	**3000**
Total	6800
B	**16.25**
T	96
E	4
X	17.75
Total	134

RIMW-28

1,2,4-TCB	*BDL*
1,2-DCB	3.38
1,4-DCB	0.99
CB	14
Total	18.5
B	0.76
T	41
E	4.53
X	7.17
Total	53.5

RIMW-26

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.72
E	*BDL*
X	*BDL*
Total	1

MW-104

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.12
E	*BDL*
X	*BDL*
Total	0.12

RIMW-24

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	0.44
T	0.47
E	*BDL*
X	*BDL*
Total	1

RIMW-23

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.78
E	*BDL*
X	*BDL*
Total	1

MW-120A

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	*BDL*
E	*BDL*
X	*BDL*
Total	0

MW-120B

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	*BDL*
E	*BDL*
X	*BDL*
Total	0

Constituent Names / EPA MCLs

Name	Abbreviation	MCL (ug/L)
1,2,4-Trichlorobenzene	1,2,4-TCB	70
1,2-Dichlorobenzene	1,2-DCB	600
1,4-Dichlorobenzene	1,4-DCB	75
Chlorobenzene	CB	100
Benzene	B	5
Toluene	T	1000
Ethylbenzene	E	700
Xylenes (Total)	X	10000

Saprolite

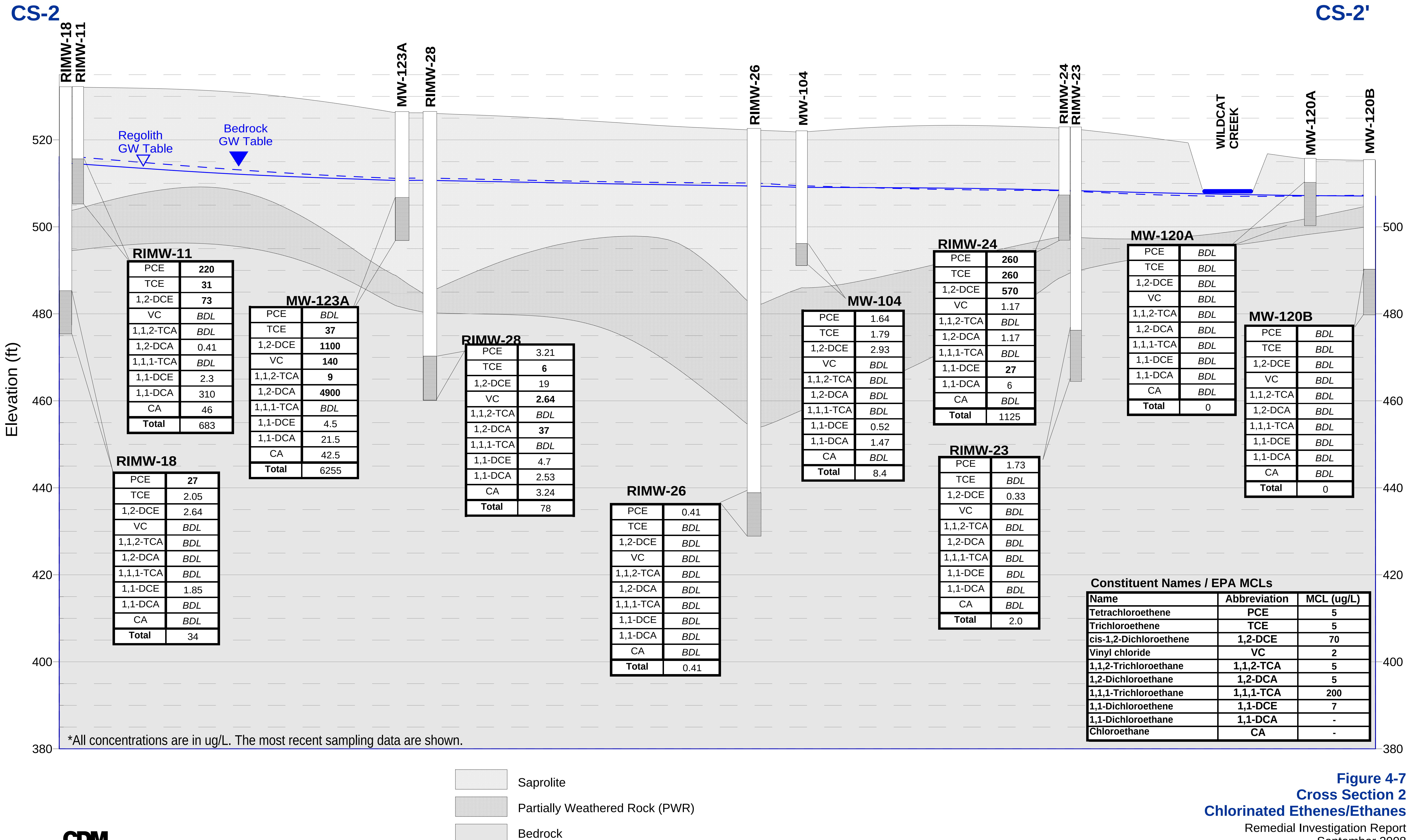
Partially Weathered Rock (PWR)

Bedrock

CDM

Figure 4-6
Cross Section 2
BTEX / Chlorinated Benzenes

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina



RIMW-11

PCE	**220**
TCE	**31**
1,2-DCE	**73**
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	0.41
1,1,1-TCA	*BDL*
1,1-DCE	2.3
1,1-DCA	310
CA	46
Total	683

RIMW-18

PCE	**27**
TCE	2.05
1,2-DCE	2.64
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	*BDL*
1,1,1-TCA	*BDL*
1,1-DCE	1.85
1,1-DCA	*BDL*
CA	*BDL*
Total	34

MW-123A

PCE	*BDL*
TCE	**37**
1,2-DCE	**1100**
VC	**140**
1,1,2-TCA	**9**
1,2-DCA	**4900**
1,1,1-TCA	*BDL*
1,1-DCE	4.5
1,1-DCA	21.5
CA	42.5
Total	6255

RIMW-28

PCE	3.21
TCE	**6**
1,2-DCE	19
VC	**2.64**
1,1,2-TCA	*BDL*
1,2-DCA	**37**
1,1,1-TCA	*BDL*
1,1-DCE	4.7
1,1-DCA	2.53
CA	3.24
Total	78

RIMW-26

PCE	0.41
TCE	*BDL*
1,2-DCE	*BDL*
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	*BDL*
1,1,1-TCA	*BDL*
1,1-DCE	*BDL*
1,1-DCA	*BDL*
CA	*BDL*
Total	0.41

MW-104

PCE	1.64
TCE	1.79
1,2-DCE	2.93
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	*BDL*
1,1,1-TCA	*BDL*
1,1-DCE	0.52
1,1-DCA	1.47
CA	*BDL*
Total	8.4

RIMW-24

PCE	**260**
TCE	**260**
1,2-DCE	**570**
VC	1.17
1,1,2-TCA	*BDL*
1,2-DCA	1.17
1,1,1-TCA	*BDL*
1,1-DCE	**27**
1,1-DCA	6
CA	*BDL*
Total	1125

RIMW-23

PCE	1.73
TCE	*BDL*
1,2-DCE	0.33
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	*BDL*
1,1,1-TCA	*BDL*
1,1-DCE	*BDL*
1,1-DCA	*BDL*
CA	*BDL*
Total	2.0

MW-120A

PCE	*BDL*
TCE	*BDL*
1,2-DCE	*BDL*
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	*BDL*
1,1,1-TCA	*BDL*
1,1-DCE	*BDL*
1,1-DCA	*BDL*
CA	*BDL*
Total	0

MW-120B

PCE	*BDL*
TCE	*BDL*
1,2-DCE	*BDL*
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	*BDL*
1,1,1-TCA	*BDL*
1,1-DCE	*BDL*
1,1-DCA	*BDL*
CA	*BDL*
Total	0

Constituent Names / EPA MCLs

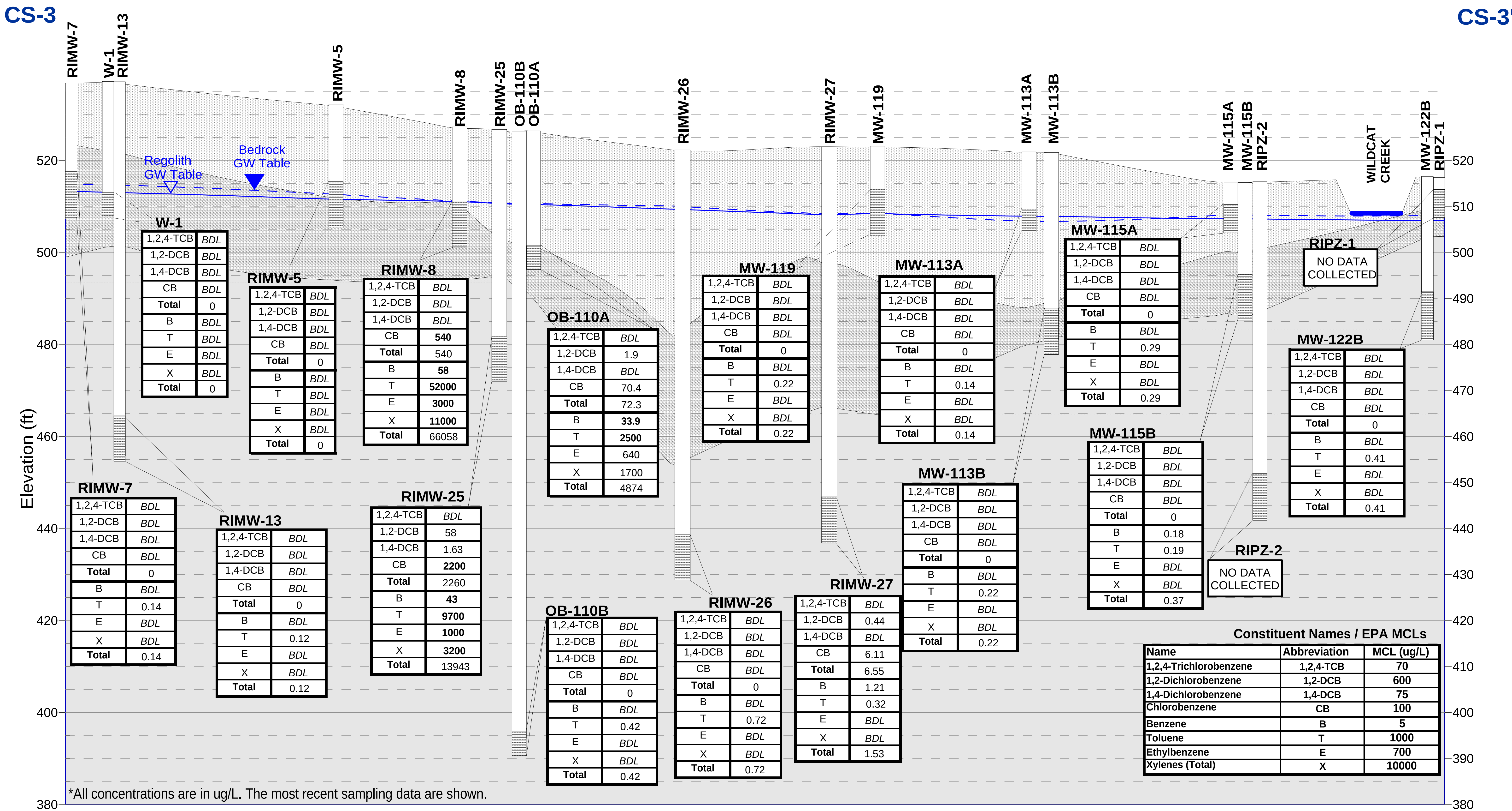
Name	Abbreviation	MCL (ug/L)
Tetrachloroethene	PCE	5
Trichloroethene	TCE	5
cis-1,2-Dichloroethene	1,2-DCE	70
Vinyl chloride	VC	2
1,1,2-Trichloroethane	1,1,2-TCA	5
1,2-Dichloroethane	1,2-DCA	5
1,1,1-Trichloroethane	1,1,1-TCA	200
1,1-Dichloroethene	1,1-DCE	7
1,1-Dichloroethane	1,1-DCA	-
Chloroethane	CA	-

*All concentrations are in ug/L. The most recent sampling data are shown.

CDM

Figure 4-7
Cross Section 2
Chlorinated Ethenes/Ethanes

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina



W-1

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	BDL
E	BDL
X	BDL
Total	0

RIMW-5

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	BDL
E	BDL
X	BDL
Total	0

RIMW-8

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	**540**
Total	540
B	**58**
T	**52000**
E	**3000**
X	**11000**
Total	66058

OB-110A

1,2,4-TCB	BDL
1,2-DCB	1.9
1,4-DCB	BDL
CB	70.4
Total	72.3
B	**33.9**
T	**2500**
E	640
X	1700
Total	4874

MW-119

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.22
E	BDL
X	BDL
Total	0.22

MW-113A

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.14
E	BDL
X	BDL
Total	0.14

MW-115A

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.29
E	BDL
X	BDL
Total	0.29

MW-122B

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.41
E	BDL
X	BDL
Total	0.41

MW-115B

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	0.18
T	0.19
E	BDL
X	BDL
Total	0.37

MW-113B

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.22
E	BDL
X	BDL
Total	0.22

RIMW-7

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.14
E	BDL
X	BDL
Total	0.14

RIMW-13

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.12
E	BDL
X	BDL
Total	0.12

RIMW-25

1,2,4-TCB	BDL
1,2-DCB	58
1,4-DCB	1.63
CB	**2200**
Total	2260
B	**43**
T	**9700**
E	**1000**
X	**3200**
Total	13943

OB-110B

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.42
E	BDL
X	BDL
Total	0.42

RIMW-26

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.72
E	BDL
X	BDL
Total	0.72

RIMW-27

1,2,4-TCB	BDL
1,2-DCB	0.44
1,4-DCB	BDL
CB	6.11
Total	6.55
B	1.21
T	0.32
E	BDL
X	BDL
Total	1.53

Constituent Names / EPA MCLs

Name	Abbreviation	MCL (ug/L)
1,2,4-Trichlorobenzene	1,2,4-TCB	70
1,2-Dichlorobenzene	1,2-DCB	600
1,4-Dichlorobenzene	1,4-DCB	75
Chlorobenzene	CB	100
Benzene	B	5
Toluene	T	1000
Ethylbenzene	E	700
Xylenes (Total)	X	10000

CDM

Figure 4-8
Cross Section 3
BTEX / Chlorinated Benzenes

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

W-1

PCE	160
TCE	17
1,2-DCE	31
VC	BDL
1,1,2-TCA	1.37
1,2-DCA	1.17
1,1,1-TCA	5.78
1,1-DCE	24
1,1-DCA	7.34
CA	BDL
Total	248

RIMW-5

PCE	55
TCE	83
1,2-DCE	90
VC	7.15
1,1,2-TCA	6.86
1,2-DCA	52000
1,1,1-TCA	30
1,1-DCE	349
1,1-DCA	52
CA	8.33
Total	52681

RIMW-8

PCE	960
TCE	580
1,2-DCE	1536
VC	844
1,1,2-TCA	140
1,2-DCA	19000
1,1,1-TCA	47000
1,1-DCE	9000
1,1-DCA	7000
CA	3000
Total	89060

OB-110A

PCE	6.9
TCE	3.9
1,2-DCE	7.2
VC	34.4
1,1,2-TCA	BDL
1,2-DCA	46.6
1,1,1-TCA	55.3
1,1-DCE	71.5
1,1-DCA	160
CA	1300
Total	1686

MW-119

PCE	BDL
TCE	BDL
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0

MW-113A

PCE	BDL
TCE	BDL
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0

MW-115A

PCE	BDL
TCE	BDL
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0

RIPZ-1

NO DATA COLLECTED

MW-122B

PCE	BDL
TCE	BDL
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0

MW-115B

PCE	BDL
TCE	0.34
1,2-DCE	11
VC	0.49
1,1,2-TCA	BDL
1,2-DCA	6.61
1,1,1-TCA	BDL
1,1-DCE	6.68
1,1-DCA	1.45
CA	BDL
Total	27

MW-113B

PCE	24
TCE	16
1,2-DCE	41
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	0.18
1,1,1-TCA	BDL
1,1-DCE	2.82
1,1-DCA	0.72
CA	BDL
Total	85

RIPZ-2

NO DATA COLLECTED

RIMW-7

PCE	24
TCE	2.58
1,2-DCE	1.84
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	0.58
1,1,1-TCA	BDL
1,1-DCE	1.75
1,1-DCA	1.07
CA	BDL
Total	32

RIMW-13

PCE	BDL
TCE	BDL
1,2-DCE	1.22
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	0.79
1,1,1-TCA	BDL
1,1-DCE	0.22
1,1-DCA	0.51
CA	BDL
Total	2.7

RIMW-25

PCE	52
TCE	100
1,2-DCE	1300
VC	800
1,1,2-TCA	36
1,2-DCA	4100
1,1,1-TCA	770
1,1-DCE	540
1,1-DCA	950
CA	2500
Total	11148

OB-110B

PCE	BDL
TCE	BDL
1,2-DCE	2.55
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	8.34
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	2.47
CA	BDL
Total	13

RIMW-26

PCE	0.41
TCE	BDL
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0.41

RIMW-27

PCE	400
TCE	370
1,2-DCE	800
VC	15
1,1,2-TCA	1.49
1,2-DCA	260
1,1,1-TCA	BDL
1,1-DCE	82
1,1-DCA	34
CA	2.92
Total	1965

Constituent Names / EPA MCLs

Name	Abbreviation	MCL (ug/L)
Tetrachloroethene	PCE	5
Trichloroethene	TCE	5
cis-1,2-Dichloroethene	1,2-DCE	70
Vinyl chloride	VC	2
1,1,2-Trichloroethane	1,1,2-TCA	5
1,2-Dichloroethane	1,2-DCA	5
1,1,1-Trichloroethane	1,1,1-TCA	200
1,1-Dichloroethene	1,1-DCE	7
1,1-Dichloroethane	1,1-DCA	-
Chloroethane	CA	-

Saprolite

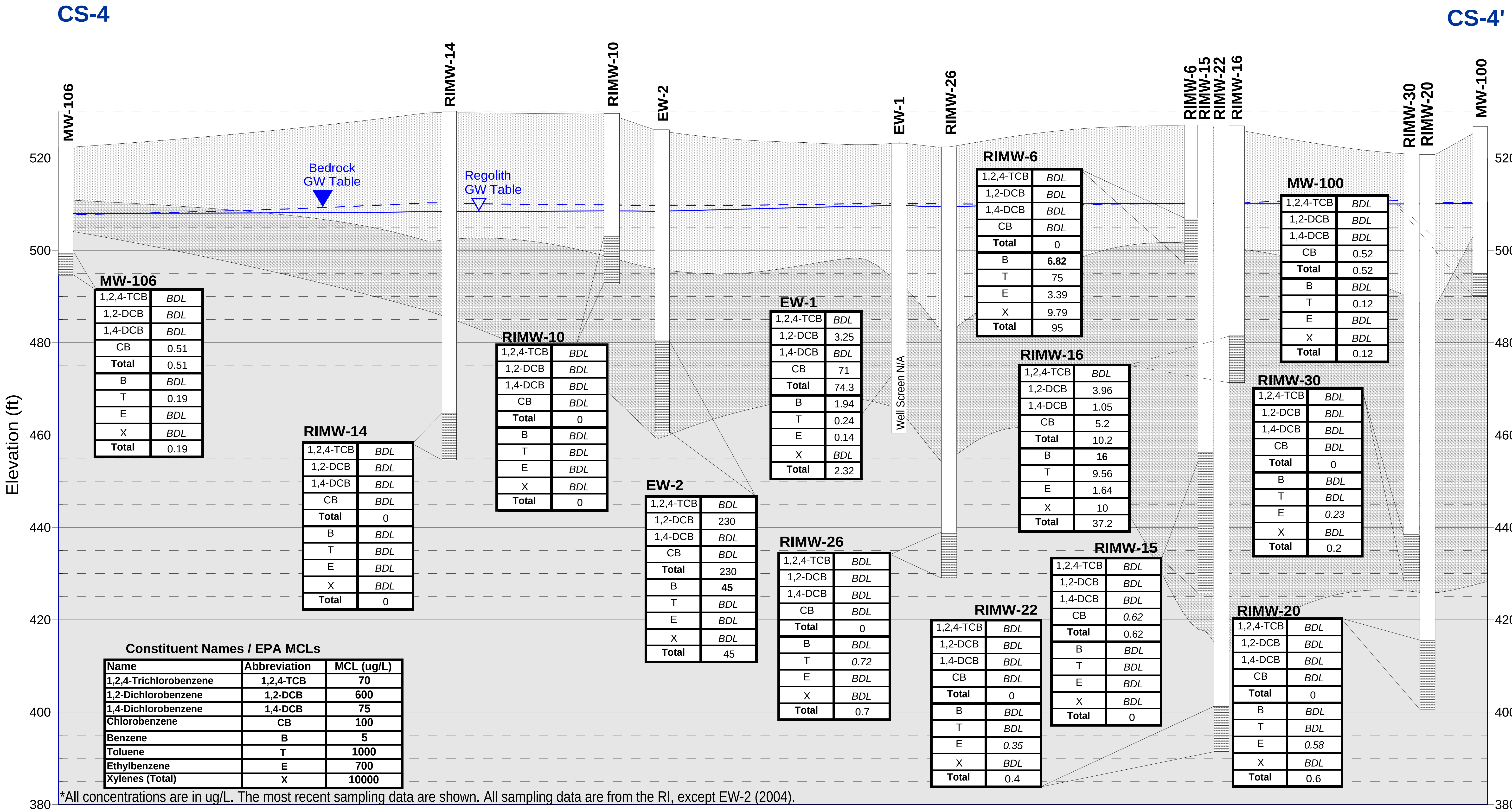
Partially Weathered Rock (PWR)

Bedrock

CDM

Figure 4-9
Cross Section 3
Chlorinated Ethenes/Ethanes

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina



MW-106

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	0.51
Total	0.51
B	BDL
T	0.19
E	BDL
X	BDL
Total	0.19

RIMW-14

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	BDL
E	BDL
X	BDL
Total	0

RIMW-10

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	BDL
E	BDL
X	BDL
Total	0

EW-2

1,2,4-TCB	BDL
1,2-DCB	230
1,4-DCB	BDL
CB	BDL
Total	230
B	**45**
T	BDL
E	BDL
X	BDL
Total	45

EW-1

1,2,4-TCB	BDL
1,2-DCB	3.25
1,4-DCB	BDL
CB	71
Total	74.3
B	1.94
T	0.24
E	0.14
X	BDL
Total	2.32

RIMW-26

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	0.72
E	BDL
X	BDL
Total	0.7

RIMW-6

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	**6.82**
T	75
E	3.39
X	9.79
Total	95

RIMW-16

1,2,4-TCB	BDL
1,2-DCB	3.96
1,4-DCB	1.05
CB	5.2
Total	10.2
B	**16**
T	9.56
E	1.64
X	10
Total	37.2

RIMW-22

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	BDL
E	0.35
X	BDL
Total	0.4

RIMW-15

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	0.62
Total	0.62
B	BDL
T	BDL
E	BDL
X	BDL
Total	0

MW-100

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	0.52
Total	0.52
B	BDL
T	0.12
E	BDL
X	BDL
Total	0.12

RIMW-30

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	BDL
E	0.23
X	BDL
Total	0.2

RIMW-20

1,2,4-TCB	BDL
1,2-DCB	BDL
1,4-DCB	BDL
CB	BDL
Total	0
B	BDL
T	BDL
E	0.58
X	BDL
Total	0.6

Constituent Names / EPA MCLs

Name	Abbreviation	MCL (ug/L)
1,2,4-Trichlorobenzene	1,2,4-TCB	70
1,2-Dichlorobenzene	1,2-DCB	600
1,4-Dichlorobenzene	1,4-DCB	75
Chlorobenzene	CB	100
Benzene	B	5
Toluene	T	1000
Ethylbenzene	E	700
Xylenes (Total)	X	10000

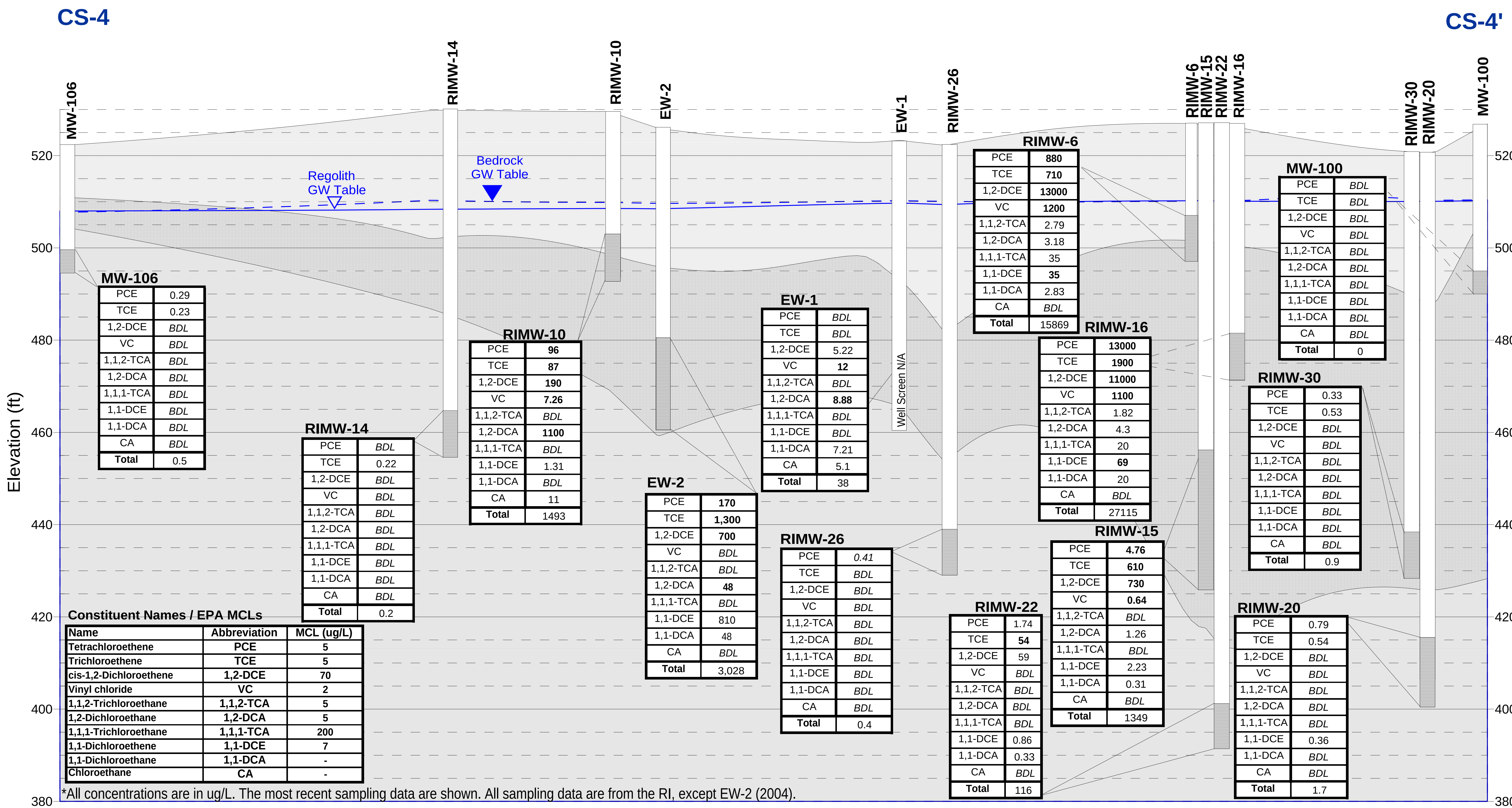
*All concentrations are in ug/L. The most recent sampling data are shown. All sampling data are from the RI, except EW-2 (2004).

Saprolite
Partially Weathered Rock (PWR)
Bedrock

CDM

Figure 4-10
Cross Section 4
BTEX / Chlorinated Benzenes

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina



MW-106

PCE	0.29
TCE	0.23
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0.5

RIMW-14

PCE	BDL
TCE	0.22
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0.2

RIMW-10

PCE	**96**
TCE	**87**
1,2-DCE	**190**
VC	**7.26**
1,1,2-TCA	BDL
1,2-DCA	**1100**
1,1,1-TCA	BDL
1,1-DCE	1.31
1,1-DCA	BDL
CA	11
Total	1493

EW-2

PCE	**170**
TCE	**1,300**
1,2-DCE	**700**
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	**48**
1,1,1-TCA	BDL
1,1-DCE	810
1,1-DCA	48
CA	BDL
Total	3,028

EW-1

PCE	BDL
TCE	BDL
1,2-DCE	5.22
VC	**12**
1,1,2-TCA	BDL
1,2-DCA	**8.88**
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	7.21
CA	5.1
Total	38

RIMW-26

PCE	0.41
TCE	BDL
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0.4

RIMW-6

PCE	**880**
TCE	**710**
1,2-DCE	**13000**
VC	**1200**
1,1,2-TCA	2.79
1,2-DCA	3.18
1,1,1-TCA	35
1,1-DCE	**35**
1,1-DCA	2.83
CA	BDL
Total	15869

RIMW-16

PCE	**13000**
TCE	**1900**
1,2-DCE	**11000**
VC	**1100**
1,1,2-TCA	1.82
1,2-DCA	4.3
1,1,1-TCA	20
1,1-DCE	**69**
1,1-DCA	20
CA	BDL
Total	27115

RIMW-15

PCE	**4.76**
TCE	**610**
1,2-DCE	**730**
VC	**0.64**
1,1,2-TCA	BDL
1,2-DCA	1.26
1,1,1-TCA	BDL
1,1-DCE	2.23
1,1-DCA	0.31
CA	BDL
Total	1349

RIMW-22

PCE	1.74
TCE	**54**
1,2-DCE	59
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	0.86
1,1-DCA	0.33
CA	BDL
Total	116

MW-100

PCE	BDL
TCE	BDL
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0

RIMW-30

PCE	0.33
TCE	0.53
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	BDL
1,1-DCA	BDL
CA	BDL
Total	0.9

RIMW-20

PCE	0.79
TCE	0.54
1,2-DCE	BDL
VC	BDL
1,1,2-TCA	BDL
1,2-DCA	BDL
1,1,1-TCA	BDL
1,1-DCE	0.36
1,1-DCA	BDL
CA	BDL
Total	1.7

Constituent Names / EPA MCLs

Name	Abbreviation	MCL (ug/L)
Tetrachloroethene	PCE	5
Trichloroethene	TCE	5
cis-1,2-Dichloroethene	1,2-DCE	70
Vinyl chloride	VC	2
1,1,2-Trichloroethane	1,1,2-TCA	5
1,2-Dichloroethane	1,2-DCA	5
1,1,1-Trichloroethane	1,1,1-TCA	200
1,1-Dichloroethene	1,1-DCE	7
1,1-Dichloroethane	1,1-DCA	-
Chloroethane	CA	-

*All concentrations are in ug/L. The most recent sampling data are shown. All sampling data are from the RI, except EW-2 (2004).

Saprolite

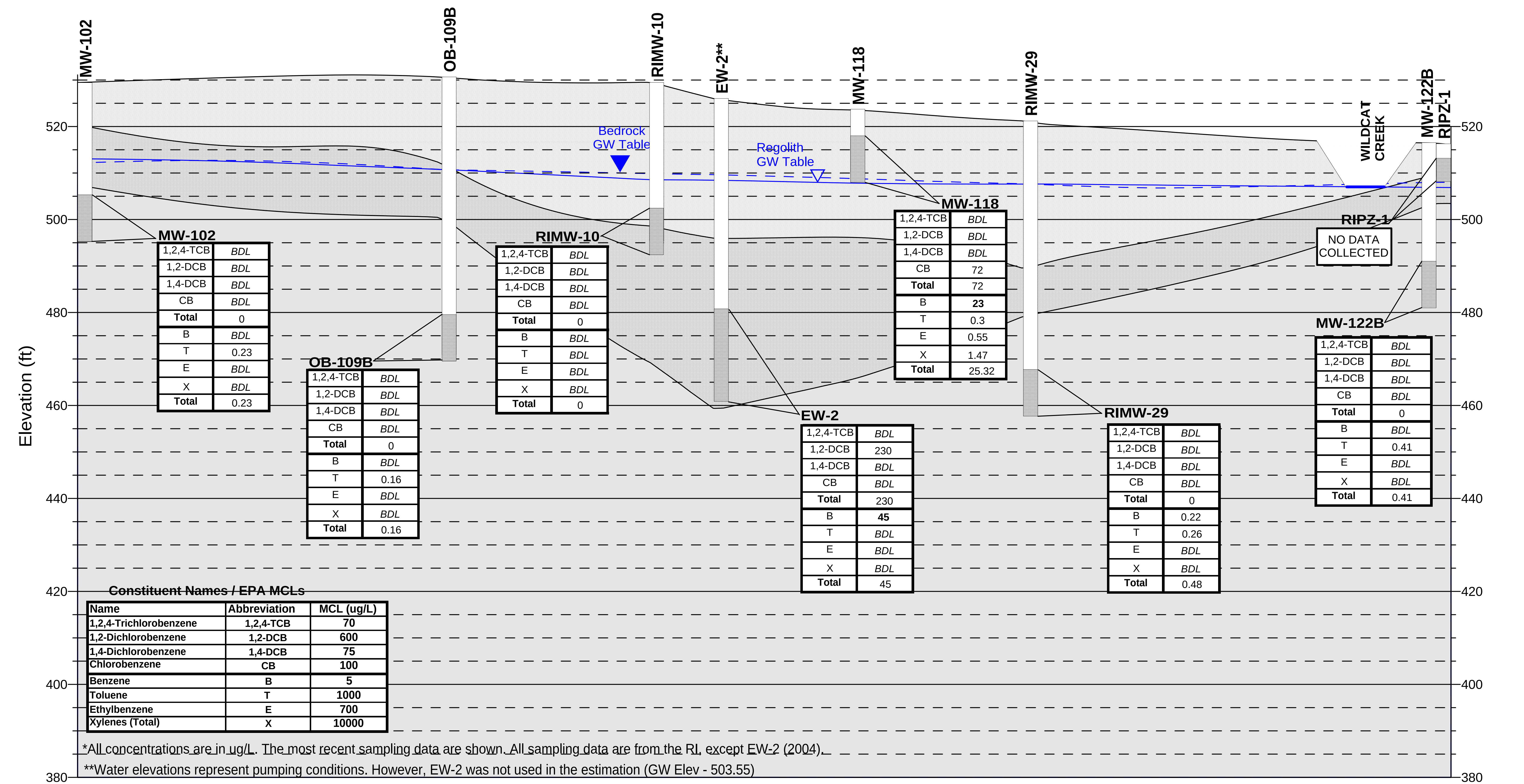
Partially Weathered Rock (PWR)

Bedrock

CDM

Figure 4-11
Cross Section 4
Chlorinated Ethenes/Ethanes

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina



MW-102

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.23
E	*BDL*
X	*BDL*
Total	0.23

OB-109B

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.16
E	*BDL*
X	*BDL*
Total	0.16

RIMW-10

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	*BDL*
E	*BDL*
X	*BDL*
Total	0

EW-2

1,2,4-TCB	*BDL*
1,2-DCB	230
1,4-DCB	*BDL*
CB	*BDL*
Total	230
B	**45**
T	*BDL*
E	*BDL*
X	*BDL*
Total	45

MW-118

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	72
Total	72
B	**23**
T	0.3
E	0.55
X	1.47
Total	25.32

RIMW-29

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	0.22
T	0.26
E	*BDL*
X	*BDL*
Total	0.48

RIPZ-1

NO DATA COLLECTED

MW-122B

1,2,4-TCB	*BDL*
1,2-DCB	*BDL*
1,4-DCB	*BDL*
CB	*BDL*
Total	0
B	*BDL*
T	0.41
E	*BDL*
X	*BDL*
Total	0.41

Constituent Names / EPA MCLs

Name	Abbreviation	MCL (ug/L)
1,2,4-Trichlorobenzene	1,2,4-TCB	70
1,2-Dichlorobenzene	1,2-DCB	600
1,4-Dichlorobenzene	1,4-DCB	75
Chlorobenzene	CB	100
Benzene	B	5
Toluene	T	1000
Ethylbenzene	E	700
Xylenes (Total)	X	10000

*All concentrations are in ug/L. The most recent sampling data are shown. All sampling data are from the RI, except EW-2 (2004).

**Water elevations represent pumping conditions. However, EW-2 was not used in the estimation (GW Elev - 503.55)

Saprolite

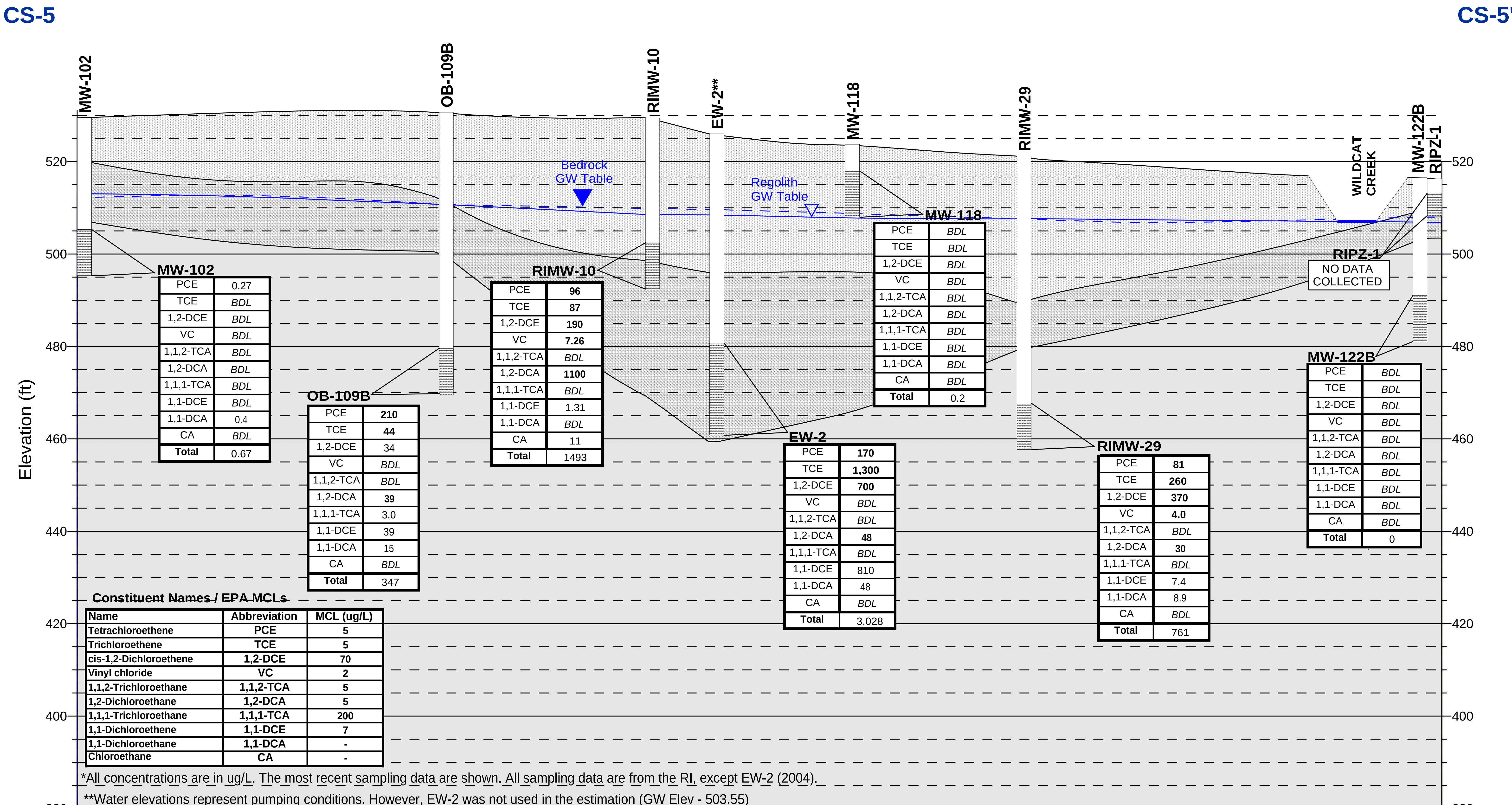
Partially Weathered Rock (PWR)

Bedrock

CDM

Figure 4-12
Cross Section 5
BTEX / Chlorinated Benzenes

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina



MW-102

PCE	0.27
TCE	*BDL*
1,2-DCE	*BDL*
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	*BDL*
1,1,1-TCA	*BDL*
1,1-DCE	*BDL*
1,1-DCA	0.4
CA	*BDL*
Total	0.67

OB-109B

PCE	**210**
TCE	**44**
1,2-DCE	34
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	**39**
1,1,1-TCA	3.0
1,1-DCE	39
1,1-DCA	15
CA	*BDL*
Total	347

RIMW-10

PCE	**96**
TCE	**87**
1,2-DCE	**190**
VC	**7.26**
1,1,2-TCA	*BDL*
1,2-DCA	**1100**
1,1,1-TCA	*BDL*
1,1-DCE	1.31
1,1-DCA	*BDL*
CA	11
Total	1493

EW-2

PCE	**170**
TCE	**1,300**
1,2-DCE	**700**
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	**48**
1,1,1-TCA	*BDL*
1,1-DCE	810
1,1-DCA	48
CA	*BDL*
Total	3,028

MW-118

PCE	*BDL*
TCE	*BDL*
1,2-DCE	*BDL*
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	*BDL*
1,1,1-TCA	*BDL*
1,1-DCE	*BDL*
1,1-DCA	*BDL*
CA	*BDL*
Total	0.2

RIMW-29

PCE	**81**
TCE	**260**
1,2-DCE	**370**
VC	**4.0**
1,1,2-TCA	*BDL*
1,2-DCA	**30**
1,1,1-TCA	*BDL*
1,1-DCE	7.4
1,1-DCA	8.9
CA	*BDL*
Total	761

MW-122B

PCE	*BDL*
TCE	*BDL*
1,2-DCE	*BDL*
VC	*BDL*
1,1,2-TCA	*BDL*
1,2-DCA	*BDL*
1,1,1-TCA	*BDL*
1,1-DCE	*BDL*
1,1-DCA	*BDL*
CA	*BDL*
Total	0

Constituent Names / EPA MCLs

Name	Abbreviation	MCL (ug/L)
Tetrachloroethene	PCE	5
Trichloroethene	TCE	5
cis-1,2-Dichloroethene	1,2-DCE	70
Vinyl chloride	VC	2
1,1,2-Trichloroethane	1,1,2-TCA	5
1,2-Dichloroethane	1,2-DCA	5
1,1,1-Trichloroethane	1,1,1-TCA	200
1,1-Dichloroethene	1,1-DCE	7
1,1-Dichloroethane	1,1-DCA	-
Chloroethane	CA	-

*All concentrations are in ug/L. The most recent sampling data are shown. All sampling data are from the RI, except EW-2 (2004).

**Water elevations represent pumping conditions. However, EW-2 was not used in the estimation (GW Elev - 503.55)

Saprolite

Partially Weathered Rock (PWR)

Bedrock

CDM

Figure 4-13
Cross Section 5
Chlorinated Ethenes/Ethanes

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

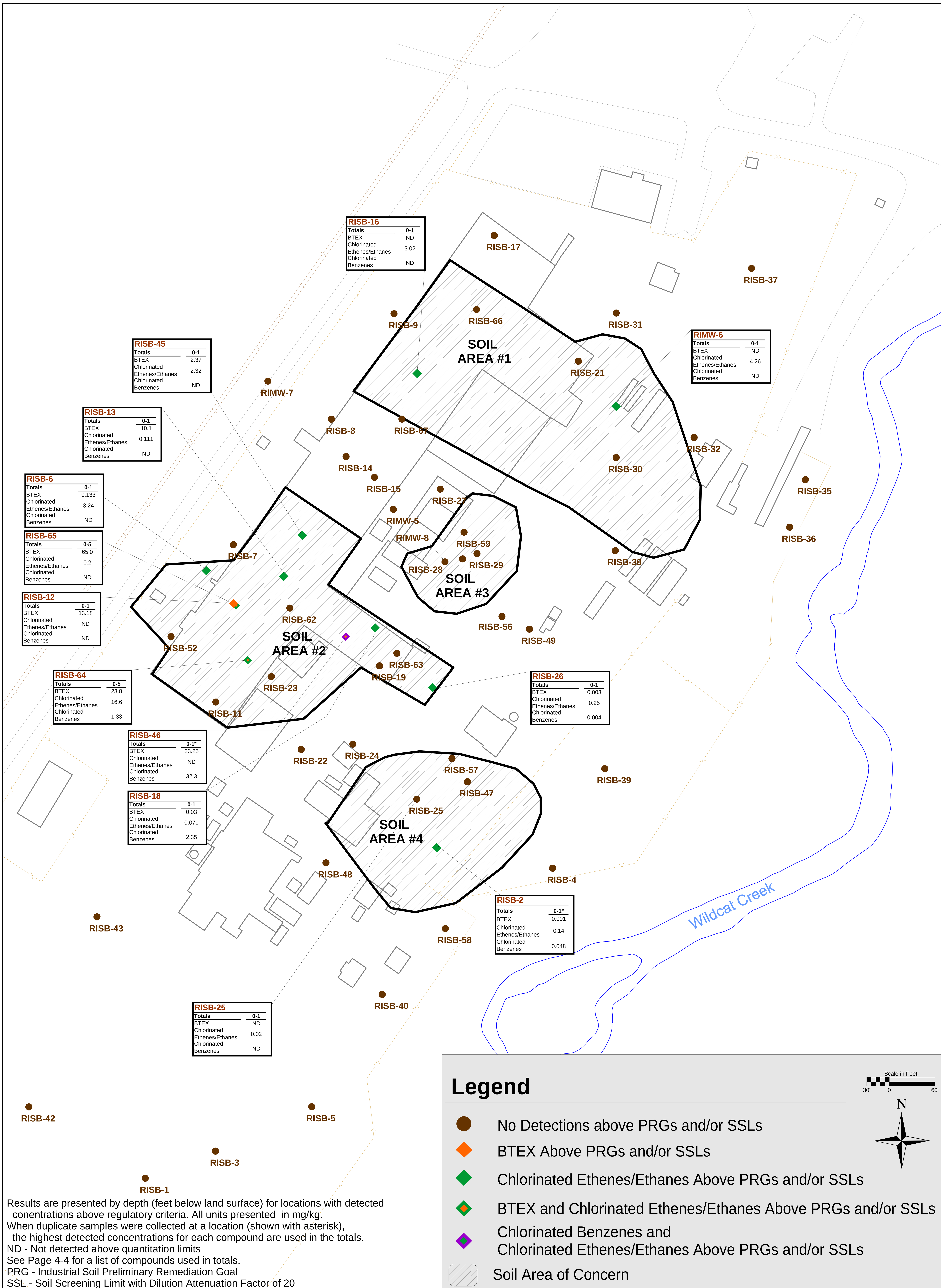
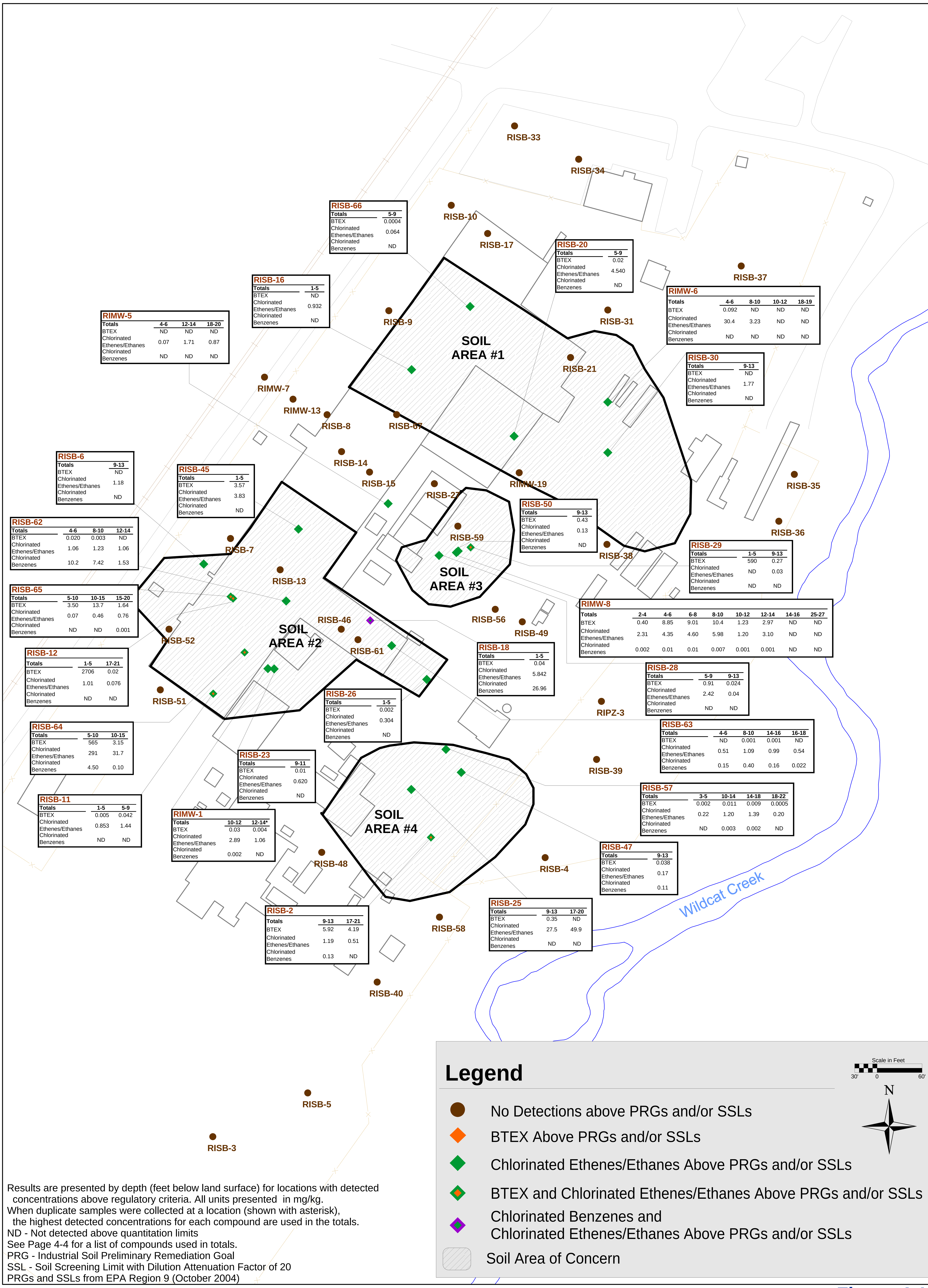


Figure 4-14
Surface Soil Locations with Detections of VOCs above Screening Criteria

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM



Results are presented by depth (feet below land surface) for locations with detected concentrations above regulatory criteria. All units presented in mg/kg.
When duplicate samples were collected at a location (shown with asterisk), the highest detected concentrations for each compound are used in the totals.
ND - Not detected above quantitation limits
See Page 4-4 for a list of compounds used in totals.
PRG - Industrial Soil Preliminary Remediation Goal
SSL - Soil Screening Limit with Dilution Attenuation Factor of 20
PRGs and SSLs from EPA Region 9 (October 2004)

Figure 4-15
Subsurface Soil Locations with Detections of VOCs above Screening Criteria

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

Well ID	Sample Date	BTEX Total (mg/L)
BP-1A	Jan-07	<0.001
EW-2	Apr-04	0.045
MW-101	Jan-07	<0.001
MW-103	Jan-07	<0.001
MW-104	Jan-07	<0.001
MW-105	Jan-07	<0.001
MW-107	Jan-07	BDL
MW-111	Jan-07	BDL
MW-112	Jan-07	BDL
MW-113A	Jan-07	<0.001
MW-114	Jan-07	BDL
MW-115A	Jan-07	<0.001
MW-118	Jan-07	0.025
MW-119	Jan-07	<0.001
MW-120A	Jan-07	BDL
MW-123A	Jan-07	0.13
OB-109	Jan-07	<0.001
OB-11	Jan-07	0.17
OB-110A	Jan-07	4.9
OB-12	Jan-07	0.30
OB-13	Jan-07	740
OB-21	Jan-07	21
OB-22	Jan-07	200
OB-23	Jan-07	0.34
OB-8A	Jan-07	6.5
OB-900	Jan-07	0.068
OB-901	Jan-07	0.038
OB-902	Jan-07	0.015
P-1	Jan-07	0.007
P-2	Jan-07	0.82
P-3	Jan-07	0.004
RIMW 1	Jan-07	0.050
RIMW 10	Jan-07	BDL
RIMW 11	Jan-07	BDL
RIMW 12	Jan-07	<0.001
RIMW 16	Jan-07	0.037
RIMW 3	Jan-07	0.013
RIMW 4	Jan-07	0.034
RIMW 5	Jan-07	0.005
RIMW 7	Jan-07	<0.001
RIMW 8	Jan-07	66
RIMW 9	Jan-07	<0.001
RIMW-24	Sep-07	<0.001
RIMW-27	Sep-07	0.002
RIMW-30	Sep-07	<0.001
W-1	Jan-07	BDL
W-2	Jan-07	BDL
W-4	Jan-07	<0.001

Total BTEX includes:
Benzene, Toluene,
Ethylbenzene, and Xylenes
BDL - Below Detection Limit

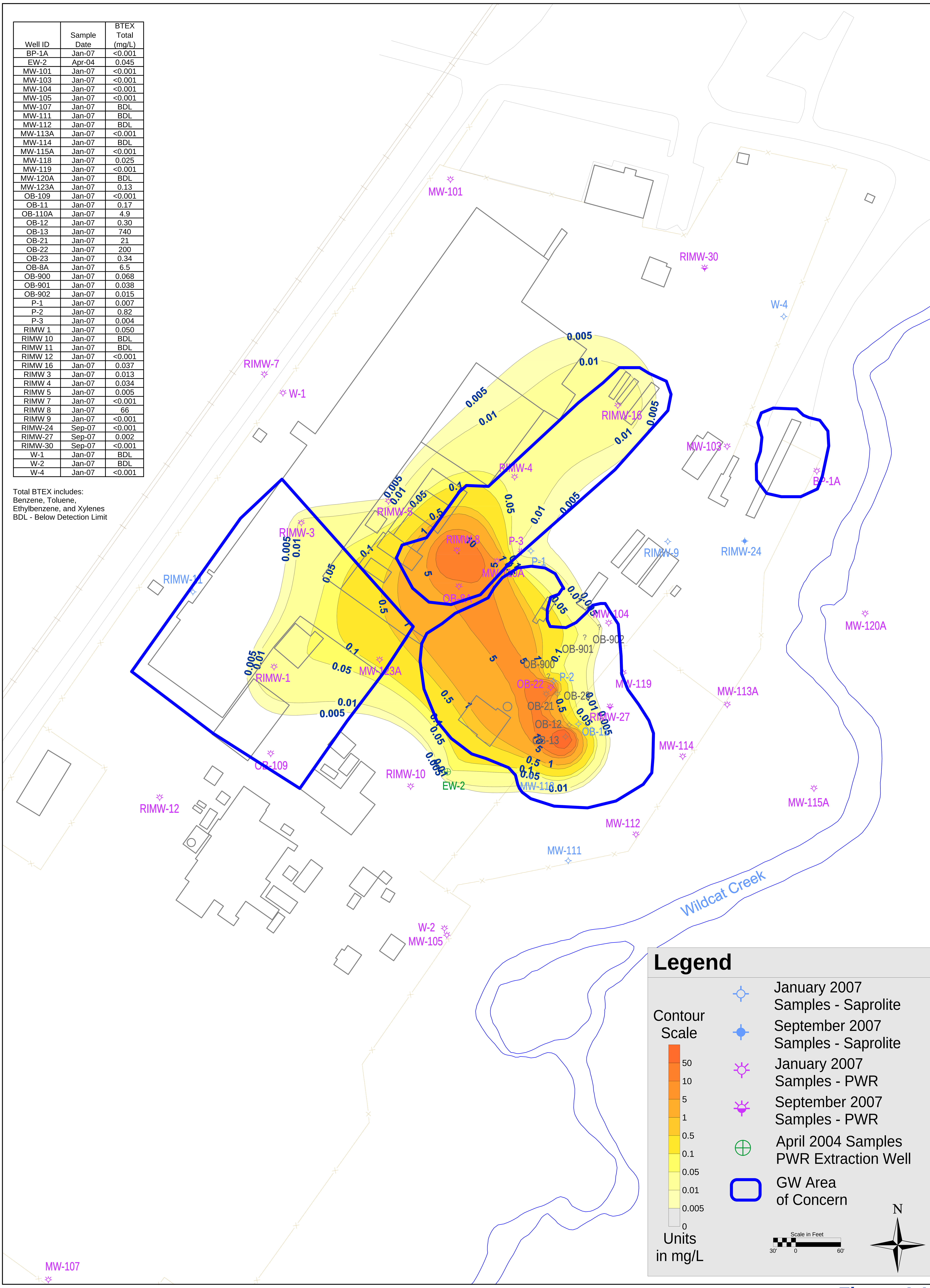


Figure 4-16
Total BTEX Concentration Map
Regolith Groundwater

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

Well ID	Sample Date	Total Chlorinated Ethenes/Ethanes (mg/L)
BP-1A	Jan-07	0.053
EW-2	Apr-04	3.0
MW-101	Jan-07	0.002
MW-103	Jan-07	0.002
MW-104	Jan-07	0.008
MW-105	Jan-07	<0.001
MW-107	Jan-07	BDL
MW-111	Jan-07	BDL
MW-112	Jan-07	BDL
MW-113A	Jan-07	BDL
MW-114	Jan-07	BDL
MW-115A	Jan-07	BDL
MW-118	Jan-07	BDL
MW-119	Jan-07	BDL
MW-120A	Jan-07	BDL
MW-123A	Jan-07	6.3
OB-109	Jan-07	0.067
OB-11	Jan-07	0.004
OB-110A	Jan-07	1.7
OB-12	Jan-07	0.002
OB-13	Jan-07	BDL
OB-21	Jan-07	BDL
OB-22	Jan-07	BDL
OB-23	Jan-07	0.018
OB-8A	Jan-07	2.5
OB-900	Jan-07	<0.001
OB-901	Jan-07	BDL
OB-902	Jan-07	<0.001
P-1	Jan-07	3.1
P-2	Jan-07	0.018
P-3	Jan-07	6.9
RIMW 1	Jan-07	21
RIMW 10	Jan-07	1.5
RIMW 11	Jan-07	0.68
RIMW 12	Jan-07	0.016
RIMW 16	Jan-07	27
RIMW 3	Jan-07	14
RIMW 4	Jan-07	10
RIMW 5	Jan-07	53
RIMW 7	Jan-07	0.032
RIMW 8	Jan-07	89
RIMW 9	Jan-07	0.24
RIMW-24	Sep-07	1.1
RIMW-27	Sep-07	2.0
RIMW-30	Sep-07	<0.001
W-1	Jan-07	0.25
W-2	Jan-07	BDL
W-4	Jan-07	<0.001

Total Chlorinated Ethenes/Ethanes include:
Chloroethane, 1,1-Dichloroethane,
1,1-Dichloroethene, 1,2-Dichloroethane,
cis-1,2-Dichloroethene, 1,1,1-Trichloroethane,
Tetrachloroethene, 1,1,2,2-Tetrachloroethane,
Trichloroethene, 1,1,2-Trichloroethane,
and Vinyl Chloride
BDL - Below Detection Limit

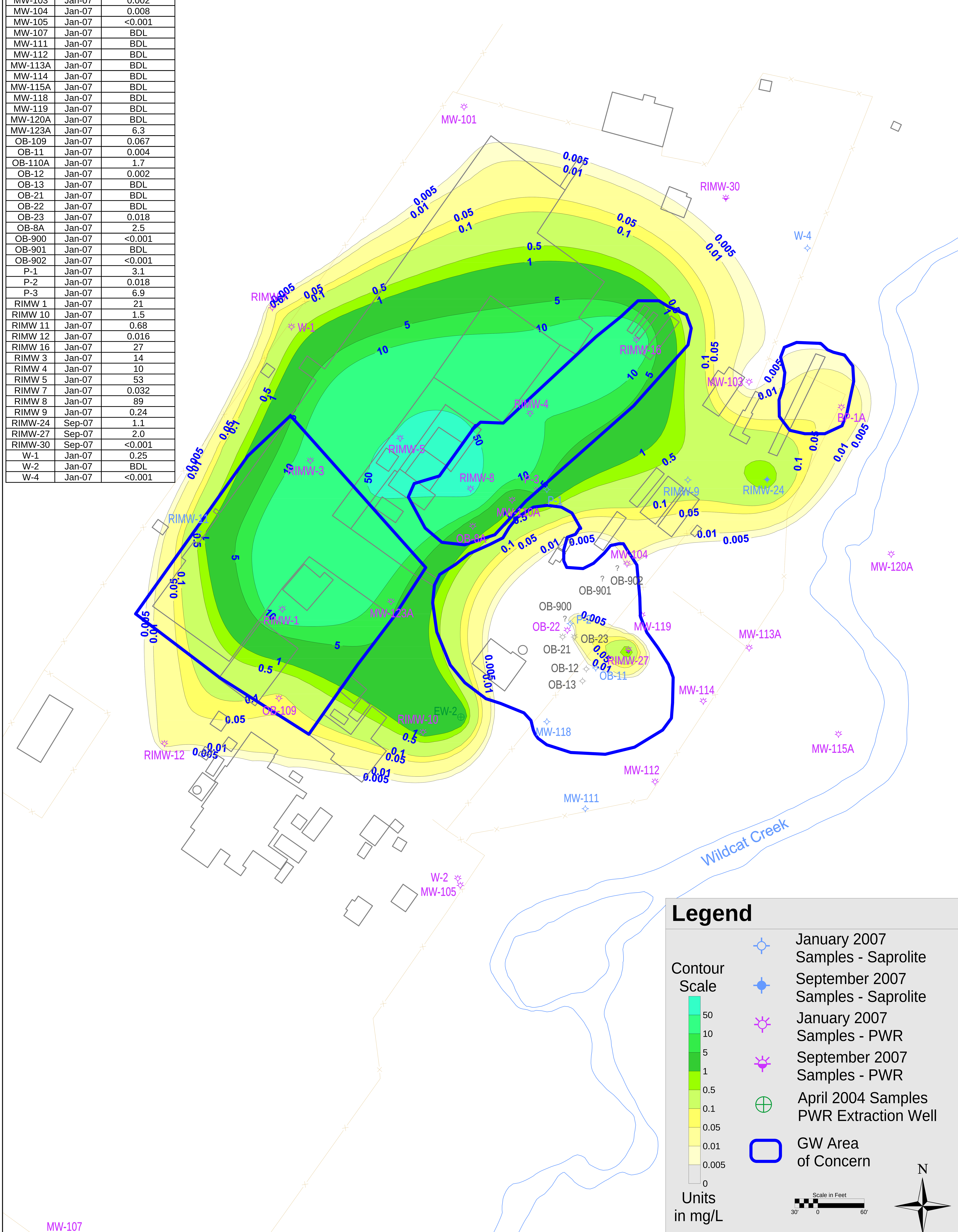


Figure 4-17
Total Chlorinated Ethenes/Ethanes Concentration Map
Regolith Groundwater

CDM

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

Well ID	Sample Date	Total Chlorinated Benzenes (mg/L)
BP-1A	Jan-07	0.002
EW-2	Apr-04	0.23
MW-101	Jan-07	<0.001
MW-103	Jan-07	BDL
MW-104	Jan-07	BDL
MW-105	Jan-07	0.003
MW-107	Jan-07	BDL
MW-111	Jan-07	<0.001
MW-112	Jan-07	BDL
MW-113A	Jan-07	BDL
MW-114	Jan-07	BDL
MW-115A	Jan-07	BDL
MW-118	Jan-07	0.07
MW-119	Jan-07	BDL
MW-120A	Jan-07	BDL
MW-123A	Jan-07	6.9
OB-109	Jan-07	BDL
OB-11	Jan-07	BDL
OB-110A	Jan-07	0.07
OB-12	Jan-07	BDL
OB-13	Jan-07	BDL
OB-21	Jan-07	BDL
OB-22	Jan-07	BDL
OB-23	Jan-07	0.001
OB-8A	Jan-07	0.47
OB-900	Jan-07	BDL
OB-901	Jan-07	BDL
OB-902	Jan-07	BDL
P-1	Jan-07	0.046
P-2	Jan-07	BDL
P-3	Jan-07	0.072
RIMW 1	Jan-07	0.025
RIMW 10	Jan-07	BDL
RIMW 11	Jan-07	<0.001
RIMW 12	Jan-07	BDL
RIMW 16	Jan-07	0.010
RIMW 3	Jan-07	0.002
RIMW 4	Jan-07	0.12
RIMW 5	Jan-07	0.012
RIMW 7	Jan-07	<0.001
RIMW 8	Jan-07	0.54
RIMW 9	Jan-07	<0.001
RIMW-24	Sep-07	BDL
RIMW-27	Sep-07	0.007
RIMW-30	Sep-07	BDL
W-1	Jan-07	BDL
W-2	Jan-07	BDL
W-4	Jan-07	BDL

Total Chlorinated Benzenes include:
1,2-Dichlorobenzene, 1,3-Dichlorobenzene,
1,4-Dichlorobenzene, 1,2,3-Trichlorobenzene,
1,2,4-Trichlorobenzene, and Chlorobenzene
BDL - Below Detection Limit

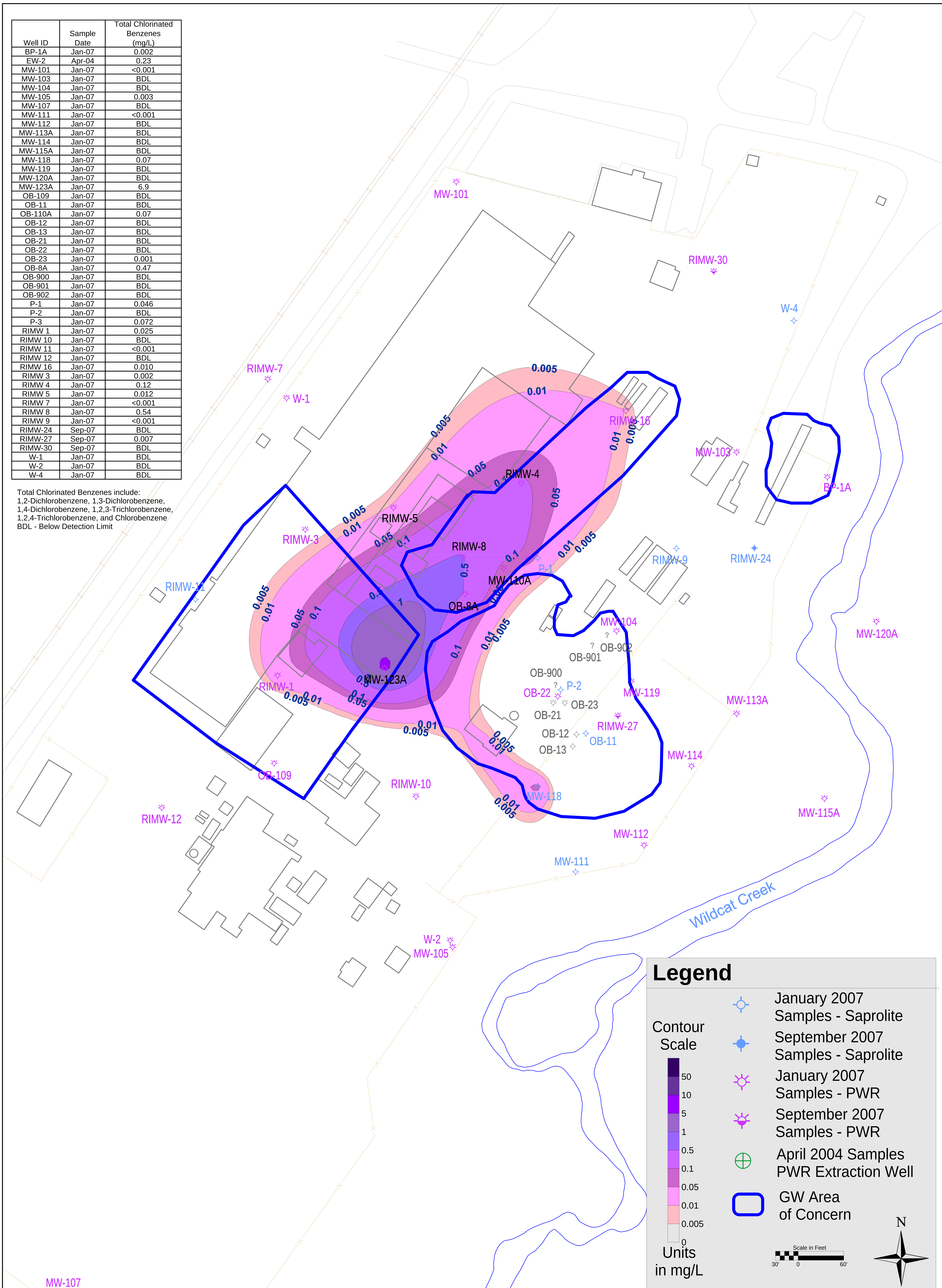


Figure 4-18
Total Chlorinated Benzenes Concentration Map
Regolith Groundwater

Remedial Investigation Reoport
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

Well ID	Sample Date	BTEX Total (mg/L)
BP-1B	Jan-07	<0.001
EW-3	Apr-04	<0.001
MW-100	Jan-07	<0.001
MW-102	Jan-07	<0.001
MW-108	Jan-07	BDL
MW-113B	Jan-07	<0.001
MW-115B	Jan-07	<0.001
MW-120B	Jan-07	BDL
MW-121B	Sep-07	BDL
MW-122B	Sep-07	<0.001
OB-109B	Jan-07	<0.001
RIMW 13	Jan-07	<0.001
RIMW 14	Jan-07	BDL
RIMW 18	Jan-07	<0.001
RIMW 19	Jan-07	<0.001
RIMW-20	Sep-07	<0.001
RIMW-21	Sep-07	<0.001
RIMW-22	Sep-07	<0.001
RIMW-23	Sep-07	<0.001
RIMW-25	Sep-07	14
RIMW-26	Sep-07	<0.001
RIMW-28	Sep-07	0.053
RIMW-29	Sep-07	<0.001

Total BTEX includes:
Benzene, Toluene,
Ethylbenzene, and Xylenes
BDL - Below Detection Limit

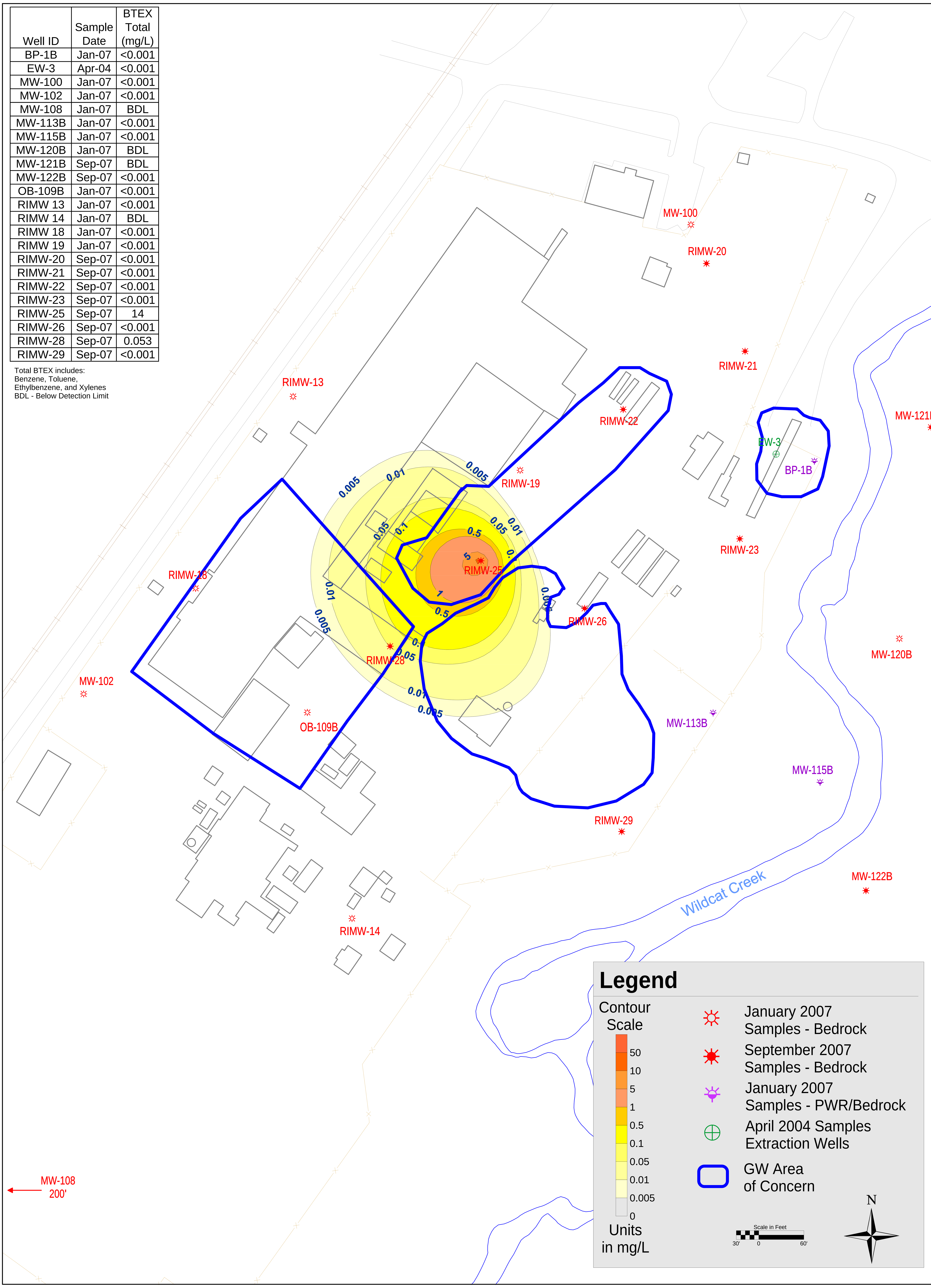


Figure 4-19
Total BTEX Concentration Map
Bedrock Groundwater
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

Well ID	Sample Date	Total Chlorinated Ethene Ethanes (mg/L)
BP-1B	Jan-07	1.5
EW-3	Apr-04	2.4
MW-100	Jan-07	BDL
MW-102	Jan-07	<0.001
MW-108	Jan-07	BDL
MW-113B	Jan-07	0.085
MW-115B	Jan-07	0.027
MW-120B	Jan-07	BDL
MW-121B	Sep-07	0.010
MW-122B	Sep-07	BDL
OB-109B	Jan-07	0.35
RIMW 13	Jan-07	0.003
RIMW 14	Jan-07	<0.001
RIMW 18	Jan-07	0.03
RIMW 19	Jan-07	0.28
RIMW-20	Sep-07	0.002
RIMW-21	Sep-07	BDL
RIMW-22	Sep-07	0.12
RIMW-23	Sep-07	0.002
RIMW-25	Sep-07	11
RIMW-26	Sep-07	<0.001
RIMW-28	Sep-07	0.08
RIMW-29	Sep-07	0.76

Total Chlorinated Ethenes/Ethanes include:
Chloroethane, 1,1-Dichloroethane,
1,1-Dichloroethene, 1,2-Dichloroethane,
cis-1,2-Dichloroethene, 1,1,1-Trichloroethane,
Tetrachloroethene, 1,1,2,2-Tetrachloroethane,
Trichloroethene, 1,1,2-Trichloroethane,
and Vinyl Chloride
BDL - Below Detection Limit

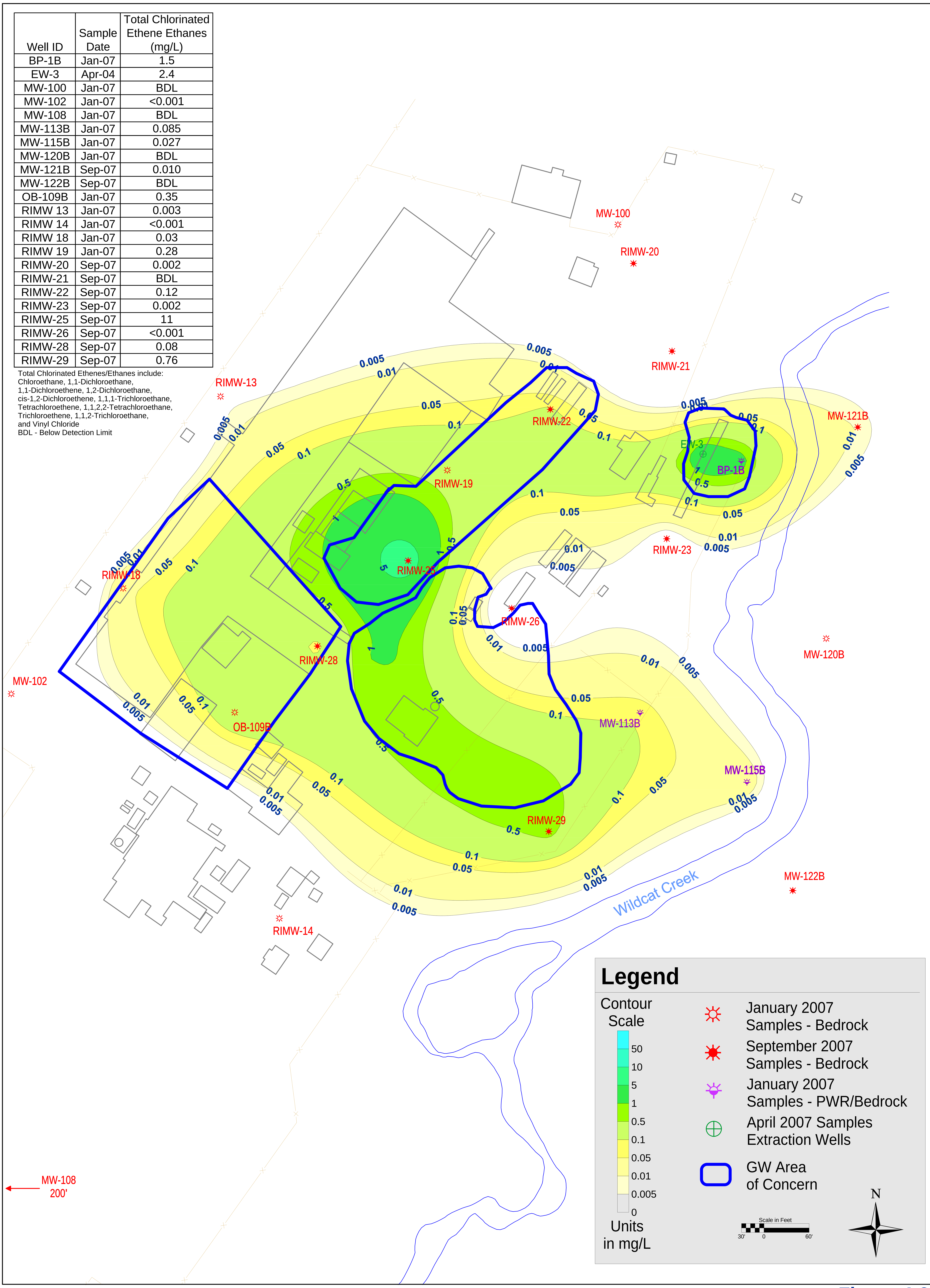


Figure 4-20
Total Chlorinated Ethenes/Ethanes Concentration Map
Bedrock Groundwater

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

Well ID	Sample Date	Total Chlorinated Benzenes (mg/L)
BP-1B	Jan-07	0.002
EW-3	Apr-04	<0.001
MW-100	Jan-07	<0.001
MW-102	Jan-07	BDL
MW-108	Jan-07	BDL
MW-113B	Jan-07	BDL
MW-115B	Jan-07	BDL
MW-120B	Jan-07	BDL
MW-121B	Sep-07	BDL
MW-122B	Sep-07	BDL
OB-109B	Jan-07	BDL
RIMW 13	Jan-07	BDL
RIMW 14	Jan-07	BDL
RIMW 18	Jan-07	BDL
RIMW 19	Jan-07	BDL
RIMW-20	Sep-07	BDL
RIMW-21	Sep-07	BDL
RIMW-22	Sep-07	BDL
RIMW-23	Sep-07	BDL
RIMW-25	Sep-07	2.3
RIMW-26	Sep-07	BDL
RIMW-28	Sep-07	0.018
RIMW-29	Sep-07	BDL

Total Chlorinated Benzenes include:
1,2-Dichlorobenzene, 1,3-Dichlorobenzene,
1,4-Dichlorobenzene, 1,2,3-Trichlorobenzene,
1,2,4-Trichlorobenzene, and Chlorobenzene
BDL - Below Detection Limit

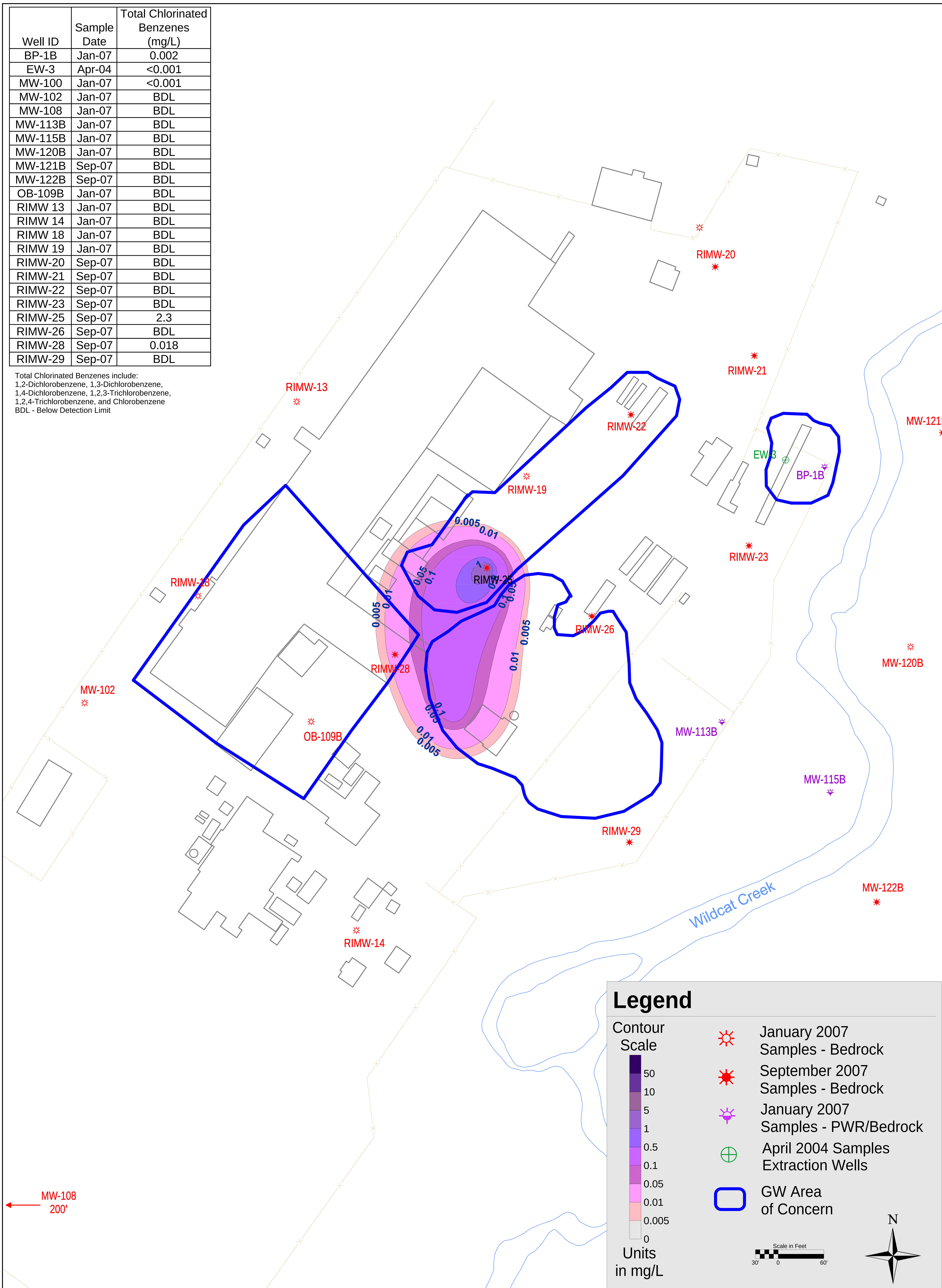


Figure 4-21
Total Chlorinated Benzenes Concentration Map
Bedrock Groundwater

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

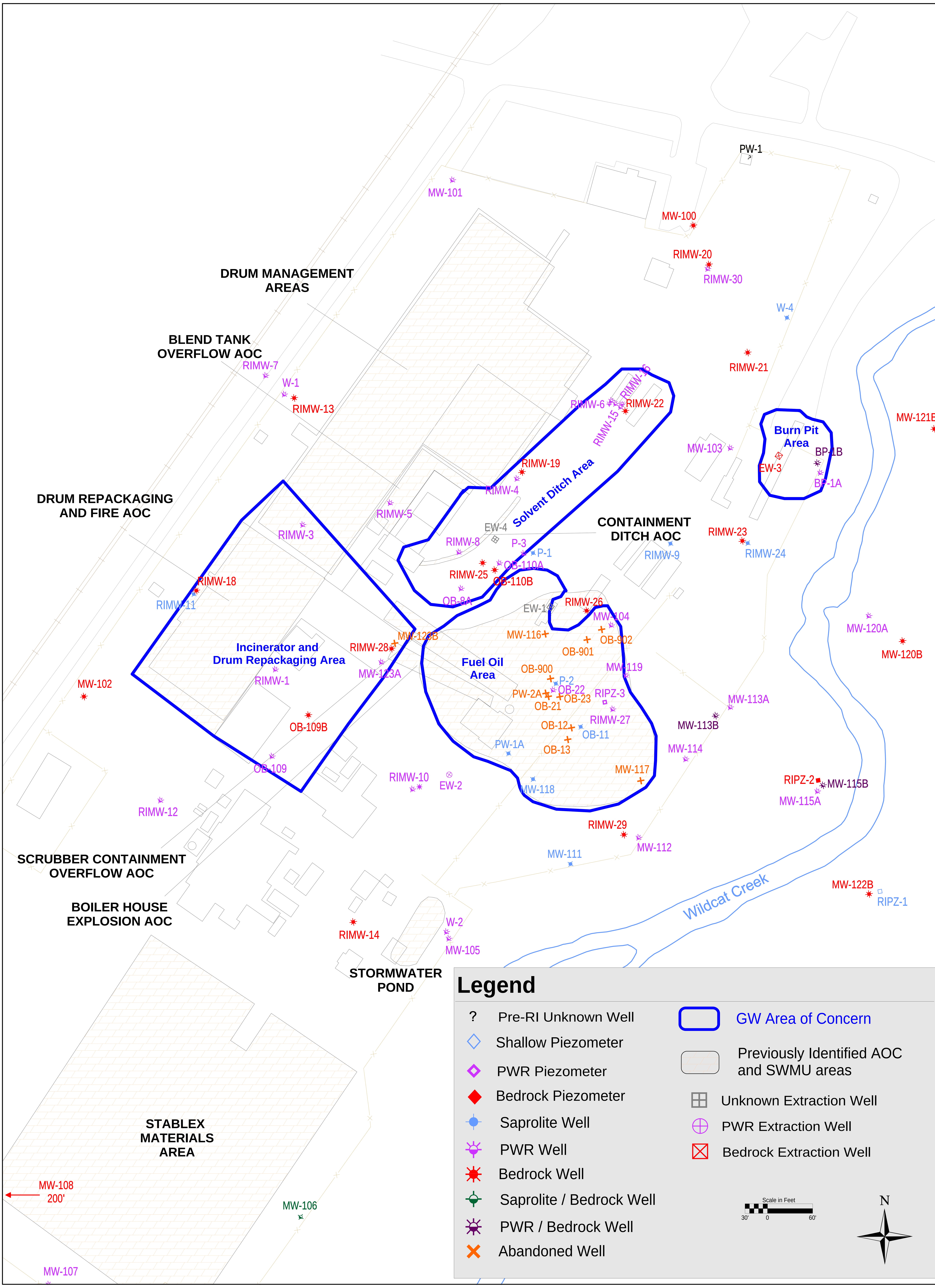


Figure 4-22
Groundwater Areas of Concern

CDM

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

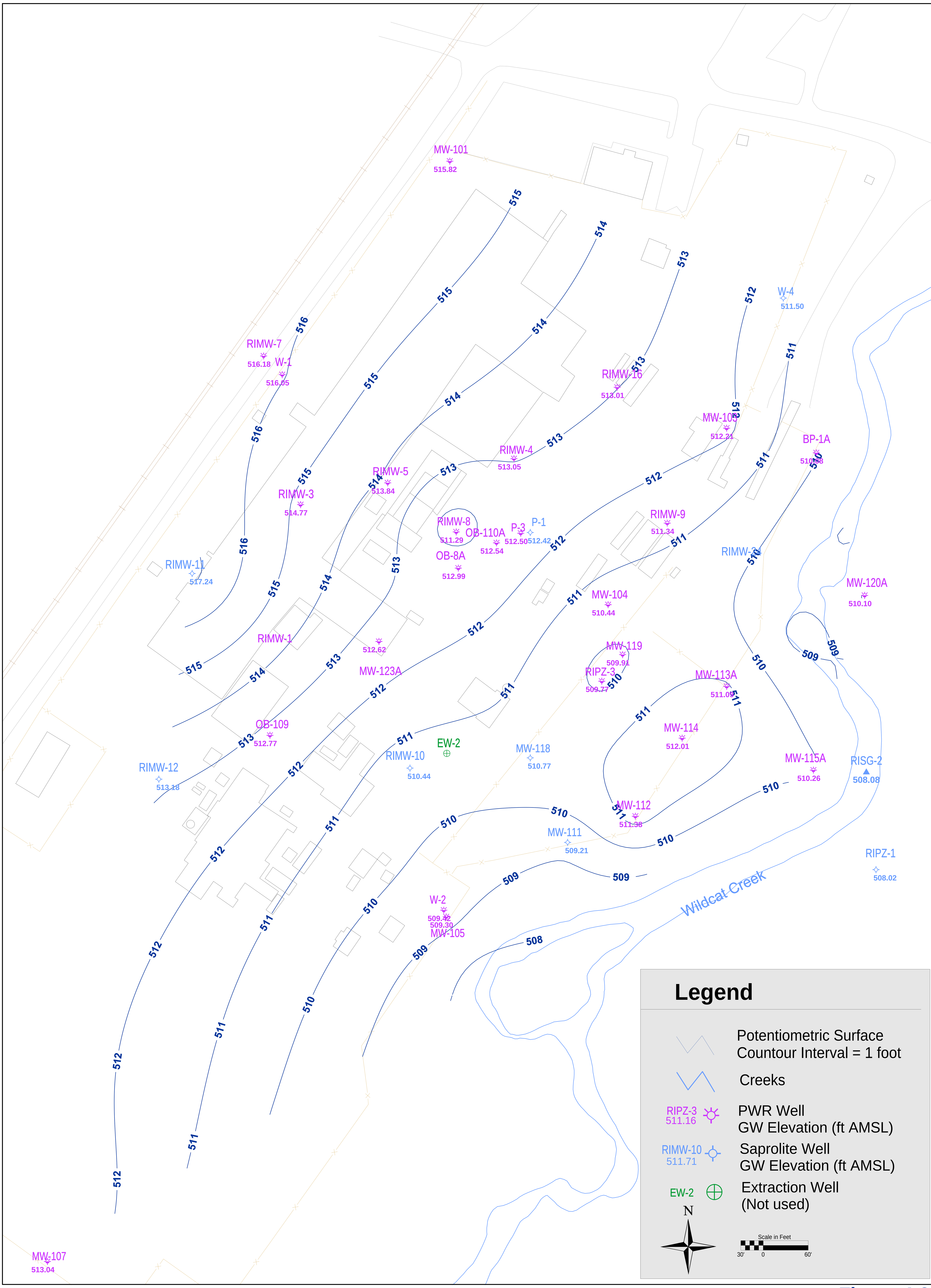


Figure 4-23
Regolith Potentiometric Surface Map
Pre-Equilibrium (Extraction Pumps ON)
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

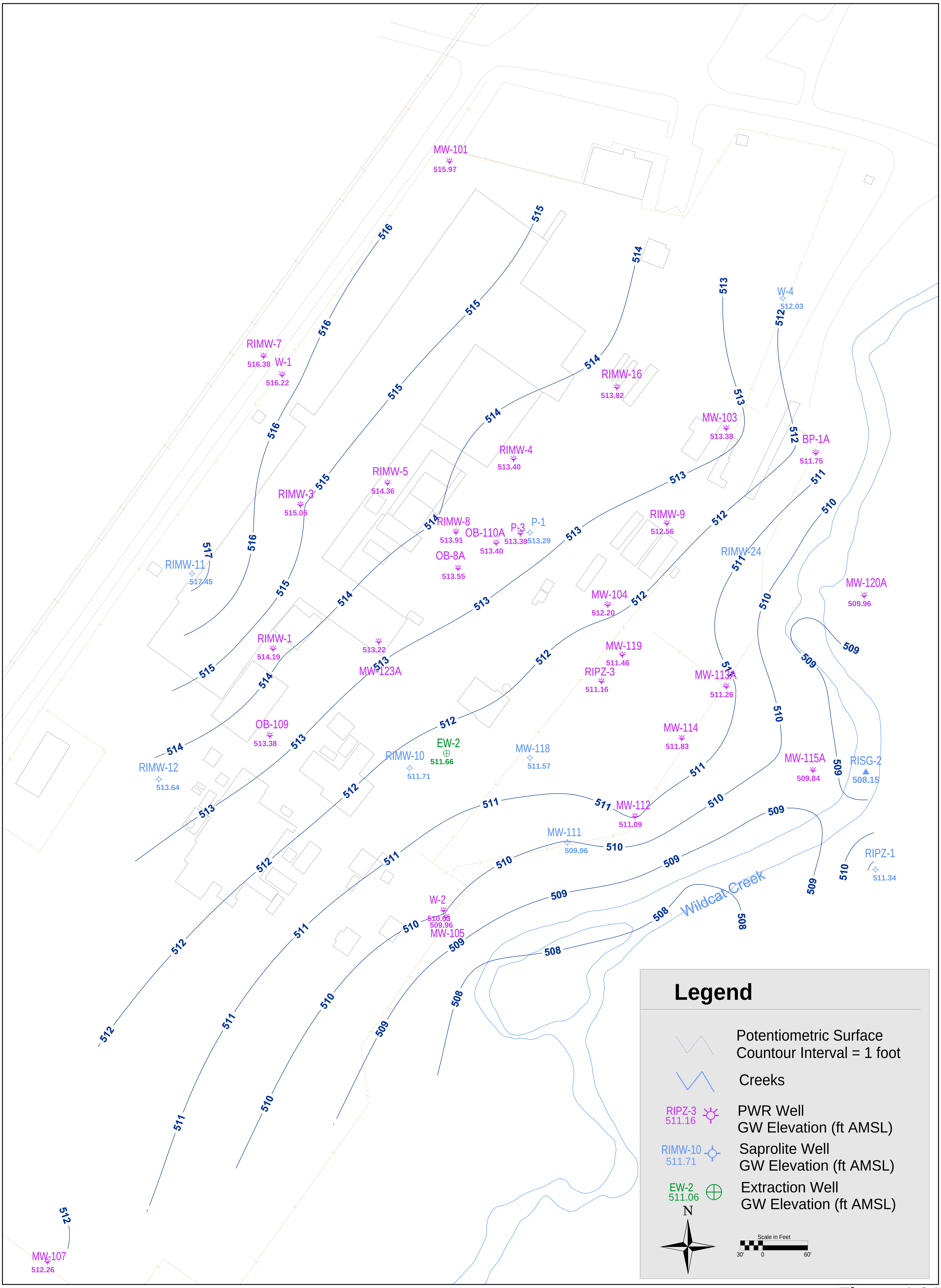


Figure 4-24
Regolith Potentiometric Surface Map
Post-Equilibrium (Extraction Pumps OFF)
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

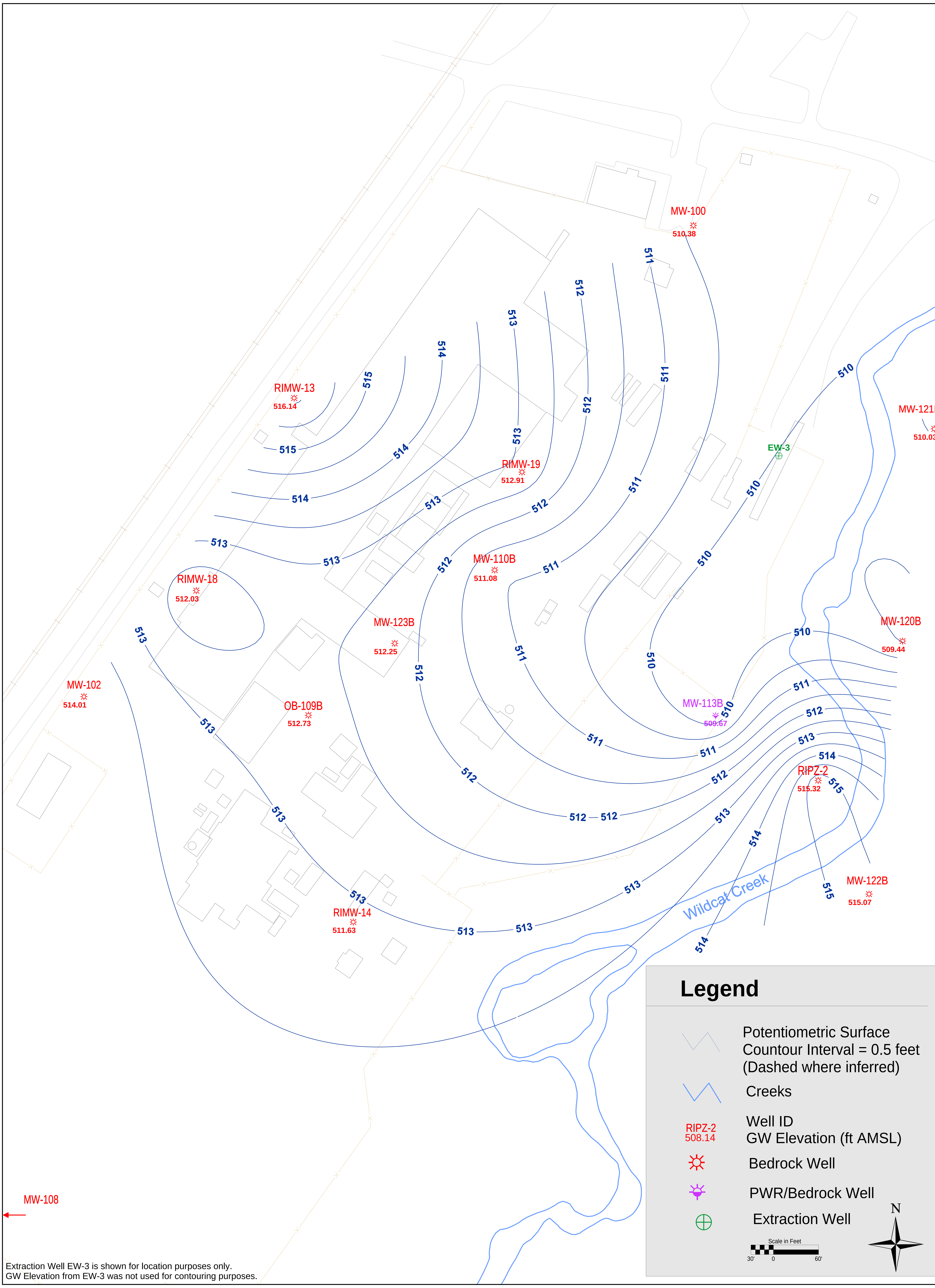


Figure 4-25
Bedrock Potentiometric Surface Map
Pre-Equilibrium (Extraction Pumps ON)
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

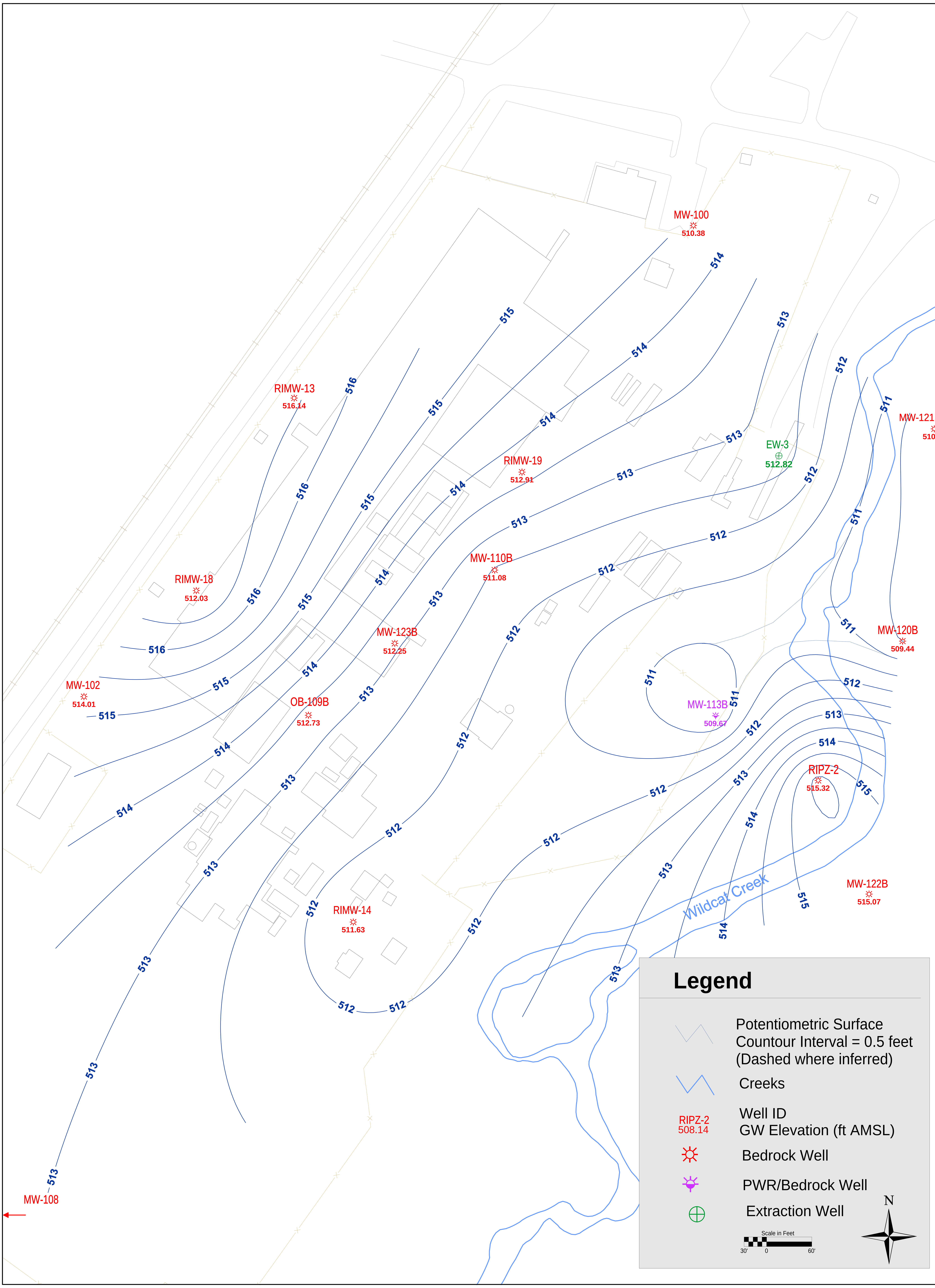


Figure 4-26
Bedrock Potentiometric Surface Map
Post-Equilibrium (Extraction Pumps OFF)
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

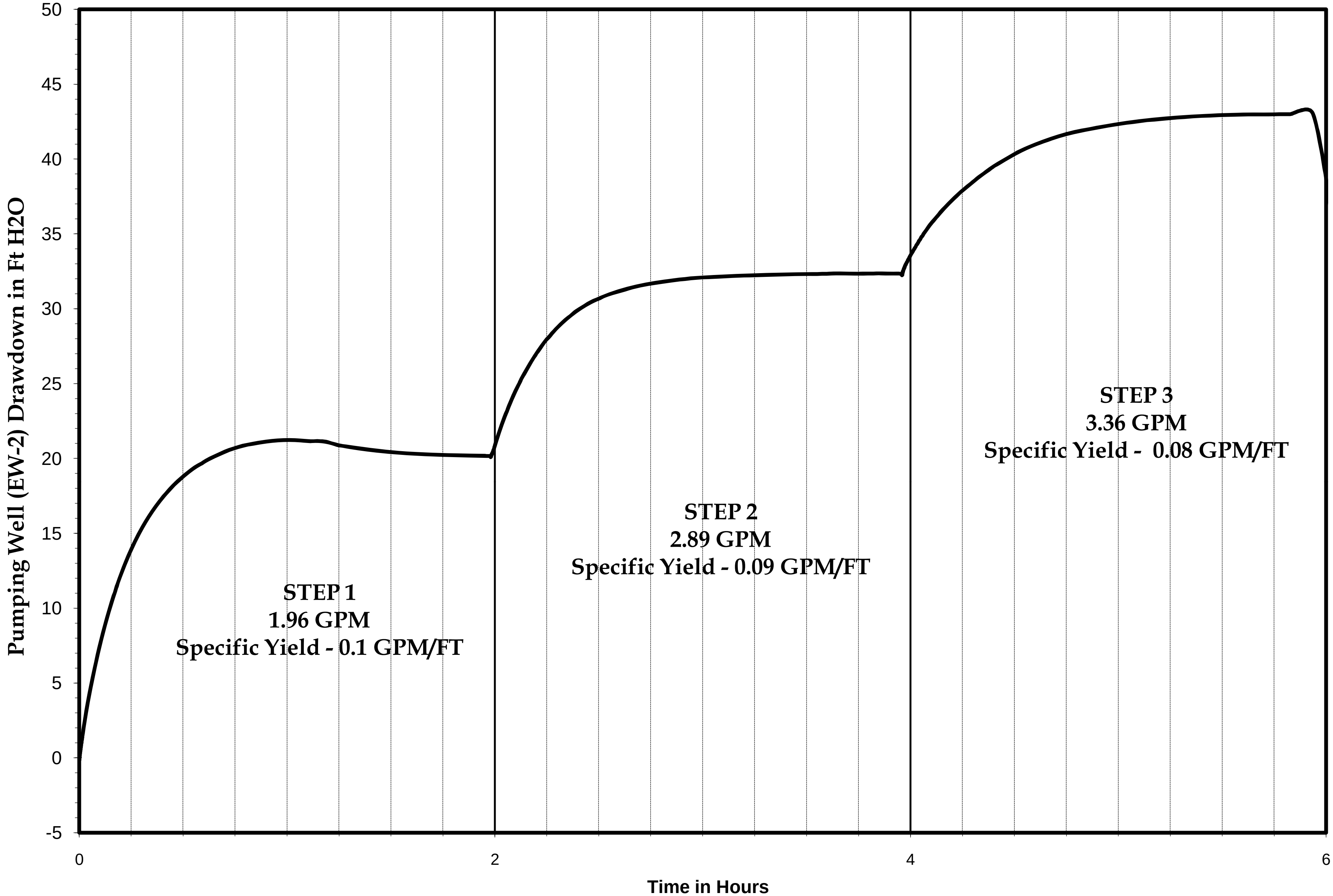


Figure 4-27
EW-2 Step Test
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

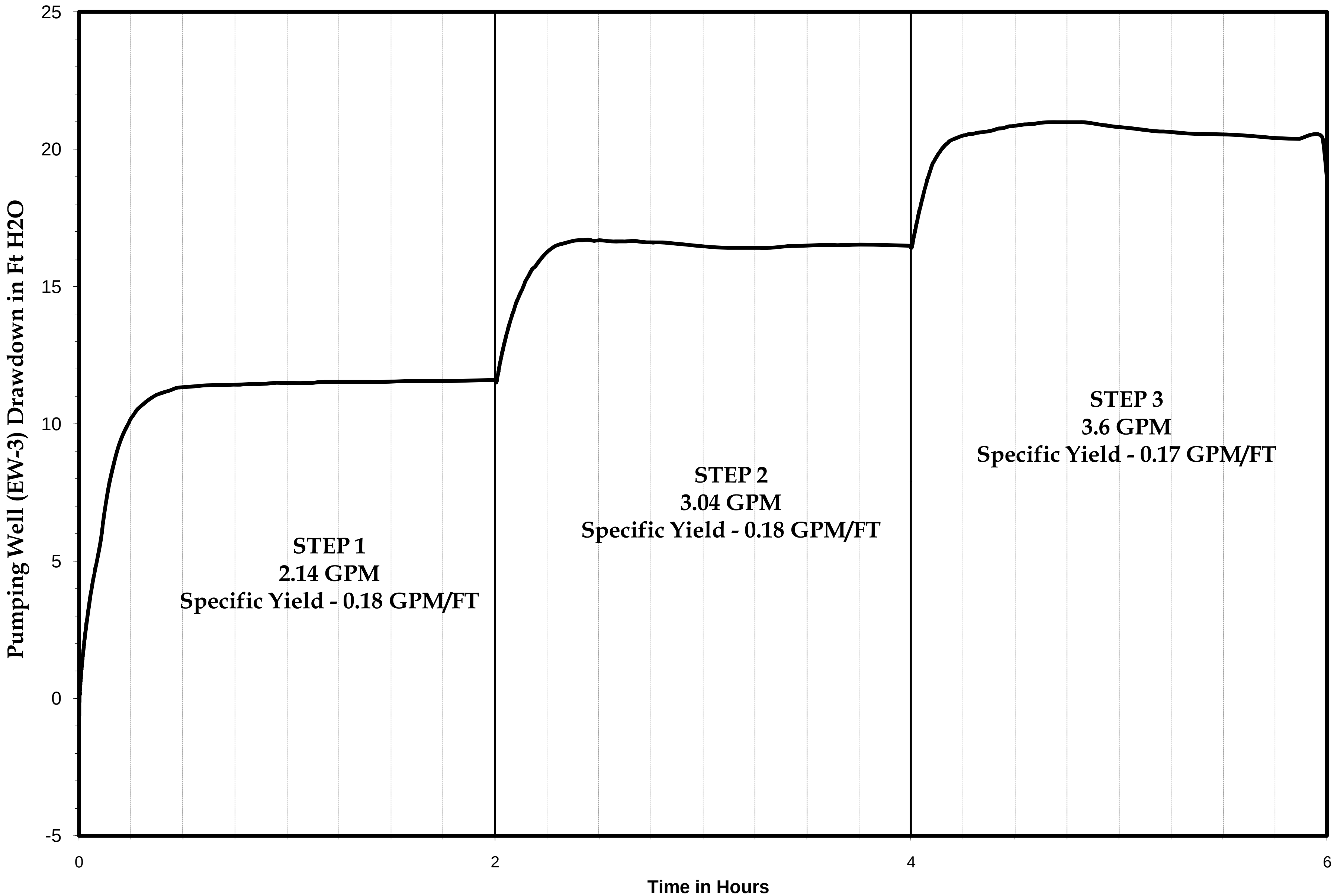


Figure 4-28
EW-3 Step Test
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

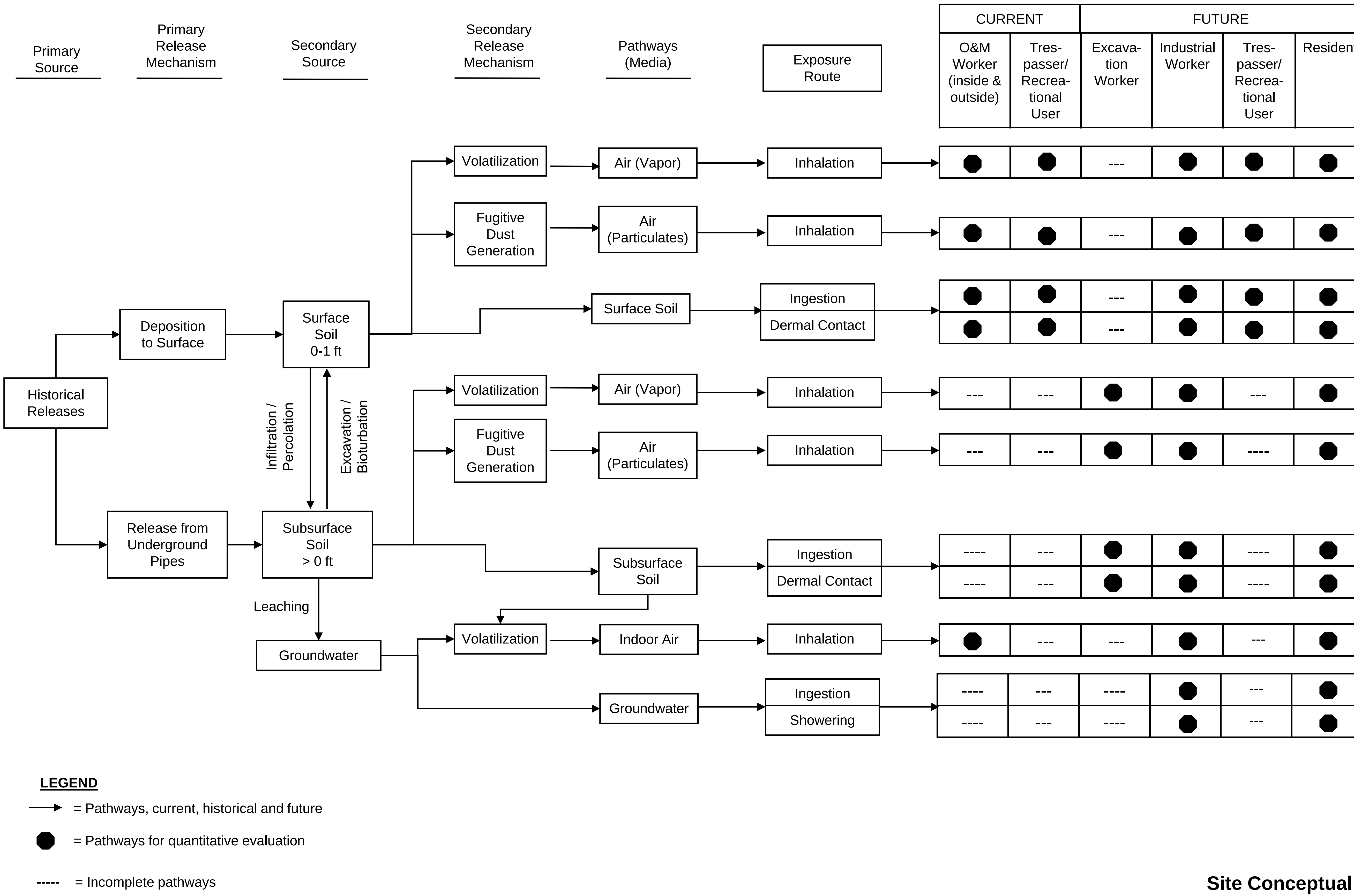


Figure 5-1
Site Conceptual Exposure Model
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, SC

Tables

Table 3-1
Phase I Sampling Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft bgs)	End Depth (ft bgs)	Laboratory Analyses				Duplicate Collected?
			TCL VOCs	*TCL SVOCs*	*TAL Metals*	*PCBs*	
Soil Borings							
RI-BCK1 (background)	0	1	x	x	x		
	3	4	x	x	x		
RI-BCK2 (background)	0	1	x	x	x		
	3	4	x	x	x		
RISB-1	0	1	x	x	x		
RISB-2	0	1	x	x	x		x
	9	13	x	x	x		
	17	21	x	x	x		
RISB-3	0	1	x	x	x		
	9	13	x	x	x		
RISB-4	0	1	x	x	x		
	5	9	x	x	x		
RISB-5	0	1	x	x	x		
	5	9	x	x	x		
RISB-6	0	1	x	x	x		
	13	15	x	x	x		
RISB-7	0	1	x	x	x		
	1	5	x	x	x		
RISB-8	0	1	x	x	x		
	5	8	x	x	x		
RISB-9	0	1	x	x	x		
	5	9	x	x	x		
RISB-10	5	9	x	x	x		
RISB-11	0	1	x	x	x		
	1	5	x	x	x		
	5	9	x	x	x		
RISB-12	0	1	x	x	x		
	1	5	x	x	x		
	17	21	x	x	x		
RISB-13	0	1	x	x	x		
	5	9	x	x	x		x
RISB-14	0	1	x	x	x		
	5	9	x	x	x		x
	9	13	x	x	x		
RISB-15	0	1	x	x	x		
	9	13	x	x	x		
RISB-16	0	1	x	x	x		
	1	5	x	x	x		
RISB-17	0	1	x	x	x		
	9	13	x	x	x		
RISB-18	0	1	x				
	1	5	x	x	x	x	
RISB-19	0	1	x	x	x	x	
RISB-20	5	9	x	x	x		

Table 3-1
Phase I Sampling Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft bgs)	End Depth (ft bgs)	Laboratory Analyses				Duplicate Collected?
			TCL VOCs	*TCL SVOCs*	*TAL Metals*	*PCBs*	
RISB-21	0	1	x	x	x		
	5	9	x	x	x		
RISB-22	0	1	x	x	x		
RISB-23	0	1	x	x	x		
	9	11	x	x	x		
RISB-24	0	1	x	x	x		
RISB-25	0	1	x	x	x		
	9	13	x	x	x	x	
	17	20	x	x	x		
RISB-26	0	1	x				
	1	5	x	x	x	x	
RISB-27	0	1	x	x	x		
	5	9	x	x	x		
RISB-28	0	1	x	x	x		
	5	9	x		x		
	9	13	x	x	x		
RISB-29	0	1	x	x	x		
	1	5	x	x	x		
	9	13	x				
RISB-30	0	1	x	x	x		
	9	13	x	x	x		
RISB-31	0	1	x	x	x		
	9	13	x	x	x		
RISB-32	0	1	x	x	x		
RISB-33	5	9	x	x	x		
	17	20	x	x	x		x
RISB-34	11	13	x	x	x		
RISB-35	0	1	x	x	x		
	5	9	x	x	x		x
RISB-36	0	1	x	x	x		
	13	16	x	x	x		
RISB-37	0	1	x	x	x		
	9	13	x	x	x		
RISB-38	0	1	x	x	x		
	17	21	x	x	x		
RISB-39	0	1	x	x	x		
	13	17	x	x	x		
RISB-40	0	1	x	x	x		
	9	13	x	x	x		
RISB-41	0	1	x	x	x		
RISB-42	0	1	x	x	x		
RISB-43	0	1	x	x	x		
RISB-44	0	1	x	x	x		
	5	8.5	x	x	x		
RISB-45	0	1	x	x	x		
	1	5	x	x	x		

Table 3-1
Phase I Sampling Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft bgs)	End Depth (ft bgs)	Laboratory Analyses				Duplicate Collected?
			TCL VOCs	*TCL SVOCs*	*TAL Metals*	*PCBs*	
RISB-46	0	1	x	x	x	x	x
	1	5	x	x	x	x	
RISB-47	0	1	x	x	x		
	9	13	x	x	x		
RISB-48	0	1	x	x	x		
	13	15	x	x	x		
RISB-49	0	1	x	x	x		
	13	17	x	x	x		
RISB-50	9	13	x	x	x		
RISB-51	9	13	x	x	x		x
RISB-52	0	1	x	x	x		
	9	13	x	x	x		
Sediment							
RISD-FCBK (Background)			x	x	x		
RISD-WCBK (Background)			x	x	x		
RISD-1			x	x	x		
RISD-2			x	x	x		
RISD-3			x	x	x		
RISD-4			x	x	x		x
RISD-5			x	x	x		
RICB-3			x	x	x		
RI-WASTE			x	x	x		
Surface Soil Across Wildcat Creek							
RISS-1	0	1		x	x		
RISS-2	0	1		x	x		
RISS-3	0	1		x	x		
RISS-4	0	1		x	x		
RISS-5	0	1		x	x		
RISS-6	0	1		x	x		
RISS-7	0	1		x	x		
RISS-8	0	1		x	x		
RISS-9	0	1		x	x		
RISS-10	0	1		x	x		x
Groundwater							
RITW-12			x				
RITW-28			x				
RITW-34			x				
RITW-38			x				

Notes:
BGS - Below Ground Surface
PCB - Polychlorinated Biphenyl
SVOC - Semi-Volatile Organic Compound
TCL - EPA's Target Compound List
TAL - EPA's Target Analyte List
VOC - Volatile Organic Compound

Table 3-2
Phase I Onsite Sampling Deviation Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Deviation	Explanation
RISB-1	No Subsurface Sample	PID/Color-Tec results negative; SCDHEC removed subsurface sample.
RISB-2	Location Moved	SCDHEC reduced Stablex Materials Area locations from 5 to 3. SB-2 was moved downgradient of SB-25 based on findings.
	Subsurface Sample Added	SCDHEC added a subsurface sample based on PID and Color-Tec readings.
RISB-4	Location Moved	SCDHEC reduced Stablex Materials Area locations from 5 to 3. SB-4 was moved downgradient of SB-47 and SB-39 based on findings.
RISB-6	Location Moved	SCDHEC directed location to be moved based on discussion with Mike McAbee. A former drum conveyer area was in this location.
RISB-10	No Surface Sample	No recovery from 0-5 ft bls.
RISB-11	Subsurface Sample Added	Based on SCDHEC request and Color-Tec results.
RISB-12	Subsurface Sample Added	Based on SCDHEC request and PID/Color-Tec results.
RISB-14	Subsurface Sample Added	Duplicate sample sent for 5-9 ft interval; 9-13 ft interval based on Color-Tec.
RISB-18	Location Moved	SCDHEC directed location to be moved outside of asphalt area and added SB-46 to triangulate the incineration pit.
	Sample Analyses Removed	SCDHEC approved removal of SVOC/Metals analysis from surface sample.
RISB-19	No Subsurface Sample	Subsurface sample not sent for analysis. Sample was in concrete cored area and was not re-sampled.
RISB-20	No Surface Sample	No recovery from 0-5 ft bls.
RISB-22	No Subsurface Sample	Based on SCDHEC request and PID/Color-Tec results.
RISB-24	No Subsurface Sample	Based on SCDHEC request and PID/Color-Tec results.
RISB-25	Subsurface Sample Added	Based on SCDHEC request and PID/Color-Tec results.
RISB-26	Sample Analyses Removed	SCDHEC approved removal of SVOC/Metals analysis from surface sample.
RISB-28	Subsurface Sample Added	Based on SCDHEC request and PID results.
	Sample Analyses Removed	5-9 ft interval SVOC samples not received by lab; SCDHEC approved not resampling because 9-13 ft sample was collected for VOCs.
RISB-29	Subsurface Sample Added	Based on SCDHEC request and PID results.
	Sample Analyses Removed	9-13 ft interval not sampled for SVOC/Metals; re-sampled as RISB-50 to collect 9-13 ft interval per SCDHEC instructions.
RISB-32	No Subsurface Sample	Based on SCDHEC request and PID/Color-Tec results.
RISB-33	No Surface Sample	Based on SCDHEC request and PID/Color-Tec results.
	Subsurface Sample Added	Based on SCDHEC request.
RISB-34	No Surface Sample	Based on SCDHEC request.
RISB-41	No Subsurface Sample	Based on SCDHEC request and PID/Color-Tec results; refusal less than 10 ft bls.
RISB-42	No Subsurface Sample	Based on SCDHEC request and PID/Color-Tec results; refusal less than 10 ft bls.
RISB-43	No Subsurface Sample	Based on SCDHEC request and PID/Color-Tec results; refusal less than 10 ft bls.
RISB-45	Location Added	Based on SCDHEC request prior to starting Phase I.
RISB-46	Location Added	Based on SCDHEC request prior to starting Phase I.
RISB-47	Location Added	Based on SCDHEC request to bound contamination located at RISB-25.
RISB-48	Location Added	Based on SCDHEC request to bound contamination located at RISB-25.
RISB-49	Location Added	Based on SCDHEC request to bound contamination located at RISB-29.
RISB-50	Location Added	Location added to re-collect 9-13 ft interval at SB-29.
	No Surface Sample	Location replaced SB-29 subsurface only; no surface sample required.
RISB-51	Location Added	Location added per SCDHEC request and SB-29 results.
	No Surface Sample	Based on SCDHEC request.
RISB-52	Location Added	Replaced old SB-6 location.
RI-WASTE	Location Added	Location added inside building based on SCDHEC request. Sediment sample was collected in contained area near drum conveyer area.

Table 3-3
Phase II Sampling Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft bgs)	End Depth (ft bgs)	Laboratory Analyses TAL Metals	TCL VOCs	TCL SVOCs	TOC	Biochemical/ Geochemical Analyses*	Duplicate Collected?
Groundwater Samples								
BP-1A				x				No
BP-1B				x				No
EW-1				x				No
EW-4				x				No
MW-100				x				No
MW-101				x				No
MW-102				x				No
MW-103				x				No
MW-104				x				No
MW-105				x				No
MW-106				x				No
MW-107				x				No
MW-108				x				No
MW-111				x				No
MW-112				x				No
MW-113A				x				No
MW-113B				x				No
MW-114				x				No
MW-115A				x			x	No
MW-115B				x			x	No
MW-116				x				No
MW-117				x				Yes
MW-118				x				No
MW-119				x				No
MW-120A				x				No
MW-120B				x				No
MW-121B				x				No
MW-122B				x				No
MW-123A				x			x	No
MW-123B				x				No
OB-109				x				No
OB-109B				x				No
OB-11				x			x	No
OB-110A				x			x	No
OB-110B				x			x	No
OB-12				x				No
OB-13				x				No
OB-21				x				No
OB-22				x				No
OB-23				x				No
OB-8A				x				No
OB-900				x				No
OB-901				x				No
OB-902				x				No
P-1				x				No
P-2				x				No

Table 3-3
Phase II Sampling Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft bgs)	End Depth (ft bgs)	Laboratory Analyses TAL Metals	TCL VOCs	TCL SVOCs	TOC	Biochemical/ Geochemical Analyses*	Duplicate Collected?
P-3				x				No
PW-1				x				No
PW-2A				x				No
RIMW-1			x	x	x			No
RIMW-3			x	x	x			No
RIMW-4			x	x	x			Yes
RIMW-5			x	x	x		x	Yes
RIMW-6			x	x	x		x	No
RIMW-7			x	x	x			No
RIMW-8			x	x	x			Yes
RIMW-9			x	x	x			Yes
RIMW-10			x	x	x			No
RIMW-11			x	x	x			No
RIMW-12			x	x	x			No
RIMW-13			x	x	x			No
RIMW-14			x	x	x		x	No
RIMW-15			x	x	x		x	Yes
RIMW-16			x	x	x			No
RIMW-18			x	x	x			No
Packer Test	44	56		x				No
Packer Test	56	68		x				No
RIMW-19			x	x	x			No
Packer Test	63	75		x				No
Packer Test	76	88		x				No
RIPZ-1							x	No
RIPZ-3			x	x	x			Yes
RITW-64				x				No
RITW-65				x				No
W-1				x			x	No
W-2				x				No
W-4				x				No
Soil Samples								
RIMW-1	10	12		x				No
	12	14		x				Yes
RIMW-5	0	1		x				No
	4	6		x				No
	12	14		x				No
	18	20		x				No
RIMW-6	0	1		x				No
	4	6		x				No
	8	10		x				No
	10	12				x		No
	18	19				x		No
RIMW-7	0	1		x				No
	4	6		x				No
	8	10		x				No

Table 3-3
Phase II Sampling Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft bgs)	End Depth (ft bgs)	Laboratory Analyses				Biochemical/ Geochemical Analyses*	Duplicate Collected?
			TAL Metals	TCL VOCs	TCL SVOCs	TOC		
RIMW-8	0	1		x				No
	2	4		x				No
	4	6		x				No
	6	8		x				No
	8	10		x				No
	10	12		x				Yes
	12	14		x		x		No
	14	16				x		No
	25	27				x		No
RIMW-13	14	16				x		No
RIMW-19	8	10		x				No
	12	14		x				No
	16	18		x				No
RIPZ-3	10	12				x		No
	18	20				x		No
RISB-56	0	1		x				No
	4	6		x				No
	8	10		x				No
	12	14		x				No
RISB-57	0	1		x				No
	3	5		x				No
	10	14		x				No
	14	18		x				No
	18	22		x				No
RISB-58	0	1		x				No
	4	6		x				No
	10	12		x				No
	14	16		x				No
	18	20		x				No
RISB-59	0	1		x				No
	4	6		x				No
	10	12		x				No
	12	14		x				Yes
RISB-61	10	12		x				No
	16	18		x				No
	20	22		x				No
RISB-62	0	1		x				No
	4	6		x				No
	8	10		x				No
	12	14		x				Yes
RISB-63	0	1		x				No
	4	6		x				No
	8	10		x				No
	14	16		x				No
	16	18		x				No
RISB-64	0	5		x	x			No
	5	10		x	x			No
	10	15		x	x			No

Table 3-3
Phase II Sampling Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft bgs)	End Depth (ft bgs)	Laboratory Analyses				Biochemical/ Geochemical Analyses*	Duplicate Collected?
			TAL Metals	*TCL VOCs*	*TCL SVOCs*	*TOC*		
RISB-65	0	5		**x**	**x**			No
	5	10		**x**	**x**			No
	10	15		**x**	**x**			No
	15	20		**x**				No
RISB-66	0	5		**x**				No
	5	9		**x**				No
RISB-67	0	5		**x**				No
	5	10		**x**				No

Notes:
bgs - below ground surface
TAL - Target Analyte List (EPA)
TCL - Target Compound List (EPA)
TOC - Total Organic Carbon
DOC - Dissolved Organic Carbon
SVOCs - Semi-Volatile Organic Compounds
VOCs - Volatile Organic Compounds
* Biochemical and geochemical analyses include dissolved organic carbon, ferrous and total iron, nitrate and nitrite, phosphate, sulfate and sulfide, methane, alkalinity, carbon dioxide, and dissolved oxygen.

Table 3-4
Packer Testing Detections
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																			
			1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichlorobenzene	1,2-Dichloroethane	4-Methyl-2-pentanone	Benzene	Bromodichloromethane	Chlorobenzene	Chloroethane	Chloroform	cis-1,2-Dichloroethene	Ethylbenzene	Tetrachloroethene	Toluene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RIMW-18	44	56				1.2			5.23		3.77			19	5.5	1.78	70	80	2.08			3.48
	56	68				2.14					3.86			19	6.06	1.15	93	36	2.32			2.28
RIMW-19	63	75	10	1.24	18	60		460						2.18	70		85	0.86	68	1.75		
	76	88	8.92	1.24	15	56	0.56	3000		0.36		3.76	5.89	2.07	50	0.34	57	1.43	42	2.72	0.62	

Table 3-5
RIMW-15 Diffusion Tests
Laboratory Detections
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location ID	Depth (ft bgs)	1,2-Dichloroethane	1,1-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene
Units		ug/L	ug/L	ug/L	ug/L	ug/L
RIMW-15 DIFF#1	70-77.5	1.1	2.2	1	10	330
RIMW-15 DIFF#4	92.5-100	1.3	2.9	1.3	7.3	480

Notes:
bgs - Below Ground Surface
Only those compounds that were detected in either sample are included on this table.
Samples from Diffusion Samplers 2 (77.5-85 ft bgs) and 3 (85-92.5 ft bgs) were not sent to the laboratory for analysis.

Table 3-6
Phase III Sampling Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well / Gage ID	Depth Interval (ft bgs)	Water Levels	TCL VOC Analysis	Duplicate Analysis
BP-1A		X		
BP-1B		X		
EW-1		X		
EW-2		X		
EW-3		X		
EW-4		X		
MW-100		X		
MW-101		X		
MW-102		X		
MW-103		X		
MW-104		X		
MW-105		X		
MW-106		X		
MW-107		X		
MW-108		X		
MW-111		X		
MW-112		X		
MW-113A		X		
MW-113B		X		
MW-114		X		
MW-115A		X		
MW-115B		X		
MW-118		X		
MW-119		X		
MW-120A		X		
MW-120B		X		
MW-121B		X	X	
MW-122B		X	X	
MW-123A		X		
OB-109		X		
OB-109B		X		
OB-11		X		
OB-110A		X		
OB-110B		X		
OB 22		X		
OB-8A		X		
P-1		X		
P-2		X		
P-3		X		
PW-1A		X		
RIMW-1		X		
RIMW-3		X		
RIMW-4		X		
RIMW-5		X		
RIMW-6		X		
RIMW-7		X		
RIMW-8		X		
RIMW-9		X		
RIMW-10		X		
RIMW-11		X		
RIMW-12		X		
RIMW-13		X		
RIMW-14		X		
RIMW-15		X	X	

Table 3-6
Phase III Sampling Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well / Gage ID	Depth Interval (ft bgs)	Water Levels	TCL VOC Analysis	Duplicate Analysis
RIMW-15*	70-77.5		X	
	92.5-100		X	
RIMW-16		X		
RIMW-18		X		
RIMW-19		X		
RIMW-20		X	X	
RIMW-21		X	X	
RIMW-22		X	X	
RIMW-23		X	X	
RIMW-24		X	X	
RIMW-25		X	X	X
RIMW-26		X	X	
RIMW-27		X	X	X
RIMW-28		X	X	
RIMW-29		X	X	
RIMW-30		X	X	
RIPZ-1		X		
RIPZ-2		X		
RIPZ-3		X		
W-1		X		
W-2		X		
W-4		X		

*Diffusion samplers were used on RIMW-15 at two depth intervals (bgs - below ground surface)

Table 4-1
Regulatory Criteria
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Compound	CAS #	Region 9 PRGs (2004) Industrial Soil (mg/kg)	Region 9 PRGs (2004) Soil Screening Level - DAF 20 (mg/kg)	Region 9 PRGs (2004) Tap Water PRG (ug/L)	Region 4 ESV (mg/kg)	MCL (ug/L)
Volatile Organic Compounds						
1,1,1-Trichloroethane	71-55-6	1,200	2	3,172	-	200
1,1,2,2-Tetrachloroethane	79-34-5	0.93	0.003	0.055	-	-
1,1,2-Trichloroethane	79-00-5	1.6	0.02	0.2	-	5
1,1-Dichloroethane	75-34-3	1,739	23	811	-	-
1,1-Dichloroethene	75-35-4	413	0.06	339	-	7
1,2,4-Trichlorobenzene	120-82-1	216	5	7.2	-	70
1,2-Dichlorobenzene	95-50-1	600	17	370	-	600
1,2-Dichloroethane	107-06-2	0.60	0.02	0.12	-	5
1,2-Dichloropropane	78-87-5	0.74	0.03	0.16	-	5
1,4-Dichlorobenzene	106-46-7	7.9	2	0.5	-	75
4-Methyl-2-pentanone	108-10-1	47,001	-	1,993	-	-
Acetone	67-64-1	54,321	16	5,475	-	-
Benzene	71-43-2	1.4	0.03	0.35	-	5
Bromodichloromethane	75-27-4	1.8	0.6	0.18	-	-
Carbon tetrachloride	56-23-5	0.55	0.07	0.17	-	5
Chlorobenzene	108-90-7	530	1	106	-	100
Chloroethane	75-00-3	6.5	-	4.6	-	-
Chloroform	67-66-3	0.47	0.6	0.17	-	-
cis-1,2-Dichloroethene	156-59-2	146	0.4	60.8	-	70
Cyclohexane	110-82-7	140	-	10,342	-	-
Dibromochloromethane	124-48-1	2.6	0.4	0.13	-	-
Ethylbenzene	100-41-4	395	13	1,340	-	700
Isopropylbenzene	98-82-8	1,977	-	658	-	-
Methyl tert-butyl ether	1634-04-4	70	-	11	-	-
Methylcyclohexane	108-87-2	8,716	-	5,217	-	-
Methylene chloride	75-09-2	20.5	0.02	4.3	-	-
Tetrachloroethene	127-18-4	1.3	0.06	0.1	-	5
Toluene	108-88-3	520	12	723	-	1000
Trichloroethene	79-01-6	0.11	0.06	0.028	-	5
Vinyl chloride	75-01-4	0.75	0.01	0.02	-	2
Xylenes (Total)	1330-20-7	420	210	206	-	10000

Table 4-1
Regulatory Criteria
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Compound	CAS #	Region 9 PRGs (2004)			Region 4 ESV (mg/kg)	MCL (ug/L)
		Industrial Soil (mg/kg)	Soil Screening Level - DAF 20 (mg/kg)	Tap Water PRG (ug/L)		
Semi-Volatile Organic Compounds						
2-Chlorophenol	95-57-8	236	4	30.4	-	-
2-Methylnaphthalene	91-57-6	-	-	-	0.33	-
Benzo(a)anthracene	56-55-3	2.1	2	0.092	0.33	-
Benzo(a)pyrene	50-32-8	0.21	8	0.0092	0.33	0.2
Bis(2-ethylhexyl)phthalate	117-81-7	123	-	4.8	0.18	6
Chrysene	218-01-9	211	160	9.2	0.33	-
Fluoranthene	206-44-0	22,000	4,300	1,460	0.33	-
Fluorene	86-73-7	26,281	560	243	0.33	-
Naphthalene	91-20-3	188	84	6.2	0.33	-
NDPA/DPA	86-30-6	352	1	13.7	-	-
Phenanthrene	85-01-8	-	-	-	0.33	-
Pyrene	129-00-0	29,126	4,200	183	0.33	-
Inorganics						
Antimony	7440-36-0	409	5	14.6	12	6
Arsenic	7440-38-2	1.6	29	0.045	7.24	10
Cadmium	7440-43-9	451	8	18.2	1	5
Chromium	7440-47-3	448[A]	38[A]	109[B]	52.3	100
Copper	7440-50-8	40,877	-	1,460	18.7	1,300[C]
Iron	7439-89-6	100,000	-	10,950	-	-
Lead	7439-92-1	800	-	-	30.2	15[C]
Manganese	7439-96-5	19,458	-	876	-	-
Mercury	7487-94-7	306	-	10.9	0.13	2
Nickel	7440-02-0	20,439	130	730	15.9	-
Silver	7440-22-4	5,110	34	182	2	-
Thallium	7440-28-0	67.5	-	2.4	-	2
Zinc	7440-66-6	100,000	12,000	10,950	124	-

Notes:
DAF - Dilution Attenuation Factor
MCL - Maximum Contaminant Level
PRG - EPA Region 9 Preliminary Remediation Goal (10/2004)
ESV - EPA Region 4 Ecological Screening Value (11/2001)
Only detected compounds in soil, groundwater, or sediment above criteria are included on this table.
[A] Total Chromium (1:6 ratio Cr VI:Cr III)
[B] Chromium VI
[C] Action Level

Table 4-2
September 2007 Groundwater Elevations
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well / Gage ID	Top of Casing Elevation (ft)	Total Depth (ft btoc)	Hydraulic Zone	Depth to Product (ft btoc)	Depth to Water (ft btoc)	Water Elevation (ft)	Product Thickness (ft)
BP-1A	523.03	25.2	PWR		15.38	507.65	
BP-1B	523.74	39.68	PWR/Bedrock		16.32	507.42	
EW-1	525.19	64	No Data	14.76	14.95	510.24	0.19
EW-2	525.12	65	PWR	Active Pumping Well			
EW-3	521.13	52	Bedrock	Active Pumping Well			
EW-4	528.18	78.4	No Data		16.95	511.23	
MW-100	530.04	41.6	Bedrock		19.61	510.43	
MW-101	529.95	32	PWR		17.79	512.16	
MW-102	531.31	36.1	Bedrock		19.16	512.15	
MW-103	523.16	31.14	PWR		13.8	509.36	
MW-104	522.36	31.8	PWR		13.28	509.08	
MW-105	528.29	44.7	PWR		20.89	507.40	
MW-106	524.76	20.42	Saprolite/Bedrock		15.75	509.01	
MW-107	521.55	30.49	PWR		12.56	508.99	
MW-108	517.94	21.38	Bedrock		10.25	507.69	
MW-111	522.96	19.88	Saprolite		15.58	507.38	
MW-112	522.11	17.22	PWR		14.46	507.65	
MW-113A	524.38	20.08	PWR		16.51	507.87	
MW-113B	521.20	40.8	PWR/Bedrock		14.42	506.78	
MW-114	522.92	14.85	PWR	Dry			
MW-115A	519.47	14.16	PWR		12.17	507.30	
MW-115B	518.90	32.33	PWR/Bedrock		11.31	507.59	
MW-116	524.43	24.1	PWR/Bedrock	Abandoned 8/2007			
MW-117	521.69	19.4	Saprolite/Bedrock	Abandoned 8/2007			
MW-118	523.31	15.7	Saprolite		15.48	507.83	
MW-119	522.88	19.5	PWR		14.42	508.46	
MW-120A	518.98	18.7	PWR		11.79	507.19	
MW-120B	518.07	38.28	Bedrock		10.74	507.33	
MW-121B	519.32	40.25	Bedrock		11.69	507.63	
MW-122B	520.32	39.42	Bedrock		12.33	507.99	
MW-123A	529.14	32.5	PWR		18.46	510.68	
MW-123B	529.06	51.9	Bedrock	Abandoned 8/2007			
OB-109	532.64	28.02	PWR		21.92	510.72	
OB-109B	530.38	60.8	Bedrock		19.68	510.70	
OB-11	524.50	20.21	Saprolite	16.01	16.25	508.25	0.24
OB-110A	526.41	30.35	PWR		15.96	510.45	
OB-110B	525.60	132.1	Bedrock		16.27	509.33	
OB-12	524.92	20	Saprolite	Abandoned 8/2007			
OB-13	524.92	19.9	Saprolite	Abandoned 8/2007			
OB-21	524.91	27.7	PWR	Abandoned 8/2007			
OB-22	524.82	27.35	PWR	16.17	16.43	508.39	0.26
OB-23	524.55	23.1	PWR	Abandoned 8/2007			
OB-8A	526.14	25.7	PWR		15.37	510.77	
OB-900	524.20	23	No Data	Abandoned 8/2007			
OB-901	523.22	22.2	No Data	Abandoned 8/2007			
OB-902	524.36	25	No Data	Abandoned 8/2007			

Table 4-2
September 2007 Groundwater Elevations
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well / Gage ID	Top of Casing Elevation (ft)	Total Depth (ft btoc)	Hydraulic Zone	Depth to Product (ft btoc)	Depth to Water (ft btoc)	Water Elevation (ft)	Product Thickness (ft)
P-1	525.73	17.65	Saprolite		15.35	510.38	
P-2	523.98	20	Saprolite	15.19	16.21	507.77	1.02
P-3	526.12	34.82	PWR		15.7	510.42	
PW-1	531.19	166.5	No Data		20.13	511.06	
PW-1A	526.84	26.88	No Data	18.13	21.56	505.28	3.43
PW-2	535.88	> 202	No Data	Well Not Found			
PW-2A	525.85	32.4	PWR/Bedrock	Abandoned 8/2007			
PW-3	525.88	187	No data	Well Not Found			
RIMW-1	531.31	30	PWR		19.63	511.68	
RIMW-3	531.76	35	PWR		19.21	512.55	
RIMW-4	529.26	31	PWR		18.5	510.76	
RIMW-5	531.88	26.5	PWR		20.31	511.57	
RIMW-6	526.21	31	PWR		15.98	510.23	
RIMW-7	536.73	30	PWR		23.42	513.31	
RIMW-8	530.59	27	PWR		19.48	507.17	
RIMW-9	524.48	23	Saprolite		15.11	509.37	
RIMW-10	529.46	38	PWR		20.91	508.55	
RIMW-11	532.11	27	Saprolite		17.39	514.72	
RIMW-12	529.10	36	PWR		18.03	511.07	
RIMW-13	536.49	83	Bedrock		21.85	514.64	
RIMW-14	529.77	76.5	Bedrock		19.44	510.33	
RIMW-15	526.31	102.5	Deep PWR		16.38	509.93	
RIMW-16	526.40	56	PWR		16.26	510.14	
RIMW-18	532.05	56.5	Bedrock		15.75	516.30	
RIMW-19	529.51	81	Bedrock		18.86	510.65	
RIMW-20	520.27	119.6	Bedrock		9.96	510.31	
RIMW-21	517.73	87.6	Bedrock		5.28	512.45	
RIMW-22	526.45	135.2	Bedrock		16.36	510.09	
RIMW-23	522.40	57.9	Bedrock		14.05	508.35	
RIMW-24	522.57	25	Saprolite		14.21	508.36	
RIMW-25	526.46	54.8	Bedrock		15.66	510.80	
RIMW-26	522.01	93.4	Bedrock		11.91	510.10	
RIMW-27	522.91	87	PWR		14.81	508.10	
RIMW-28*	525.95	66.5	Bedrock		26.42	499.53	
RIMW-29	521.06	63.8	Bedrock		13.37	507.69	
RIMW-30	520.20	92	PWR		10.13	510.07	
RIPZ-1	516.31	9	Alluvium	Dry			
RIPZ-2	519.12	74	Bedrock		10.98	508.14	
RIPZ-3	522.91	46	PWR		14.57	508.34	
W-1	537.66	29.9	PWR		24.57	513.09	
W-2	529.48	22.7	PWR		21.9	507.58	
W-3	522.80	27.3	No Data	Well Not Found			
W-4	518.30	22.25	Saprolite		9.35	508.95	

*RIMW-28 water elevation was approximately 10 feet below surrounding wells. The well had not likely fully recharged since being installed.

Table 4-3
Calculated Vertical Gradients for Well Pairs
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well Pair	Well ID	Hydraulic Zone	Groundwater Elevation (ft)	Distance Between Screens (ft)	Hydraulic Gradient (ft / ft)	Direction
1	RIMW-11	Saprolite	514.72	29.5	0.054	Up
	RIMW-18	Bedrock	516.30			
2	W-1	PWR	513.09	50.5	0.031	Up
	RIMW-13	Bedrock	514.64			
3	W-2	PWR	507.58	22.5	0.008	Down
	MW-105	PWR	507.40			
4	MW-115A	PWR	507.30	17	0.017	Up
	MW-115B	PWR / Bedrock	507.59			
5	RIMW-30	PWR	510.07	25.1	0.010	Up
	RIMW-20	Bedrock	510.31			
6	BP-1A	PWR	507.65	15	0.015	Down
	BP-1B	PWR / Bedrock	507.42			
7	RIMW-24	Saprolite	508.36	31.8	0.0003	Down
	RIMW-23	Bedrock	508.35			
8	RIMW-6	PWR	510.23	25	0.003	Down
	RIMW-16	PWR	510.14			
9	RIMW-16	PWR	510.14	35	0.006	Down
	RIMW-15	Deep PWR	509.93			
10	RIMW-15	Deep PWR	509.93	44.9	0.004	Up
	RIMW-22	Bedrock	510.09			
11	RIMW-4	PWR	510.76	50	0.002	Down
	RIMW-19	Bedrock	510.65			
12	OB-110A	PWR	510.45	105	0.011	Down
	OB-110B	Bedrock	509.33			
13	P-1	Saprolite	510.38	17.3	0.002	Up
	P-3	PWR	510.42			

Notes:

Groundwater elevations are from Phase III of the RI (September 2007).

Distance between screens was calculated as the distance from the center of screen for well 1 to the center of screen for well 2.

Hydraulic gradient = [GW Elev Well 1 - GW Elev Well 2] / Distance Between Screens

Table 4-4
Well Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location ID	Hydraulic Zone	Year Installed	Construction	Screened Interval (ft bgs)	Measured Depth from TOC (ft)	Top of Casing Elevation (ft)	Free Product		Depth to Water (ft)	Groundwater Elevation (ft)	Pre-RI VOC / SVOC Detections Above AL?
							Yes or No	If Yes, Depth to Product (ft)			
BP-1A	PWR	1988	2" PVC	13.25 - 22.7	25.20	523.03	No		15.38	507.65	Yes
BP-1B	PWR/Bedrock	1992	2" PVC	28 - 38	39.68	523.74	No		16.32	507.42	Yes
EW-1	No Data	1988	OH with SS surface casing	Unknown	~64	525.19	Yes	14.76	14.95	510.24	Yes
EW-2	PWR	1994	6" SS	45 - 65	65.00	525.12	No	Active Pumping Well			Yes
EW-3	Bedrock	1994	6" SS casing to 25.5'; OH to 52'	25.5 - 52	52.00	521.13	No	Active Pumping Well			Yes
EW-4	No Data	Unknown	6" SS with OH	Unknown	78.40	528.18	No		16.95	511.23	Unknown
MW-100	Bedrock	1983	4" GS	32 - 37	41.60	530.04	No		19.61	510.43	Yes
MW-101	PWR	1983	4" GS	24.5 - 29.5	32.00	529.95	No		17.79	512.16	Yes
MW-102	Bedrock	1983	4" GS to 23.3'; OH 24-34'	24 - 34	36.10	531.31	No		19.16	512.15	Yes
MW-103	PWR	1983	4" GS	23.5 - 28.5	31.14	523.16	No		13.80	509.36	Yes
MW-104	PWR	1983	4" GS casing with SS screen	25 - 30	31.80	522.36	No		13.28	509.08	Yes
MW-105	PWR	1983	4" GS	38 - 42	44.70	528.29	No		20.89	507.40	Yes
MW-106	Saprolite/Bedrock	1983	2" PVC	22.5 - 27.5	20.42	524.76	No		15.75	509.01	No
MW-107	PWR	1983	2" PVC	8.2 - 13.2	30.49	521.55	No		12.56	508.99	No
MW-108	Bedrock	1983	2" PVC	13 - 18	21.38	517.94	No		10.25	507.69	No
MW-111	Saprolite	1991	2" PVC	12.9 - 17.9	19.88	522.96	No		15.58	507.38	No
MW-112	PWR	1991	2" PVC	11.2 - 16.2	17.22	522.11	No		14.46	507.65	Unknown
MW-113A	PWR	1991	2" PVC	12.2 - 17.2	20.08	524.38	No		16.51	507.87	Yes
MW-113B	PWR/Bedrock	1992	2" PVC	34 - 44	40.80	521.20	No		14.42	506.78	Yes
MW-114	PWR	1990	2" PVC	8.2 - 13.2	14.85	522.92	No		Dry		Unknown
MW-115A	PWR	1992	2" PVC	5 - 11	14.16	519.47	No		12.17	507.30	Yes
MW-115B	PWR/Bedrock	1992	2" PVC	20 - 30	32.33	518.90	No		11.31	507.59	Yes
MW-116	PWR/Bedrock	1992	2" PVC	12 - 22	24.10	524.43	Abandoned 2007				Unknown
MW-117	Saprolite/Bedrock	1992	2" PVC	11 - 21	19.40	521.69	Abandoned 2007				Yes
MW-118	Saprolite	1992	2" PVC	5.5 - 15.5	15.70	523.31	No		15.48	507.83	Unknown
MW-119	PWR	1992	2" PVC	9 - 19.5	19.50	522.88	No		14.42	508.46	Unknown
MW-120A	PWR	1998	2" PVC Casing with SS screen	5 - 15	18.70	518.98	No		11.79	507.19	No
MW-120B	Bedrock	1998	2" PVC Casing with SS screen	24 - 34	38.28	518.07	No		10.74	507.33	No
MW-121B	Bedrock	1998	2" PVC Casing with SS screen	25 - 35	40.25	519.32	No		11.69	507.63	No
MW-122B	Bedrock	1998	2" PVC Casing with SS screen	25.5 - 35.5	39.42	520.32	No		12.33	507.99	No
MW-123A	PWR	2000	2" SS	20 - 30	32.50	529.14	No		18.46	510.68	Unknown
MW-123B	Bedrock	2000	2" SS	39 - 49	51.90	529.06	Abandoned 2007				Unknown
OB-109	PWR	1985	2" SS	20 - 25	28.02	532.64	No		21.92	510.72	Yes
OB-109B	Bedrock	1997	8" PVC to 32'; 2" to 51' with SS screen	51 - 61	60.80	530.38	No		19.68	510.70	Yes
OB-11	Saprolite	1991	Unknown	? - 19	20.21	524.50	Yes	16.01	16.25	508.25	Unknown
OB-110A	PWR	1985	2" GS casing with SS screen	25 - 30	30.35	526.41	No		15.96	510.45	Yes
OB-110B	Bedrock	1986	1.5" PVC	130 - 135	132.10	525.60	No		16.27	509.33	Yes
OB-12	Saprolite	1991	Unknown	? - 18	20.00	524.92	Abandoned 2007				Unknown
OB-13	Saprolite	1991	Unknown	13.2 - 18.2	19.90	524.92	Abandoned 2007				Unknown
OB-21	PWR	1991	Unknown	? - 24.8	27.70	524.91	Abandoned 2007				Unknown
OB-22	PWR	1991	Unknown	? - 24.7	27.35	524.82	Yes	16.17	16.43	508.39	Unknown
OB-23	PWR	1991	Unknown	? - 24.3	23.10	524.55	Abandoned 2007				Unknown
OB-8A	PWR	1985	2" SS	20.5 - 25.5	25.70	526.14	No		15.37	510.77	Yes

Table 4-4
Well Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location ID	Hydraulic Zone	Year Installed	Construction	Screened Interval (ft bgs)	Measured Depth from TOC (ft)	Top of Casing Elevation (ft)	Free Product		Depth to Water (ft)	Groundwater Elevation (ft)	Pre-RI VOC / SVOC Detections Above AL?
							Yes or No	*If Yes, Depth to Product (ft)*			
OB-900	No Data	Unknown	Unknown	Unknown	23.00	524.20	Abandoned 2007				Unknown
OB-901	No Data	Unknown	Unknown	Unknown	22.20	523.22	Abandoned 2007				Unknown
OB-902	No Data	Unknown	Unknown	Unknown	25.00	524.36	Abandoned 2007				Unknown
P-1	Saprolite	1988	2" PVC	8.1 - 18.1	17.65	525.73	No		15.35	510.38	Unknown
P-2	Saprolite	1988	2" PVC	9.5 - 19.5	20.00	523.98	Yes	15.19	16.21	507.77	Unknown
P-3	PWR	1988	2" PVC	27.9 - 32.8	34.82	526.12	No		15.70	510.42	Unknown
PW-1	No Data	1979	6" SS	Unknown	166.50	531.19	No		20.13	511.06	Yes
PW-1A	No Data	1991	Unknown	? - 22.7	26.88	526.84	Yes	18.13	21.56	505.28	Unknown
PW-2	No Data	1981	6" ???	Unknown	> 202	535.88	Not located				Yes
PW-2A	PWR/Bedrock	1991	Unknown	? - 29.6	32.40	525.85	Abandoned 2007				Unknown
PW-3	No data	1987	4" PVC to 35'; 6.5" OH to 129'; OH with 1 or 2" PVC to 187'	129 - 187	187.00	525.88	Not located				Yes
RIMW-1	PWR	2006	2" PVC	19-29	30	531.31	No		19.63	511.68	N/A
RIMW-3	PWR	2006	2" PVC	24-34	35	531.76	No		19.21	512.55	N/A
RIMW-4	PWR	2006	2" PVC	20-30	31	529.26	No		18.5	510.76	N/A
RIMW-5	PWR	2006	2" PVC	16-26	26.5	531.88	No		20.31	511.57	N/A
RIMW-6	PWR	2006	2" PVC	20-30	31	526.21	No		15.98	510.23	N/A
RIMW-7	PWR	2006	2" PVC	19-29	30	536.73	No		23.42	513.31	N/A
RIMW-8	PWR	2006	2" PVC	16-26	27	530.59	No		19.48	507.17	N/A
RIMW-9	Saprolite	2006	2" PVC	12-22	23	524.48	No		15.11	509.37	N/A
RIMW-10	PWR	2006	2" PVC	27-37	38	529.46	No		20.91	508.55	N/A
RIMW-11	Saprolite	2006	2" PVC	16-26	27	532.11	No		17.39	514.72	N/A
RIMW-12	PWR	2006	2" PVC	25-35	36	529.10	No		18.03	511.07	N/A
RIMW-13	Bedrock	2006	6" steel casing to 37', 2" PVC to 82'	72-82	83	536.49	No		21.85	514.64	N/A
RIMW-14	Bedrock	2006	6" steel casing to 46', 2" PVC to 75'	65-75	76.5	529.77	No		19.44	510.33	N/A
RIMW-15	Deep PWR	2006	2" PVC	70-100	102.5	526.31	No		16.38	509.93	N/A
RIMW-16	PWR	2006	2" PVC	45-55	56	526.40	No		16.26	510.14	N/A
RIMW-18	Bedrock	2006	6" steel casing to 40', 2" PVC to 55.5'	45.5-55.5	56.5	532.05	No		15.75	516.30	N/A
RIMW-19	Bedrock	2006	6" steel casing to 55', 2" PVC to 80'	70-80	81	529.51	No		18.86	510.65	N/A
RIMW-20	Bedrock	2007	6" steel casing to 100', 2" PVC to 120'	104.6-119.6	119.57	520.27	No		9.96	510.31	N/A
RIMW-21	Bedrock	2007	6" steel casing to 70', 2" PVC to 88'	77.3-87.3	87.57	517.73	No		5.28	512.45	N/A
RIMW-22	Bedrock	2007	6" steel casing to 117', 2" PVC to 135'	124.9-134.9	135.20	526.45	No		16.36	510.09	N/A
RIMW-23	Bedrock	2007	6" steel casing to 37', 2" PVC to 58'	45.8-57.8	57.88	522.4	No		14.05	508.35	N/A
RIMW-24	Saprolite	2007	2" PVC	15-25	25.00	522.57	No		14.21	508.36	N/A
RIMW-25	Bedrock	2007	6" steel casing to 40', 2" PVC to 55'	44.7-54.7	54.76	526.46	No		15.66	510.80	N/A
RIMW-26	Bedrock	2007	6" steel casing to 71', 2" PVC to 94'	83.2-93.2	93.37	522.01	No		11.91	510.10	N/A
RIMW-27	PWR	2007	6" steel casing to 69', 2" PVC to 87'	76-86	87.00	522.91	No		14.81	508.10	N/A
RIMW-28	Bedrock	2007	6" steel casing to 46', 2" PVC to 67'	56.4-66.4	66.52	525.95	No		26.42	499.53	N/A
RIMW-29	Bedrock	2007	6" steel casing to 47', 2" PVC to 64'	54-64	63.83	521.06	No		13.37	507.69	N/A
RIMW-30	PWR	2007	2" PVC	82-92	92.00	520.2	No		10.13	510.07	N/A
RIPZ-1	Alluvium	2006	1" PVC	3-8	9	516.31	No		4.97	511.34	N/A
RIPZ-2	Bedrock	2006	4" PVC to 38', 1" PVC to 73'	63-73	74	519.12	No		10.98	508.14	N/A
RIPZ-3	PWR	2006	6" Steel casing to 35', 1" PVC to 44.5	39.5-44.5	46	522.91	No		14.57	508.34	N/A

Table 4-4
Well Summary
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location ID	Hydraulic Zone	Year Installed	Construction	Screened Interval (ft bgs)	Measured Depth from TOC (ft)	Top of Casing Elevation (ft)	Free Product		Depth to Water (ft)	Groundwater Elevation (ft)	Pre-RI VOC / SVOC Detections Above AL?
							Yes or No	*If Yes, Depth to Product (ft)*			
W-1	PWR	1981	4" PVC	24 - 29	29.90	537.66	No		24.57	513.09	Unknown
W-2	PWR	1981	4" PVC	15 - 20	22.70	529.48	No		21.90	507.58	Unknown
W-3	No Data	1981	4" PVC	20 - 25	27.30	522.80	Unable to Locate				Unknown
W-4	Saprolite	1981	4" PVC	15 - 20	22.25	518.30	No		9.35	508.95	Unknown

Notes:
AL - EPA Action Level
GS - Galvanized Steel
NA - Not Analyzed
OH - Open Hole
PVC - Polyvinyl Chloride
SS - Stainless Steel
Table information originates from several sources, including available boring logs, well construction forms, CDM's 2004 investigation, historical reports, and/or information provided by URS. Where information could not be obtained from an available source, "Unknown" was used.
Measured depths to water and to product are from Phase III of the RI (CDM, September 2007).
Water bearing zone designations are based on professional judgement after reviewing available information.
Monitor Well PW-2, PW-3, and W-3 could not be located during the September 2007 samplng event.

Table 4-5
Summary of Soil Detections Above Screening Criteria
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																			SVOCs	Inorganics			
			1,1,1-Trichloroethane	*1,1,2-Trichloroethane*	*1,1-Dichloroethene*	*1,2,4-Trichlorobenzene*	*1,2-Dichlorobenzene*	*1,2-Dichloroethane*	*1,4-Dichlorobenzene*	*Acetone*	*Benzene*	*Chlorobenzene*	*Chloroform*	*cis-1,2-Dichloroethene*	*Ethylbenzene*	*Methylene chloride*	*Tetrachloroethene*	*Toluene*	*Trichloroethene*	*Vinyl chloride*	*Xylenes (Total)*	*NDPA/DPA*	*Arsenic*	*Chromium*	*Nickel*	*Thallium*
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	mg/kg	mg/kg	mg/kg	mg/kg
SSLs (DAF 20)			2,000	20	60	5,000	17,000	20	2,000	16,000	30	1,000	600	400	13,000	20	60	12,000	60	10	2.1E+05	1,000	29	38	130	-
Industrial Soil PRGs			1.2E+06	1,605	4.1E+05	2.2E+05	6.0E+05	603	7,867	5.4E+07	1,409	5.3E+05	470	1.5E+05	4.0E+05	20,527	1,309	5.2E+05	115	746	4.2E+05	3.5E+05	1.6	448	20,439	67
Phase I																										
RI-BCK1	3	4																					1.6			
RISB-1	0	1																					1.7			
RISB-2	0	1																						*45*		
Duplicate	0	1						*71*															1.8			
RISB-2	9	13						**780**			*247*								*67*				2	*77*		
RISB-2	17	21						*350*			*264*													*98*		
RISB-4	0	1																						*73*		
RISB-4	5	9																					2.8			
RISB-6	0	1															**2700**		**300**							
RISB-6	13	15															*1000*									
RISB-7	0	1																								91
RISB-7	1	5																					1.6			
RISB-11	1	5												*840*										*48*		68
RISB-11	5	9						*100*			*42*						*171*		**850**							
RISB-12	0	1									*150*												1.7			
RISB-12	1	5								*19000*	**5600**				*150000*		*300*	**1900000**	**240**		**650000**			*43*		
RISB-12	17	21																						*61*		
RISB-13	0	1															*111*							*49*		
RISB-15	0	1																					2.6			
RISB-16	0	1															**2800**		*61.6*				1.8			99
RISB-16	1	5															*880*									
RISB-17	0	1																					1.7			
RISB-17	9	13																						*47*		
RISB-18	0	1																		*29*		NA	NA	NA	NA	NA
RISB-18	1	5		*99*			*22000*	**4800**	*4000*					*460*					**452**							
RISB-20	5	9												*2100*			**2100**		**340**							
RISB-23	0	1																					1.8			
RISB-23	9	11																	**340**					*56*		
RISB-24	0	1																					6.1	*74*	*150*	
RISB-25	0	1																					2.1			
RISB-25	9	13						**24000**						*2900*		*110*	*280*		**310**				2.8			
RISB-25	17	20						**45000**					**690**	*4100*		*160*	*300*		**470**							
RISB-26	0	1																		*12*		NA	NA	NA	NA	NA
RISB-26	1	5																	**130**	*12*			1.9	*50*		
RISB-28	0	1																						*100*		
RISB-28	5	9			*400*			*27*								*37*						NA				
RISB-29	0	1																					8.9	*54*		87
RISB-29	1	5													*70000*			*220000*			*300000*		1.9	*68*		
RISB-29	9	13						*23*														NA	NA	NA	NA	NA
RISB-30	0	1																						*61*	*140*	
RISB-30	9	13												*650*			*1100*									
RISB-31	0	1																					2.7	*43*		
RISB-32	0	1																					1.8	*42*		

Table 4-5
Summary of Soil Detections Above Screening Criteria
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																			SVOCs	Inorganics			
			1,1,1-Trichloroethane	*1,1,2-Trichloroethane*	*1,1-Dichloroethene*	*1,2,4-Trichlorobenzene*	*1,2-Dichlorobenzene*	*1,2-Dichloroethane*	*1,4-Dichlorobenzene*	*Acetone*	*Benzene*	*Chlorobenzene*	*Chloroform*	*cis-1,2-Dichloroethene*	*Ethylbenzene*	*Methylene chloride*	*Tetrachloroethene*	*Toluene*	*Trichloroethene*	*Vinyl chloride*	*Xylenes (Total)*	*NDPA/DPA*	*Arsenic*	*Chromium*	*Nickel*	*Thallium*
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	mg/kg	mg/kg	mg/kg	mg/kg
SSLs (DAF 20)			2,000	20	60	5,000	17,000	20	2,000	16,000	30	1,000	600	400	13,000	20	60	12,000	60	10	2.1E+05	1,000	29	38	130	-
Industrial Soil PRGs			1.2E+06	1,605	4.1E+05	2.2E+05	6.0E+05	603	7,867	5.4E+07	1,409	5.3E+05	470	1.5E+05	4.0E+05	20,527	1,309	5.2E+05	115	746	4.2E+05	3.5E+05	1.6	448	20,439	67
RISB-34	11	13																					1.7			
RISB-37	0	1																					2.9			
RISB-39	0	1																					1.8	*40*		
RISB-40	0	1																					2.1			
RISB-41	0	1																								74
RISB-42	0	1																					2.1			
RISB-43	0	1																						*71*		
RISB-44	0	1																					2.6	*53*		
RISB-45	0	1			*340*			**1400**								*54*	*93*		**200**				1.6			
RISB-45	1	5			*480*			**2500**								*110*	*120*		**330**							
RISB-46	0	1									*64*												2	*99*	*180*	
Duplicate	0	1				*17000*			*3700*		*150*	*2000*						*21000*					1.8	*68*	*180*	
RISB-47	0	1																					3.1	*40*		
RISB-47	9	13																		*16*				*96*	*140*	
RISB-48	13	15																						*44*		
RISB-49	0	1																					2.1			
RISB-49	13	17									*490*											*13000*				
RISB-50	9	13						*75*								*21*										
RISB-52	0	1																						*41*		
Phase II																										
RIMW-1	10	12												*1100*			*71*		**1700**			NA	NA	NA	NA	NA
RIMW-1	12	14																	*83*			NA	NA	NA	NA	NA
Duplicate	12	14												*460*					**590**			NA	NA	NA	NA	NA
RIMW-5	12	14						**1700**														NA	NA	NA	NA	NA
RIMW-5	18	20						**870**														NA	NA	NA	NA	NA
RIMW-6	0	1												*3400*			*800*					NA	NA	NA	NA	NA
RIMW-6	4	6			*79*									*23000*			**3700**		**3200**	*370*		NA	NA	NA	NA	NA
RIMW-6	8	10												*3200*								NA	NA	NA	NA	NA
RIMW-8	2	4			*90*			*390*								*24*						NA	NA	NA	NA	NA
RIMW-8	4	6	*2400*	*23*	*120*			**1500**								*130*	*87*					NA	NA	NA	NA	NA
RIMW-8	6	8	*2600*					**1900**								*100*						NA	NA	NA	NA	NA
RIMW-8	8	10	*3600*	*30*	*160*			**1900**								*210*	*120*					NA	NA	NA	NA	NA
RIMW-8	10	12						**910**								*42*						NA	NA	NA	NA	NA
Duplicate	10	12						**610**								*30*						NA	NA	NA	NA	NA
RIMW-8	12	14		*42*	*110*			**1700**														NA	NA	NA	NA	NA
RISB-57	10	14						*25*						*600*			*220*		**320**	*32*		NA	NA	NA	NA	NA
RISB-57	14	18						*30*						*740*			*260*		**340**	*22*		NA	NA	NA	NA	NA
RISB-57	18	22															*83*					NA	NA	NA	NA	NA
RISB-62	4	6		*210*				**720**											*78*			NA	NA	NA	NA	NA
RISB-62	8	10		*280*				**880**														NA	NA	NA	NA	NA
RISB-62	12	14		*120*				**610**														NA	NA	NA	NA	NA
Duplicate	12	14		*210*				**770**														NA	NA	NA	NA	NA
RISB-63	4	6						*360*														NA	NA	NA	NA	NA
RISB-63	8	10						**940**														NA	NA	NA	NA	NA

Table 4-5
Summary of Soil Detections Above Screening Criteria
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																			SVOCs	Inorganics			
			1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,2-Dichloroethane	1,4-Dichlorobenzene	Acetone	Benzene	Chlorobenzene	Chloroform	cis-1,2-Dichloroethene	Ethylbenzene	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes (Total)	NDPA/DPA	Arsenic	Chromium	Nickel	Thallium
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	mg/kg	mg/kg	mg/kg	mg/kg
SSLs (DAF 20)			2,000	20	60	5,000	17,000	20	2,000	16,000	30	1,000	600	400	13,000	20	60	12,000	60	10	2.1E+05	1,000	29	38	130	-
Industrial Soil PRGs			1.2E+06	1,605	4.1E+05	2.2E+05	6.0E+05	603	7,867	5.4E+07	1,409	5.3E+05	470	1.5E+05	4.0E+05	20,527	1,309	5.2E+05	115	746	4.2E+05	3.5E+05	1.6	448	20,439	67
RISB-63	14	16						**910**														NA	NA	NA	NA	NA
RISB-63	16	18						*530*														NA	NA	NA	NA	NA
RISB-64	0	5						**930**			*155*			*11000*		*45.2*	**1900**	*17000*	**2700**	*56.7*			NA	NA	NA	NA
RISB-64	5	10			*80.3*			**11000**		*24000*	**2100**		**750**	*58000*	*33000*	*402*	**72000**	*370000*	**150000**	*85.8*			NA	NA	NA	NA
RISB-64	10	15						**9300**		*36000*	*281*			*5200*		*237*	*1200*		**16000**				NA	NA	NA	NA
RISB-65	0	5									*329*							*45000*	**120**				NA	NA	NA	NA
RISB-65	5	10								*31000*													NA	NA	NA	NA
RISB-65	10	15								*28000*	*118*												NA	NA	NA	NA
RISB-65	15	20									*91*			*436*								NA	NA	NA	NA	NA
RISB-66	5	9																		*13*		NA	NA	NA	NA	NA

Notes:
NA - Not Analyzed
This table only includes detected results above either the industrial soil preliminary remediation goal (PRG) or soil screening level (SSL) with a dilution attenuation factor (DAF) of 20. PRGs and SSLs from EPA Region 9 (10/2004).
Bold values indicate exceedances of both the PRG and SSL.
Values in red and italics indicate exceedances of the SSL only.
Other values not in bold or italics indicate exceedances of the PRG only.

Table 4-6
Summary of Groundwater Detections Above Screening Criteria
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Location	VOCs																															SVOCs			Inorganics	
	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,4-Dichlorobenzene	4-Methyl-2-pentanone	Acetone	Benzene	Bromodichloromethane	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	cis-1,2-Dichloroethene	Cyclohexane	Dibromochloromethane	Ethylbenzene	Isopropylbenzene	Methyl tert-butyl ether	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes	2-Chlorophenol	Bis(2-ethylhexyl)phthalate	Naphthalene	Iron	Manganese
MCL	200	-	5	-	7	70	600	5	5	75	-	-	5	-	5	100	-	-	70	-	-	700	-	-	-	-	5	1,000	5	2	10,000	-	6	-	-	-
PRG	3,172	0.055	0.20	811	339	7.20	370	0.12	0.16	0.50	1,993	5,475	0.35	0.18	0.17	106	4.60	0.17	60.8	10,342	0.13	1,340	658	11	5,217	4.30	0.10	723	0.03	0.02	206	30.4	4.8	6.2	10.95	0.88
UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	mg/L
Phase I																																				
RITW-12				1000	*89*						7100		**410**						**1200**			*710*					**1400**	**28000**	**82**	**40**	2700	NA	NA	NA	NA	NA
RITW-28	**51000**		**154**	1600	**6600**			**15000**			11000		**69**		**11000**	**123**		882	**235**			**3000**				7900	**428**	**51000**	**1200**		**10000**	NA	NA	NA	NA	NA
RITW-34																													3.45	1.8		NA	NA	NA	NA	NA
RITW-38					*130*			1.14					2.39						**490**								**190**		**34**	**43**		NA	NA	NA	NA	NA
Phase II																																				
BP-1A								0.42					0.45														1.37		**9.07**	1.4		NA	NA	NA	NA	NA
BP-1B			0.75		*22*			1.27										0.38	**670**								**170**		**620**	**2.06**		NA	NA	NA	NA	NA
EW-1			1.73		*94*			**3200**					1.94				31	1.29	**148**								**44**		**130**	**38**		NA	NA	NA	NA	NA
EW-4					*22*			**97**					**6.41**			**110**	400									8.91	1.48		2.5	**14**	280	NA	NA	NA	NA	NA
MW-100																																NA	NA	NA	NA	NA
MW-101																																NA	NA	NA	NA	NA
MW-102																		1.34									0.27					NA	NA	NA	NA	NA
MW-103																											0.41		1.15			NA	NA	NA	NA	NA
MW-104																											1.64		1.79			NA	NA	NA	NA	NA
MW-105																		0.51											0.29			NA	NA	NA	NA	NA
MW-106																		0.52									0.29		0.23			NA	NA	NA	NA	NA
MW-107																																NA	NA	NA	NA	NA
MW-108																																NA	NA	NA	NA	NA
MW-111																																NA	NA	NA	NA	NA
MW-112																																NA	NA	NA	NA	NA
MW-113A																																NA	NA	NA	NA	NA
MW-113B								0.18																			**24**		**16**			NA	NA	NA	NA	NA
MW-114																																NA	NA	NA	NA	NA
MW-115A																																NA	NA	NA	NA	NA
MW-115B								**6.61**																					0.34	0.49		NA	NA	NA	NA	NA
MW-116								**8.88**					**120**				5.1							35						**12**		NA	NA	NA	NA	NA
MW-117													2.39																			NA	NA	NA	NA	NA
Duplicate													2.43																			NA	NA	NA	NA	NA
MW-118													**23**											13								NA	NA	NA	NA	NA
MW-119																																NA	NA	NA	NA	NA
MW-120A																																NA	NA	NA	NA	NA
MW-120B																																NA	NA	NA	NA	NA
MW-121B																											0.57		**7.66**			NA	NA	NA	NA	NA
MW-122B								0.46																					0.25			NA	NA	NA	NA	NA
MW-123A			**9**				**2500**	**4900**		**1300**			**16.25**			**3000**	42.5		**1100**							29.75			**37**	**140**		NA	NA	NA	NA	NA
MW-123B			**7.74**		*15*		**1400**	**2300**		**1100**			**17**			**3500**	35	4.17	**680**							12	2.3		**130**	**84**		NA	NA	NA	NA	NA
OB-8A	*310*		4.98		*71*			**540**	0.53	0.61			**20**			**460**	1300	2.05								330	**19**	**5200**	**15**	**24**	1000	NA	NA	NA	NA	NA
OB-11								2.94					**100**											80					0.32			NA	NA	NA	NA	NA
OB-12								1.04					**36**											43					0.55		250	NA	NA	NA	NA	NA
OB-21													**306**									**3100**	2900	444							**17000**	NA	NA	NA	NA	NA
OB-22													**1050**									**46000**	36000		19000			**3080**			**150000**	NA	NA	NA	NA	NA
OB-23								2.77					**69**				6.6							100					0.22	0.56		NA	NA	NA	NA	NA
OB-109								0.33					0.66														0.31		**15**	**4.97**		NA	NA	NA	NA	NA
OB-109B					*39*			1.57										1.12									**210**		**44**			NA	NA	NA	NA	NA
OB-110A					*71.5*			**46.6**					**33.9**				1300									29	**6.9**	**2500**	3.9	**34.4**	1700	NA	NA	NA	NA	NA
OB-110B								**8.34**																								NA	NA	NA	NA	NA
OB-900													**60**																			NA	NA	NA	NA	NA
OB-901													**13**																			NA	NA	NA	NA	NA
OB-902													2.88																			NA	NA	NA	NA	NA
P-1			1.07		*100*			**2600**	0.66	1.02			1.08				25	1.74	**120**								**46**		**84**	**13**		NA	NA	NA	NA	NA
P-2								4.51					**91**				12							250							330	NA	NA	NA	NA	NA
P-3			2.38		*100*			**6200**		0.76			1.5				31	5.11	**205**								**150**		**196.5**	**6.61**		NA	NA	NA	NA	NA
PW-1																													0.55			NA	NA	NA	NA	NA
PW-2A						**126**							**54**									*900*	1300	302							5700	NA	NA	NA	NA	NA
RIMW-1			3.8		*247*			**267**		1.07			**45**					16	**3600**							24	**2600**		**14000**	**34**						6.1
RIMW-3			1.77		**640**			**13000**					**12**					3.24	**151**							12	**234**		**120**	**18**						
RIMW-4			**7.41**		*245*			**7800**	1.34	1.43			**31**			**110**	31	21	**1100**							21	**245**		**195**	**67**			**6.1**			
Duplicate			**7.15**		*233*			**7800**	1.15	0.55			**30**			**110**	28	20	**1100**							20	**261**		**193**	**66**		NA	NA	NA	NA	NA

Table 4-6
Summary of Groundwater Detections Above Screening Criteria
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

	VOCs																															SVOCs			Inorganics	
Location	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,4-Dichlorobenzene	4-Methyl-2-pentanone	Acetone	Benzene	Bromodichloromethane	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	cis-1,2-Dichloroethene	Cyclohexane	Dibromochloromethane	Ethylbenzene	Isopropylbenzene	Methyl tert-butyl ether	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes	2-Chlorophenol	Bis(2-ethylhexyl)phthalate	Naphthalene	Iron	Manganese
MCL	200	-	5	-	7	70	600	5	5	75	-	-	5	-	5	100	-	-	70	-	-	700	-	-	-	-	5	1,000	5	2	10,000	-	6	-	-	-
PRG	3,172	0.055	0.20	811	339	7.20	370	0.12	0.16	0.50	1,993	5,475	0.35	0.18	0.17	106	4.60	0.17	60.8	10,342	0.13	1,340	658	11	5,217	4.30	0.10	723	0.03	0.02	206	30.4	4.8	6.2	10.95	0.88
UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	mg/L
RIMW-5			**6.86**		**349**			**52000**		1.97			**5.27**				8.33	19	**90**							7.59	**55**		**83**	**7.15**						
Duplicate			**7.34**		**370**			**53000**		2.72			**5.69**				8.74	20	**93**							8.06	**56**		**88**	**7.86**		NA	NA	NA	NA	NA
RIMW-6			2.79		*35*			3.18					**6.82**						**13000**								**880**		**710**	**1200**				9.1		6
RIMW-7								0.58																			**24**		2.58							
RIMW-8	**47000**		**140**	7000	**9000**			**19000**					**58**			**540**	3000	140	**1536**			**3000**				3700	**960**	**52000**	**580**	**844**	**11000**	150	**10**	33	13	12
Duplicate	**47000**		**146**	7400	**7200**			**19000**					**58**			**530**	2700	134	**1506**			**3000**				3700	**892**	**52000**	**582**	**824**	**11000**	140	**19**	28	12	12
RIMW-9																		3.98									**70**		**23**							
Duplicate																		3.79									**66**		**17**			NA	NA	NA	NA	NA
RIMW-10								**1100**									11	19	**190**								**96**		**87**	**7.26**						
RIMW-11								0.41									46	16	**73**								**220**		**31**							
RIMW-12																											1.88		1.42	0.45						
RIMW-13								0.79																									**7**			
RIMW-14																													0.22							
RIMW-15			1.17		*12*			2.31					1.95						**3000**								**880**		**700**	**166**						
Duplicate			1.2		*11*			2.06					1.76						**2800**								**710**		**610**	**140**						
RIMW-16			1.82		*69*			4.3		1.05			**16**						**11000**								**13000**		**1900**	**1100**						2.4
RIMW-18																		15									**27**		2.05							
RIMW-19			1.56		*45*			**28**										1.99	69								**64**		**48**							
RIPZ-3			1.05		*96*			**680**					1.03				27	1.51	**280**								**220**		**340**	**4.39**						1.1
Duplicate			1.83		*97*			**660**		0.61			1.05				27	1.59	**290**								**220**		**330**	**4.36**		NA	NA	NA	NA	NA
RITW-64			0.75		*20*			**199.6**		0.5			**25**				7.1	12.51	**930**							16	**1300**		**820**	**13**		NA	NA	NA	NA	NA
RITW-65			**5.15**		*180*			**19**		0.69			**14**				47	2.17	**1000**								**5500**	820	**246**	1.08		NA	NA	NA	NA	NA
W-1			1.37		*24*			1.17										1.72									**160**		**17**			NA	NA	NA	NA	NA
W-2																																NA	NA	NA	NA	NA
W-4								0.34																								NA	NA	NA	NA	NA
OB-13*												22000	**18000**							63000		**150000**	100000		200000			**2290**			**570000**	NA	NA	NA	NA	NA
Phase III																																				
MW-121B																											0.76		**7.53**			NA	NA	NA	NA	NA
MW-122B																																NA	NA	NA	NA	NA
RIMW-15								1.26											**730**								4.76		**610**	0.64		NA	NA	NA	NA	NA
RIMW-20														5.36				18			3.85						0.79		0.54			NA	NA	NA	NA	NA
RIMW-21																																NA	NA	NA	NA	NA
RIMW-22																		2.58									1.74		**54**			NA	NA	NA	NA	NA
RIMW-23																		3.77									1.73					NA	NA	NA	NA	NA
RIMW-24					*27*			1.17					0.44					0.33	**570**								**260**		**260**	1.17		NA	NA	NA	NA	NA
RIMW-25	*770*	3.24	**36**	950	**540**			**4100**	2.18	1.63			**43**			**2200**	2500	120	**1300**			*1000*				1300	**52**	**9700**	**100**	**800**	3200	NA	NA	NA	NA	NA
RIMW-26																		1.98									0.41					NA	NA	NA	NA	NA
RIMW-27			1.49		*82*			**260**					1.21					2.09	**800**								**400**		**370**	**15**		NA	NA	NA	NA	NA
RIMW-28								**37**		0.99			0.76	2.58				24			3.27						3.21		**6**	**2.64**		NA	NA	NA	NA	NA
RIMW-29					*30*			**7.4**										1.43	**370**								**81**		**260**	**4.01**		NA	NA	NA	NA	NA
RIMW-30														3.83				12			3.32						0.33		0.53			NA	NA	NA	NA	NA

Notes:
NA - Not Analyzed
This table only includes detected results above either the tap water preliminary remediation goal (PRG) or MCL.
Bold values indicate exceedances of both the PRG and MCL.
Values in red and italics indicate exceedances of the MCL only.
Other values not in bold or italics indicate exceedances of the tap water PRG only.

Table 4-7
Hydraulic Analysis Groundwater Elevations
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well / Gage ID	Top of Casing Elevation (ft AMSL)	Hydraulic Zone	Pre Equilibration January 27, 2007		Post Equilibration February 12, 2007	
			Groundwater Elevation (ft AMSL)	Product Thickness (ft)	Groundwater Elevation (ft AMSL)	Product Thickness (ft)
BP-1A	523.03	PWR	510.08		511.75	
BP-1B	523.74	PWR/Bedrock	509.90		512.46	
EW-1	525.19	No Data	510.92		512.40	0.08
EW-2	525.12	PWR	Pumping		511.66	
EW-3	521.13	Bedrock	Pumping		512.82	
EW-4	528.18	No Data	514.07		514.57	
MW-100	530.04	Bedrock	510.38		514.44	
MW-101	529.95	PWR	515.82		515.97	
MW-102	531.31	Bedrock	514.01		515.19	
MW-103	523.16	PWR	512.21		513.38	
MW-104	522.36	PWR	510.44		512.20	
MW-105	528.29	PWR	509.30		509.96	
MW-106	524.76	Saprolite/Bedrock	511.55		511.80	
MW-107	521.55	PWR	513.04		512.26	
MW-108	517.94	Bedrock	513.72		513.37	
MW-111	522.96	Saprolite	509.21		509.96	
MW-112	522.11	PWR	511.38		511.09	
MW-113A	524.38	PWR	511.09		511.26	
MW-113B	521.20	PWR/Bedrock	509.67		510.52	
MW-114	522.92	PWR	512.01		511.83	
MW-115A	519.47	PWR	510.26		509.84	
MW-115B	518.90	PWR/Bedrock	509.46		509.97	
MW-116	524.43	PWR/Bedrock	508.60	2.65	510.29	2.39
MW-117	521.69	Saprolite/Bedrock	509.87		510.53	
MW-118	523.31	Saprolite	510.77		511.57	
MW-119	522.88	PWR	509.91		511.46	
MW-120A	518.98	PWR	510.10		509.96	
MW-120B	518.07	Bedrock	509.44		510.46	
MW-121B	519.32	Bedrock	510.03		509.95	
MW-122B	520.32	Bedrock	515.07		515.44	
MW-123A	529.14	PWR	512.62		513.22	
MW-123B	529.06	Bedrock	512.25		513.09	
OB-109	532.64	PWR	512.77		513.38	
OB-109B	530.38	Bedrock	512.73		513.35	
OB-11	524.50	Saprolite	509.68	0.23	511.63	0.22
OB-110A	526.41	PWR	512.54		513.40	
OB-110B	525.60	Bedrock	511.08		512.46	
OB-12	524.92	Saprolite	507.28	2.52	508.05	4.06
OB-13	524.92	Saprolite	506.10	4.19	506.24	6.04
OB-21	524.91	PWR	509.44	0.03	511.71	0.06
OB-22	524.82	PWR	509.48	0.07	511.72	0.08
OB-23	524.55	PWR	506.31	3.46	508.84	3.41
OB-8A	526.14	PWR	512.99		513.55	

Table 4-7
Hydraulic Analysis Groundwater Elevations
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well / Gage ID	Top of Casing Elevation (ft AMSL)	Hydraulic Zone	Pre Equilibration January 27, 2007		Post Equilibration February 12, 2007	
			Groundwater Elevation (ft AMSL)	Product Thickness (ft)	Groundwater Elevation (ft AMSL)	Product Thickness (ft)
OB-900	524.20	No Data	516.44	2.11	516.39	2.11
OB-901	523.22	No Data	510.53		509.56	2.88
OB-902	524.36	No Data	511.06		508.51	4.30
P-1	525.73	Saprolite	512.42		513.29	
P-2	523.98	Saprolite	507.94	1.54	510.45	1.58
P-3	526.12	PWR	512.50		513.39	
PW-1	531.19	No Data	514.18		510.63	5.73
PW-2A	525.85	PWR/Bedrock	504.94	5.23	507.33	5.14
RIMW-1	531.31	PWR	Not Measured		514.19	
RIMW-3	531.76	PWR	514.77		515.05	
RIMW-4	529.26	PWR	513.05		513.40	
RIMW-5	531.88	PWR	513.84		514.36	
RIMW-6	526.21	PWR	512.73		513.60	
RIMW-7	536.73	PWR	516.18		516.38	
RIMW-8	530.59	PWR	511.29		513.91	
RIMW-9	524.48	Saprolite	511.34		512.56	
RIMW-10	529.46	PWR	510.44		511.71	
RIMW-11	532.11	Saprolite	517.24		517.45	
RIMW-12	529.10	PWR	513.18		513.64	
RIMW-13	536.49	Bedrock	516.14		516.58	
RIMW-14	529.77	Bedrock	Not Measured		511.63	
RIMW-15	526.31	Deep PWR	513.35		513.96	
RIMW-16	526.40	PWR	513.01		513.82	
RIMW-18	532.05	Bedrock	512.03		517.19	
RIMW-19	529.51	Bedrock	512.91		513.68	
RIPZ-1	516.31	Alluvium	508.02		511.34	
RIPZ-2	519.12	Bedrock	515.32		515.71	
RIPZ-3	522.91	PWR	509.77		511.16	
W-1	537.66	PWR	516.05		516.22	
W-2	529.48	PWR	509.42		510.03	
W-4	518.30	Saprolite	511.50		512.03	
RISG-1		Surface Water	510.25		510.27	
RISG-2		Surface Water	508.08		508.15	
RISG-3		Surface Water	506.84		506.84	
RISG-4		Surface Water	507.99		507.87	
RISG-5		Surface Water	505.49		505.31	

Table 4-8
Summary of Sediment and Surface Soil Detections Above Screening Criteria
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Table 4-8A
Sediment Detections above Screening Criteria

Location	SVOCs										Inorganics									
	2-Methylnaphthalene	Benzo(a)anthracene	Benzo(a)pyrene	Bis(2-ethylhexyl)phthalate	Chrysene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	Antimony	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
ESV	330	330	330	180	330	330	330	330	330	330	12	7.24	1	52.3	18.7	30.2	0.13	15.9	2	124
RICB-3				700								16	23	95	270	540	2.3	170	4.8	1400
RISD-1		430 J2		380 J2	390 J2	720			470 J2	940										
RISD-2				320 J2		340 J2				420 J2							0.13 J2			
RISD-3		480	540	360 J2	460	670				870					27	32				
RISD-4			420 J2		350 J2	450 J2				610 J2					25		0.21			
Duplicate			360 J2			390 J2				510 J2					26		0.25			
RISD-5																				
RISD-FCBK																				
RISD-WCBK		720	740		650	1100			550	1500										
RI-WASTE	15000			21000			2100 J2	3300	4900		32	10	4	180	600	140	1.5	140	4.2	1800

Table 4-8B
Surface Soil Detections (Across Wildcat Creek) above Screening Criteria

Location	Depth (feet)	Inorganics
		Arsenic
		mg/kg
SSLs (DAF 20)		29
Industrial Soil PRGs		1.6
RI-BCK1	3-4	1.6
RISS-1	0-1	2.0
RISS-3	0-1	2.3
RISS-4	0-1	2.5
RISS-5	0-1	2.2
RISS-6	0-1	1.7
RISS-7	0-1	2.1
RISS-8	0-1	1.9
RISS-9	0-1	2.2
RISS-10	0-1	1.8

Notes:
SVOC - Semi-Volatile Organic Compound
J2 - Estimated value above the method detection limit but below the reporting limit.
PRG - EPA Region 9 Preliminary Remediation Goal (10/2004)
ESV - EPA Region 4 Ecological Screening Value (11/2001)
SSL - EPA Region 9 Soil Screening Level with a Dilution Attenuation Factor of 20 (10/2004)
These tables only includes detected results above the ESVs for sediment and above the industrial soil PRG or SSL.

Table 4-9
EW-2 Aquifer Performance Test Results
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well ID	Hydraulic Zone	Screen Interval (ft AMSL)	Distance to EW-2 (feet)	Estimated Transmissivity ft^2/day*
EW-2	PWR	461-481	-	-
MW-118	Saprolite	508-518	109	83
W-2	PWR	507-512	207	83
RIPZ-3	PWR	478.5-483.5	226	620
OB-11	Saprolite	504.3-509.3	184	41
RIMW-14	Bedrock	454.8-464.8	230	124

*Estimated transmissivity values obtained from using Theis Method. Detailed analysis results are presented in Appendix E.

Table 4-10
EW-3 Aquifer Performance Test Results
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well ID	Hydraulic Zone	Screen Interval (ft AMSL)	Distance to EW-3 (feet)	Estimated Transmissivity ft^2/day*
EW-3	Bedrock	470.5-497	-	-
BP-1A	PWR	498-507.4	59	250
BP-1B	PWR/Bedrock	482.7-492.7	52	250
MW-103	PWR	493.6-498.6	65	460
RIMW-15	PWR	426.6-456.6	225	N/A
MW-120B	Bedrock	481.3-491.3	293	N/A

*Estimated transmissivity values obtained from using Theis Method. Detailed analysis results are presented in Appendix E.

Table 4-11
Summary of Biochemical and Geochemical Results

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Well / Gage ID	Sample Date	ONSITE ANALYSIS													
		pH	Temp (C)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Total Iron (mg/L)	Ferrous Iron (mg/L)	Sulfate (mg/L)	Nitrite/Nitrate (mg/L)	Sulfide (mg/L)	Phosphorous (mg/L)	CO2 (mg/L)	Alkalinity (mg/L)
MW-115A	1/24/07	5.52	12.45	0.057	75	10.21	86.5	2.16	1.5	15	0.1	174	0.03	25	20
MW-115B	1/24/07	6.56	15.23	0.227	5.67	6.37	-84.4	5.3	1.48	24	0	14	0.17	35	45
MW-123A	1/26/07	6.13	19.95	3.705	33.5	2.21	-62.5	56	53	25	1	447	0.61	325	235
OB-11	1/24/07	6.44	19.39	6.466	62	1.88	-55.7	293	280	15	0	199	0.04	425	75
OB-110A	1/26/07	6.35	19.58	0.981	2.95	0.31	-93.4	33	28	8	0	2	0.17	210	125
OB-110B	1/26/07	6.37	17.66	0.27	4.65	7.29	69.2	0	0	19	1.4	0	0.42	15	35
RIMW-14	1/26/07	7.6	18.33	0.322	0.27	0.35	-60.2	0.11	0.13	41	2.6	65	0.01	20	55
RIMW-15	1/25/07	6.4	18.14	0.398	0.96	1.97	129.1	0.03	0.12	24	4.6	0	0.26	30	50
RIMW-5	1/26/07	6.3	18.96	1.308	1.1	1.09	-9.3	0.01	0.01	25	1.2	0	0.25	35	55
RIMW-6	1/25/07	7.4	16.8	0.274	4.49	3.82	-17.2	6.3	6.17	8	1.2	3	0.31	130	150
RIPZ-1	1/25/07	6.73	17.72	0.388	0.65	2.15	53.5	1.51	2.08	150	0	128	0.01	20	70
W-1	1/25/07	6.78	12.58	0.425	286	7.74	21.2	0.06	0.15	43	22.7	1	0.16	30	40

Well / Gage ID	Sample Date	LABORATORY ANALYSIS			
		DOC mg/L	Methane ug/L	Ethene ug/L	Ethane ug/L
MW-115A	1/24/07	2	1.8	0.2	0.065
MW-115B	1/24/07	2	22	0.24	0.1
MW-123A	1/26/07	442	4700	7100	27
OB-11	1/24/07	52	15000	0.048	0.31
OB-110A	1/26/07	11	5000	2400	110
OB-110B	1/26/07	5	22	1.9	0.16
RIMW-14	1/26/07	2	4.2	1.3	<.025
RIMW-15	1/25/07	1	23	1.6	1.9
RIMW-5	1/26/07	2	28	13	0.61
RIMW-6	1/25/07	16	81	6.5	0.73
RIPZ-1	1/25/07	4	0.99	0.18	0.15
W-1	1/25/07	2	1.9	0.026	<.025

Notes:
DO - Dissolved Oxygen
ORP - Oxidation-Reduction Potential
CO2 - Carbon Dioxide
Alk. - Alkalinity
DOC - Dissolved Organic Carbon

Table 4-12
Qualifiers Added Because of Field Duplicate RPD Exceedances
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Samples	***Analyte***	***Applied Qualifiers***	***RPD Outlier***
RIMW-1 RIMW-51:12-14	cis-1,2-Dichloroethene	J	-140.11
RIMW-1 RIMW-51:12-14	Trichloroethene	J	-150.67
RIMW-4 RIMW-54	trans-1,2-Dichloroethene	J	119.61
RIMW-8 RIMW-58	Butyl benzyl phthalate	J	-77.78
RIMW-8 RIMW-58:10-12	1,2-Dichloroethane	J	39.47
RIMW-8 RIMW-58	2-Hexanone	J	48.95
RIMW-8 RIMW-58:10-12	Toluene	J	53.97
RIMW-25 DUP-01	1,1,2-Trichloro-1,2,2,-trifluoroethane	J	24.72
RIMW-25 DUP-01	Chloroform	J	20.18
RIMW-25 DUP-01	Trichlorofluoromethane	J	24.20
RISB-13 RISB-913	Potassium	J	-40.63
RISB-13 RISB-913	NDPA/DPA	J	47.76
RISB-13 RISB-913	Acetone	J	172.39
RISB-14 RISB-914	Barium	J	-37.04
RISB-14 RISB-914	Cobalt	J	-38.96
RISB-14 RISB-914	Manganese	J	-73.97
RISB-2 RISB-92	Copper	J	-49.28
RISB-46 RISB-946	Calcium	J	77.23
RISB-46 RISB-946	Chromium	J	37.13
RISB-46 RISB-946	Manganese	J	142.86
RISB-46 RISB-946	Potassium	J	65.49

Table 4-12
Qualifiers Added Because of Field Duplicate RPD Exceedances
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Samples	*Analyte*	*Applied Qualifiers*	*RPD Outlier*
RISB-46 RISB-946	Bis(2-ethylhexyl)phthalate	J	-81.25
RISB-46 RISB-946	1,2,4-Trichlorobenzene	J	-131.71
RISB-46 RISB-946	1,2-Dichlorobenzene	J	-134.09
RISB-46 RISB-946	1,3-Dichlorobenzene	J	-144.5
RISB-46 RISB-946	1,4-Dichlorobenzene	J	-135.6
RISB-46 RISB-946	Chlorobenzene	J	-112.5
RISB-46 RISB-946	Ethylbenzene	J	-118.34
RISB-46 RISB-946	Toluene	J	-92.68
RISB-46 RISB-946	Xylenes (Total)	J	-118.7
RISB-51 RISB-951	Chromium	J	-57.14
RISB-51 RISB-951	Vanadium	J	-55.67
RISB-62 RISB-562:12-14	1,1,2-Trichloroethane	J	-54.55
RISB-62 RISB-562:12-14	1,3-Dichlorobenzene	J	-109.84
RISB-62 RISB-562:12-14	1,4-Dichlorobenzene	J	-98.04
RISB-62 RISB-562:12-14	Chlorobenzene	J	-98.31
RISB-62 RISB-562:12-14	cis-1,2-Dichloroethene	J	-107.06
RISB-62 RISB-562:12-14	Trichloroethene	J	-142.73
RISD-4 RISD-54	Calcium	J	87.27
RISS-10 RISS-510	Chromium	J	50

Table 4-13
Qualifiers Added Because of Laboratory Precision RPD Exceedances
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

SDG	***Analyte***	***Applied Qualifiers***	***Outlier***
229079	Antimony	J/UJ	MS/MSD RPD 64%
229143			Laboratory Duplicate RPD
	Chromium		37%
	Iron	J/UJ	38%
	Vanadium		47%
	Antimony		37%
229143			MS/MSD RPD
	Antimony	J/UJ	46%
229203			Laboratory Duplicate RPD
	Chromium		37%
	Iron	J/UJ	38%
	Vanadium		47%
	Antimony		37%
229204			Laboratory Duplicate RPD
	Chromium		37%
	Iron	J/UJ	38%
	Vanadium		47%
	Antimony		37%
229204			MS/MSD RPD
	Potassium	J/UJ	47%
229401			Laboratory Duplicate RPD
	Cadmium		41%
	Chromium	J/UJ	80%
	Vanadium		66%
229401			Laboratory Duplicate RPD
	Barium		58%
	Cobalt		51%
	Copper	J/UJ	36%
	Manganese		92%
	Lead		41%
229403			Laboratory Duplicate RPD
	Cadmium		41%
	Chromium	J/UJ	80%
	Vanadium		66%
229404			Laboratory Duplicate RPD
	Barium		58%
	Cobalt		51%
	Copper	J/UJ	36%
	Manganese		92%
	Lead		41%

Table 4-14
Qualifiers Added Because of Trip Blank Detections
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

SDG	*Sample*	*Analyte*	*Blank Concentration x 5*	*Qualifier*
229312	SB6-1315 SB7-15	Toluene	2.8 ug/L	Reporting limit - U
237752	RIMW-6:0-1 RIMW-6:8-10	Toluene	1.5 ug/L	Reporting limit - U
239274	MW-106	Acetone	9.75 ug/L	Reporting limit – U
	MW-101	Acetone		
	RIMW-59	Acetone		
	MW-100	Acetone		
	MW-105	Acetone		
	RIMW-11	Methylene Chloride	5.25 ug/L	Reporting limit – U
	RIMW-18	Methlyene Chloride		
	RIMW-10	Methylene Chloride		
239401	OB-109	1,2-Dichloroethane	1.35 ug/L	Reporting limit – U
	OB-109B	1,2-Dichloroethane		
	EW-4	Methylene Chloride	3.7 ug/L	Reporting limit - U
	P-3	Methylene Chloride		
	P-1	Methylene Chloride		
	RIMW-5	Methylene Chloride		
	RIMW-55	Methylene Chloride		
	P-3	Toluene	1.45 ug/L	Reporting limit - U
	P-1	Toluene		
	OB-110B	Toluene		
	RIMW-4	Toluene		
	RIMW-54	Toluene		
	PW-1	Toluene		
	RIMW-1	Toluene		
	RIMW-5	Toluene		
	RIMW-55	Toluene		
	RIMW-18	Toluene		
	OB-109	Toluene		
	OB109B	Toluene		
	RIMW-3	Toluene		
	OB-110A	Trichloroethene	0.9 ug/L	Reporting limit – U
	EW-4	Trichloroethene		
	PW-1	Trichloroethene		
	RIMW-14	Trichloroethene		
	P-3	Vinyl Chloride	3.2 ug/L	Reporting limit – U
	RIMW-5	Vinyl Chloride		
	RIMW-55	Vinyl Chloride		
	OB-109	Vinyl Chloride		

Table 4-15
Qualifiers Added Because of Laboratory Blank Detections
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

SDG	*Sample*	*Analyte*	*Blank Concentration x 5*	*Qualifier*
239274	RIMW-11 RIMW-18 RIMW-10	Nickel	0.02 mg/L	U
239274	RIMW-11 RIMW-18 RIMW-12 RIMW-9	Zinc	0.0185 mg/L	U
239274	MW-106 RIMW-9 MW-101 RIMW-59 MW-100 MW-105 Trip Blank	Chlorobenzene	2.95 ug/L	10 U
239274	RIMW-9	1,2-Dichlorobenzene	1.45 ug/L	10 U
239274	MW-106 RIMW-9 MW-101 RIMW-59 MW-100 MW-105 Trip Blank	Toluene	1.05 ug/L	10 U
239341	RIP2-3	Nickel	0.02 mg/L	U
239341	RIP2-3	Thallium	0.0035 mg/L	U
239341	MW-115A MW-115B OB-900 OB-23 OB-901 OB-902 MW-104 MW-116 MW-119 MW-113A MW-113B	Toluene	0.55 ug/L	10 U
239396	RIMW-6	Nickel	0.02 mg/L	U
239396	RIMW-6 RIMW-7 RIMW-515	Thallium	0.035 mg/L	U

Table 4-15
Qualifiers Added Because of Laboratory Blank Detections
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

SDG	*Sample*	*Analyte*	*Blank Concentration x 5*	*Qualifier*
239396	BP-1A BP-1B MW-103 MW-117 MW-1175 W-4 MW-122B EW-1 RIMW-7 RIMW-13 RIMW-15 RIMW-515 RIMW-16	Toluene	0.65 ug/L	10 U
239401	RIMW-8 RIMW-58 RIMW-4 RIMW-1 RIMW-5 RIMW-14 RIMW-19 RIMW-3	Aluminum Beryllium	0.06 mg/L 0.0025 mg/L	U
239401	RIMW-58 RIMW-4 RIMW-1 RIMW-5 RIMW-14 RIMW-19	Zinc	0.0185 mg/L	U
239401	P-3 P-1 OB-110B RIMW-4	Toluene	4.55 ug/L	10 U
239401	RIMW-5 RIMW-55 Trip Blank OB-109B	Vinyl Chloride	2.3 ug/L	10 U
239441	RIMW-21 RIMW-30 TB-01 RIMW-26 MW-122B	Toluene	1.2 ug/L	10 U

Table 4-16
Qualifiers Added Because of MS / MSD %R Exceedances
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

SDG	***Analyte***	***Applied Qualifiers***	***Outlier (limit 75-125%)***
229079	Antimony	J/UJ	30/15 %R
229143	Antimony	J/UJ	30/15 %R 44/39% R 57/53% R
229204	Sodium Thallium Antimony Potassium Vanadium	J/UJ	136/102 %R, 213/236 %R 74/68 %R 44/39 %R, 57/53 %R, 42/43 %R 233/63 %R, 135/149 %R, 80/47% 81/47 %R
229206	Antimony	J/UJ	42/43 %R
229312	Antimony	J/UJ	42/43 %R 45/47 %R
229401	Antimony	J/UJ	45/47 %R 43/41 %R
229403	Antimony	J/UJ	45/47 %R 47/47 %R
229404	Antimony	J/UJ	43/41 %R 47/47 %R
239396	Thallium	J/UJ	77/71 %R

Table 4-17
Qualifiers Added Because of Surrogate %R Exceedances
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

SDG	*Sample*	*Surrogate*	*Applied Qualifiers*
229143	RISB-946	Tetrachloro-m-xylene	J/R
229143	RISB-19-01	Decachlorobiphenyl	J/UJ
229143	RISB-29-1-S	Toluene-d8	J
229203	RISB-92	4-Bromofluorobenzene	J
229206	RISB21-59	Toluene-d8 4-Bromofluorobenzene	J
229401	RISB-34-1113	Toluene-d8 4-Bromofluorobenzene	J
229404	RICB-3	4-Bromofluorobenzene	J
239341	P-2	4-Bromofluorobenzene Toluene-d8	J
239396	RIMW-13	Nitrobenzene 2-Fluorobiphenyl	J
239401	RIMW-8 RIMW-58	Dibromofluoromethane	J/UJ
239401	RIMW-5 RIMW-55	1,2-Dichloroethane-d4	J/UJ

Table 4-18
Qualifiers Added Because of Calibration %R Exceedances
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

SDG	*Analyte*	*RRF/(RSD/%D) Exceedances*	*Applied Qualifiers*
229079	Methyl Acetate	RRF – 0.019, 0.017 RSD/%D – 33.48%, 34.26%	R J/UJ
229079	2-Hexanone	RSD/%D – 29.4%	UJ
229079	Acetone 2-Butanone	RSD/%D – 54.7%, 27.3%	UJ
229143	Methyl Acetate	RRF – 0.019, 0.017 RSD/%D – 28.44%, 34.16%, 37.7%, 71.52%, 44.52%, 27.58%, 37.9%, 76.44%, 40.16%	R J/UJ
229143	4-Methyl-2-pentanone	RSD/%D – 25.1%, 28.3	J/UJ J/UJ
229143	2-Hexanone Acetone	RSD/%D – 25.9%, 31.9%, 28.4 28.2%, 105.2%, 69.3%	J/UJ
229143	2-Butanone	RSD/%D – 48.3%	J/UJ
229203	Methyl Acetate	RRF – 0.019, 0.017 RSD/%D – 71.52%, 44.52%, 76.44%, 48.12%	R J/UJ
229203	Acetone 2-Butanone	RSD/%D – 105.2%, 36.9% 48.30%	J/UJ
229204	Atrazine	RSD/%D – 27.4%	UJ
229204	Bromomethane Methyl Acetate	RRF – 0.035, 0.037, 0.047, 0.041, 0.036 RSD/%D – 26.3%, 33.6% 0.034, 0.026, 0.019, 0.017 RSD/%D – 133%, 71.5%	R J/UJ
229204	Methylene Chloride	RSD/%D – 28.6%, 34.6%	UJ
229204	2-Hexanone	RSD/%D – 25.9%	UJ
229204	Acetone 2-Butanone	RSD/%D – 105.2% 48.30%	UJ
229206	Atrazine	RSD/%D – 27.5%	UJ
229206	Methyl Acetate	RRF – 0.019, 0.017 RSD/%D – 71.52%, 44.52%, 76.44%, 48.12%	R J/UJ
229206	Acetone 2-Butanone	RSD/%D – 105.2%, 36.9% 48.30%	J/UJ
229312	Methyl Acetate	RRF – 0.019, 0.017 %D – 54%, 40.1%, 53.5%, 32%	R J
229312	Chloromethane	RSD/%D – 25.5%	UJ

Table 4-18
Qualifiers Added Because of Calibration %R Exceedances
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

SDG	*Analyte*	*RRF/(RSD/%D) Exceedances*	*Applied Qualifiers*
229401	Methyl Acetate	RRF – 0.019, 0.017 RSD/%D – 53.5%, 46.6%, 35.62%	R
229403	Methyl Acetate	RRF – 0.019, 0.017 RSD/%D – 53.5%, 46.6%, 35.62%	R J/UJ
229404	Methyl Acetate	RRF – 0.019, 0.017, 0.034, 0.026 RSD/%D – 53.5%, 32%, 29.02%, 35.62%, 46.6%, 49.2%	R J/UJ
229404	Bromomethane	RRF – 0.035, 0.037 RSD/%D – 48.6%	R
229404	Carbon Disulfide	RSD/%D – 22.6%	UJ
229404	Chloroethane	RSD/%D – 52.9%	UJ
229404	Acetone	RSD/%D – 74.6, 95.1%	UJ
229404	2-Butanone	RSD/%D – 45.1%	UJ
229404	2-Hexanone	RSD/%D – 44.4%	UJ
237552	Bromomethane Chloroethane Methyl Acetate	RRF – 0.048 RRF – 0.048 RRF – 0.035	R
237752	Bromomethane Chloroethane	RRF – 0.048, 0.04, 0.039, 0.045 RRF – 0.048, 0.04, 0.042, 0.036, 0.034	R
237914	Bromomethane Chloroethane Methyl Acetate	RRF – 0.048, 0.046, 0.047, 0.049 RRF – 0.048, 0.04, 0.037, 0.033, 0.041, RRF – 0.035 RSD/%D – 30.64%, 37.42%, 28.32%, 28.3%	J/R
237943	Bromomethane Chloroethane Methyl Acetate	RRF – 0.048, 0.046, 0.047, 0.049 RRF – 0.048, 0.04, 0.037, 0.033, 0.041 RRF – 0.035 RSD/%D – 30.64%, 37.42%, 28.3%, 38.96%, 49.84%	R
237943	Cyclohexane Methyl Cyclohexane	RSD/%D – 33.42% RSD/%D – 38.7%	UJ
238041	Bromomethane Chloroethane Methyl Acetate	RRF – 0.048, 0.049 RRF – 0.048, 0.041, 0.04 RRF – 0.035	J/R

Table 4-18

Qualifiers Added Because of Calibration %R Exceedances

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

SDG	Analyte	RRF/(RSD/%D) Exceedances	Applied Qualifiers
238119	Chloroethane Methyl Acetate Bromomethane	RRF – 0.04, 0.041, 0.042 RRF – 0.035 RRF – 0.049	R
239274	Pentachlorophenol 2,4-Dinitrophenol	RSD/%D – 35.61%, 40.8% RSD/%D – 32.8%	UJ
239274	Chloroethane Methyl Acetate	RRF – 0.04, 0.035, 0.039 RRF – 0.035	J/R
239274	Bromomethane Cyclohexane Methyl Cyclohexane	RSD/%D – 37.8% RSD/%D – 25.28% RSD/%D – 35.94%	UJ
239341	Chloroethane Methyl Acetate Bromomethane	RRF – 0.04, 0.034, 0.039, 0.033, 0.031 RRF – 0.035 RRF – 0.047, 0.049	J/R
239341	Acetone 2-Butanone Methyl Cyclohexane	RSD/%D – 68.5% RSD/%D – 41.1% RSD/%D – 27.16%	J/UJ
239396	Acetone Bromomethane 2-Butanone 2-Hexanone	RSD/%D – 88.5% RSD/%D – 31% RSD/%D – 48.4% RSD/%D – 41.9%	J/UJ
239401	Chloroethane Methylene Chloride Methyl Acetate	RRF – 0.04, 0.031, 0.03 RSD/%D – 29.5%, 32.7% RSD/%D – 25% RRF – 26.84%	J J J
239401	Bromomethane	RRF – 0.045	R
249441	Trans-1, 3-Dichloroporopene Methyl Acetate Methyl Cyclohexane Cyclohexanone	RSD/%D – 30.7% RSD/%D – 43.51% RSD/%D – 47.37%, 68.12% RSD/%D – 48.52%, 57.34%	J/UJ

Table 5-1
Summary of Surface and Subsurface Soil Hot Spot Evaluation
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

		Chemical of Potential Concern									
	Region 9 Residential Soil Screening Level	**1,2-DCA** 0.28 (mg/kg)	**1,4-DCB** 3.4 (mg/kg)	**cis-1,2-DCE** 43 (mg/kg)	**Benzene** 0.64 (mg/kg)	**PCE** 0.48 (mg/kg)	**Toluene** 520 (mg/kg)	**TCE** 0.48 (mg/kg)	**VC** 0.079 (mg/kg)	**Xylenes** 270 (mg/kg)	Basis for Identification as a Hot Spot
Hot Spot Location	**Depth (ft)**										
Subsurface Locations											
RISB-25	17-20	45									1,2-DCA
	9-13	24									
RISB-64	5-10	11		58	2.1	7.2		150	0.086		chlorinated VOCs
	10-15	9.3				1.2		16			
	0-5	0.93				1.9		2.7			
RIMW-6	4-6					3.7		3.2	0.37		chlorinated VOCs
(Hot Spot 2)	0-1					0.8					
RISB-12	12-15				5.6		1,900			650	BTEX
RISB-18	1-5	4.8	4.0								chlorinated VOCs
Surface Locations											
RISB-16 (Hot Spot 3)	0-1					2.8					PCE
	1-5					0.88					
SB-6 (Hot Spot 1)	0-1					2.7					PCE

Notes:
Hot spot selection criteria:
Subsurface soil location was selected as a hot spot if: (1) 2 or more chemicals exceeded screening criteria at a given location or (2) if chemical exceeded criteria, the concentration was 10x greater than the screening level.
Surface soil location was selected as a hot spot if residential criteria exceeded.

Table 5-2
Summary of Key Toxicological Properties for Chronic Noncarcinogenic
Effects of Study Chemicals - Oral / Dermal
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Study Chemical	ORAL/DERMAL EXPOSURE PATHWAY								Modifying Factor/ Uncertainty Factor
	Chronic Reference Dose (RfD) (mg/(kg/day))	Confidence in Chronic RfD	Subchronic Reference Dose (RfD) (mg/(kg/day))	Medium of Exposure in Critical Study	Species Tested in Critical Study	Effect of Concern in Critical Study	Source of Chronic RfD	Source of Subchronic RfD	
VOCs									
Acetophenone	1.00E-01	Low	1.00E+00	Oral Subchronic Study	rat	General Toxicity	EPA, 2007	EPA, 1997	3000
Benzene	4.00E-03	medium	na	occupational inhalation study	human	Decreased lymphocyte count	EPA, 2007		300
Bromodichloromethane	2.00E-02	medium	2.00E-02	Chronic Mouse Gavage Bioassay	mouse	Renal cytomegaly	EPA, 2007	EPA, 1997	1000
Chlorobenzene	2.00E-02	medium	2.00E-01	13-Week Dog Study, Oral Exposure (capsule)	dog	Histopathologic changes in liver	EPA, 2007	EPA, 1997	1000
Chloroethane	4.00E-01	---	nl	---	---	---	NCEA		---
Chloroform	1.00E-02	medium	1.00E-02	oral (chromic bioassay)	dog	fatty cyst formations in the liver and elevated SGPT	EPA, 2007	EPA, 1997	1000
1,1-Dichloroethane	2.00E-01	---	1.00E-01	---	---	---	EPA PPRV	EPA, 1997	---
1,2-Dichlorobenzene	9.00E-02	low	9.00E-01	Oral Exposure (gavage)	rat	observed	EPA, 2007	EPA, 1997	1000
1,1-Dichloroethene	5.00E-02	medium	9.00E-03	Rat chronic drinking water study	rat	Liver toxicity (fatty change)	EPA, 2007	EPA, 1997	100
1,2-Dichloroethane	na	---	nl	---	---	---	EPA, 2007		---
cis-1,2-Dichloroethene	1.00E-02	- - -	1.00E-01	- - -	- - -	- - -	EPA PPRV	EPA, 1997	---
1,4-Dichlorobenzene	3.00E-02	- - -	9.00E-01	- - -	- - -	- - -	NCEA	EPA, 1997	---
Ethylbenzene	1.00E-01	low	1.00E+00	subchronic to chronic oral bioassay	rat	liver/kidney toxicity	EPA, 2007	EPA, 1997	1000
2-Hexanone	--	- - -	na	- - -	- - -	- - -	EPA, 2007		---
Isopropylbenzene	1.00E-01	low	nl	oral gavage	rat	Increased kidney weight	EPA, 2007		---
4-Methyl-2-pentanone	---	- - -	8.00E-01	- - -	- - -	- - -	EPA, 2007	EPA, 1997	
Methyl tert butyl ether	na	- - -	nl	- - -	- - -	- - -	- - -		---
Methylcyclohexane	na	- - -	na	- - -	- - -	- - -	- - -		---
Methylene chloride	6.00E-02	medium	6.00E-02	oral water bioassay	rat	liver toxicity	EPA, 2007	EPA, 1997	100
Tetrachloroethene	1.00E-02	medium	1.00E-01	oral (gavage)	mouse	Hepatotoxicity in mice, weight gain in rats	EPA, 2007	EPA, 1997	1000
Toluene	8.00E-02	medium	2.00E+00	13-week gavage study	rat	Increased kidney weight	EPA, 2007	EPA, 1997	3000
1,1,1-Trichloroethane	2.00E+00	low-medium	9.00E-01	90-Day mouse dietary study	mouse	Reduced body weight	EPA, 2007	EPA, 1997	1000
1,1,2-Trichloroethane	4.00E-03	medium	4.00E-02	Subchronic Drinking Water Study	mouse	Clinical serum chemistry	EPA, 2007	EPA, 1997	1000
Trichloroethene	3.00E-04	- - -	nl	- - -	- - -	- - -	NCEA		- - -
Vinyl chloride	3.00E-03	medium	na	Oral	rat/mouse	liver cell polymophism	EPA, 2007		30
Xylenes (Total)	2.00E-01	medium	na	Chronic F344/N rat study (oral)	rat	Decreased body weight, increased mortality	EPA, 2007		1000

Table 5-2
Summary of Key Toxicological Properties for Chronic Noncarcinogenic
Effects of Study Chemicals - Oral / Dermal
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Study Chemical	ORAL/DERMAL EXPOSURE PATHWAY								Modifying Factor/ Uncertainty Factor
	Chronic Reference Dose (RfD) (mg/(kg/day))	Confidence in Chronic RfD	Subchronic Reference Dose (RfD) (mg/(kg/day))	Medium of Exposure in Critical Study	Species Tested in Critical Study	Effect of Concern in Critical Study	Source of Chronic RfD	Source of Subchronic RfD	
SVOCs									
2-Chlorophenol	5.00E-03	low	5.00E-02	Sub-Chronic Drinking Water Study	rat	Reproductive Effects	EPA, 2007	EPA, 1997	1000
Bis(2-ethylhexyl)phthalate	2.00E-02	medium	2.00E-02	Sub-chronic-to-Chronic Oral Bioassay	Guinea Pig	increased liver weight	EPA, 2007	EPA, 1997	1000
Naphthalene	2.00E-02	low	na	oral (subchronic)	rat	decreased terminal body weight	EPA, 2007		3000
Metals									
Arsenic	3.00E-04	medium	3.00E-04	oral (drinking water)	human	hyperpigmentation; skin keratosis; vascular complications	EPA, 2007	EPA, 1997	3
Iron	7.00E-01	---	na	---	---	---	NCEA		---
Manganese	2.00E-02	medium	1.40E-01	Chronic Ingestion Data	human	CNS effects	EPA, 2007	EPA, 1997	1
Thallium	7.00E-05	---	nl	---	---	---	Other		---
Vanadium	1.0E-03	---	7.00E-03	---	---	---	NCEA	EPA, 1997	---

Notes:
(na): The chemical is listed, value is not available.
(nl): The chemical is not listed by the reference source.
EPA, 2007. Integrated Risk Information System (IRIS). Chemical-specific database.
NCEA: National Center for Environmental Assessment.
EPA PPRV - EPA Provisional Peer-Reviewed Value. EPA Region 3 RBC Table.
ATSDR MRL (chronic). EPA Region 3 RBC Table.

Table 5-3
Summary of Key Toxicological Properties for Chronic Noncarcinogenic
Effects of Study Chemicals - Inhalation
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Study Chemical	***INHALATION EXPOSURE PATHWAY***											
	Inhalation Chronic Reference Concentration (RfC) (mg/m^3)	Inhalation Chronic Reference Dose (RfD_i) (mg/(kg/day))	Inhalation Subchronic Reference Concentration (RfC) (mg/m^3)	Inhalation Subchronic Reference Dose (RfD_i) (mg/(kg/day))	Source of Chronic Inhalation RfC	Source of Subchronic Inhalation RfC	Date Last Verified	Confidence in RfC	Study Type	Species Tested in Critical Study	Target Organ / Critical Effect	Uncertainty / Modifying Factors
VOCs												
Acetophenone	na	na	na	na	EPA, 2007		---	---	---	---	---	---
Benzene	3.00E-02	8.57E-03	na	na	EPA, 2007		1/26/02	medium	Occupational Inhalation	human	Decreased lymphocyte count	300
Bromodichloromethane	na	na	na	na	EPA, 2007		- - -	- - -	- - -	---	- - -	- - -
Chlorobenzene	4.90E-02	1.40E-02	na	na	EPA PPRV		- - -	- - -	- - -	- - -	- - -	- - -
Chloroethane	1.00E+00	2.90E+00	na	na	EPA, 2007		12/20/90	medium	developmental Inhalation study	mouse	Delayed fetal ossification	300
Chloroform	4.90E-02	1.40E-02	na	na	EPA PPRV (1)		- - -	- - -	- - -	- - -	- - -	- - -
1,1-Dichloroethane	4.90E-01	1.40E-01	na	5.00E+00	Heast Alt.	EPA, 1997	- - -	- - -	- - -	- - -	- - -	- - -
1,2-Dichlorobenzene	1.40E-01	4.00E-02	na	na	Heast Alt.		- - -	- - -	gavage	rats/mice	Several tumor types	- - -
1,1-Dichloroethene	2.00E-01	5.70E-02	na	na	EPA, 2007		6/7/02	medium	chronic inhalation study	Rat	Liver toxicity (fatty change)	30
1,2-Dichloroethane	2.45E+00	7.00E-01	nl	nl	ATSDR MRL (chronic)		- - -	- - -	- - -	- - -	- - -	- - -
cis-1,2-Dichloroethene	2.00E-01	5.71E-02	na	na	EPA, 2007		- - -	- - -	- - -	- - -	- - -	- - -
1,4-Dichlorobenzene	8.00E-01	2.29E-01	2.50E+00	7.14E-01	EPA, 2007	EPA, 1997	6/25/92	medium	Multigeneration Reproductive Study	rat	Increased liver weights in P1 males	100
Ethylbenzene	1.00E+00	2.90E-01	na	na	EPA, 2007		3/1/91	low	inhalation study	rat, rabbit	developmental toxicity	300
2-Hexanone	na	na	nl	nl	EPA, 2007		- - -	- - -	- - -	- - -	- - -	- - -
Isopropylbenzene	4.00E-01	1.10E-01	nl	nl	EPA, 2007		6/6/97	medium	inhalation study	rat	increased kidney weights	1000
4-Methyl-2-pentanone	3.00E+00	8.57E-01	na	na	EPA, 2007		4/2/03	Low-Medium	inhalation study	rat, mice	Reduced fetal body weight, skeletal variations, and increased fetal death in mice, and skeletal variations in rats	300
Methyl tert butyl ether	3.00E+00	8.57E-01	nl	nl	EPA, 2007		7/21/93	medium	inhalation study	rat	Increased liver and kidney weights and increased severity of spontaneous renal lesions (females), increased prostration (females), and swollen periocular tissue (males and females)	100
Methylcyclohexane	3.01E+00	8.60E-01	3.00E+00	8.57E-01	Heast Alt.	EPA, 1997	---	- - -	- - -	- - -	- - -	- - -
Methylene chloride	1.05E+00	3.00E-01	3.00E+00	8.57E-01	ATSDR MRL (chronic)	EPA, 1997	---	- - -	- - -	- - -	- - -	- - -
Tetrachloroethene	3.50E-02	1.00E-02	na	na	ATSDR MRL (chronic)		- - -	- - -	- - -	- - -	- - -	- - -
Toluene	5.00E+00	1.43E+00	na	na	EPA, 2007		8/26/05	high	Occupational Inhalation	human	Neurological effects	10

Table 5-3
Summary of Key Toxicological Properties for Chronic Noncarcinogenic
Effects of Study Chemicals - Inhalation
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Study Chemical	INHALATION EXPOSURE PATHWAY											
	Inhalation Chronic Reference Concentration (RfC) (mg/m^3)	Inhalation Chronic Reference Dose (RfD_i) (mg/(kg/day))	Inhalation Subchronic Reference Concentration (RfC) (mg/m^3)	Inhalation Subchronic Reference Dose (RfD_i) (mg/(kg/day))	Source of Chronic Inhalation RfC	Source of Subchronic Inhalation RfC	Date Last Verified	Confidence in RfC	Study Type	Species Tested in Critical Study	Target Organ / Critical Effect	Uncertainty / Modifying Factors
1,1,1-Trichloroethane	5.00E+00	1.43E+00	na	na	EPA, 2007		9/28/07	medium	2 year inhalation study	rat	Liver histopathologic changes	100
1,1,2-Trichloroethane	na	na	na	na	EPA, 2007		- - -	- - -	- - -	- - -	- - -	- - -
Trichloroethene	3.50E-02	1.00E-02	nl	nl	NCEA (1)		- - -	- - -	- - -	- - -	- - -	- - -
Vinyl chloride	1.00E-01	2.86E-02	na	na	EPA, 2007		8/7/00	medium	oral feeding study	rat	liver cell polymorphism	30
Xylenes (Total)	1.00E-01	2.86E-02	na	na	EPA, 2007		1/30/03	medium	inhalation study	rat	Impaired motor coordination	300
SVOCs												
2-Chloropheno	na	na	na	na	EPA, 2007		- - -	- - -	- - -	- - -	- - -	- - -
Bis(2-ethylhexyl)phthalate	na	na	na	na	EPA, 2007		---	---	---	---	---	---
Naphthalene	3.00E-03	9.00E-04	na	na	EPA, 2007		7/1/98	low-med	inhalation study	mouse	Nasal effects	3000
Metals												
Arsenic	na	na	na	na	EPA, 2007		- - -	- - -	- - -	- - -	- - -	- - -
Iron	na	na	na	na	EPA, 2007		- - -	- - -	- - -	- - -	- - -	- - -
Manganese	5.0E-05	1.4E-05	na	na	EPA, 2007		9/23/93	medium	Occupational Inhalation	human	Impairment of neuro-behavioral function	1000
Thallium	na	na	nl	nl	EPA, 2007		- - -	- - -	- - -	- - -	- - -	- - -
Vanadium	na	na	na	na	EPA, 2007		- - -	- - -	- - -	- - -	- - -	- - -

Notes:
(1): Chronic oral RfD was used to calculate the oral RfC.
(2): Chronic oral RfC was used to calculate the oral RfD.
(na): The chemical is listed, value is not available.
(nl): The chemical is not listed.
EPA, 2007. Integrated Risk Information System (IRIS). Chemical-specific database.
NCEA: National Center for Environmental Assessment.
EPA PPRV - EPA Provisional Peer-Reviewed Value. EPA Region 3 RBC Table.
ATSDR MRL (chronic). EPA Region 3 RBC Table.

Table 5-4
Summary of Key Toxicological Properties for Carcinogenic Effects of Study Chemicals - Oral / Dermal
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Study Chemical	Weight-of-Evidence Classification	*ORAL/DERMAL EXPOSURE PATHWAY* Oral Cancer Slope Factor (CSF) (mg/(kg/day))-1	Source	Date Last Verified	Study Type	Species Tested in Critical Study	Tumor Type in Critical Study
VOCs							
Acetophenone	D	na	EPA, 2007	---	---	---	---
Benzene	A	5.50E-02	EPA, 2007	9/30/98	inhalation occupational study	human	leukemia
Bromodichloromethane	B2	6.20E-02	EPA, 2007	4/2/92	gavage	mouse	Kidney (tubular cell adenoma and tubular cell adenocarcinoma)
Chlorobenzene	D	na	EPA, 2007	---	---	---	---
Chloroethane	ne	2.90E-03	NCEA	---	---	---	---
Chloroform	B2	1.00E-02	EPA, 2007	---	---	---	---
1,1-Dichloroethane	C	na	EPA, 2007	12/7/89	bioassay	female rat	mammary gland adenocarcinomas and hemangiosarcomas
1,2-Dichlorobenzene	D	na	EPA, 2007	12/6/89	---	---	---
1,1-Dichloroethene	C	na	EPA, 2007	---	---	---	---
1,2-Dichloroethane	B2	9.10E-02	EPA, 2007	12/5/86	gavage	rat/Osborne-Mendel, male	hemangiosarcomas
cis 1,2-Dichloroethene	D	na	EPA, 2007	9/7/89	---	---	---
1,4-Dichlorobenzene	ne	2.40E-02	Heast Alt.	---	---	---	---
Ethylbenzene	D	na	EPA, 2007	10/7/87	- - -	- - -	- - -
2-Hexanone	na	na	EPA, 2007	---	- - -	- - -	- - -
Isopropylbenzene	D	na	EPA, 2007	6/6/97	- - -	- - -	- - -
4-Methyl-2-pentanone	na	na	EPA, 2007	---	- - -	- - -	- - -
Methyl tert butyl ether	na	4.00E-03	Other	---	- - -	- - -	- - -
Methylcyclohexane	na	na	EPA, 2007	---	- - -	- - -	- - -
Methylene chloride	B2	7.50E-03	EPA, 2007	1/31/91	Drinking water	rats	hepatocellular carcinoma and neoplastic nodules
Tetrachloroethene	na	5.40E-01	Other	- - -	- - -	- - -	- - -
Toluene	na	ne	EPA, 2007	- - -	- - -	- - -	- - -

Table 5-4
Summary of Key Toxicological Properties for Carcinogenic Effects of Study Chemicals - Oral / Dermal
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Study Chemical	Weight-of-Evidence Classification	***ORAL/DERMAL EXPOSURE PATHWAY***					
		Oral Cancer Slope Factor (CSF) (mg/(kg/day))-1	Source	Date Last Verified	Study Type	Species Tested in Critical Study	Tumor Type in Critical Study
1,1,1-Trichloroethane	D	na	EPA, 2007	8/5/87	- - -	- - -	- - -
1,1,2-Trichloroethane	C	5.70E-02	EPA, 2007	7/23/86	gavage	Mouse/B6C3F1	hepatocellular carcinoma
Trichloroethene	na	4.00E-01	NCEA	- - -	- - -	- - -	- - -
Vinyl chloride	A	7.20E-01	EPA, 2007	8/6/96	occupational	human	angiosarcoma
Xylenes (Total)	ne	na	EPA, 2007	---	---	---	---
SVOCs							
2-Chlorophenol	na	ne	EPA, 2007	---	---	---	---
Bis(2-ethylhexyl)phthalate	B2	1.40E-02	EPA, 2007	10/7/87	diet	mouse	hepatocellular carcinoma and adenoma
Naphthalene	C	na	EPA, 2007	---	---	---	---
Metals							
Arsenic	A	1.50E+00	EPA, 2007	4/9/84	oral (drinking water)	human	skin cancer
Iron	na	na	EPA, 2007	---	- - -	- - -	- - -
Manganese	D	na	EPA, 2007		- - -	- - -	- - -
Thallium	na	na	EPA, 2007	---	- - -	- - -	- - -
Vanadium	ne	na	EPA, 2007	---	- - -	- - -	- - -

Notes:
(na): The chemical is listed, value is not available.
(ne): The compound has not been evaluated by EPA for evidence of human carcinogenicity.
(nl): The chemical is not listed by the reference source.
EPA, 2007. Integrated Risk Information System (IRIS). Chemical-specific database.
NCEA: National Center for Environmental Assessment.
EPA PPRV - EPA Provisional Peer-Reviewed Value. EPA Region 3 RBC Table.
ATSDR MRL (chronic). EPA Region 3 RBC Table.

Table 5-5
Summary of Key Toxicological Properties for Carcinogenic Effects of Study Chemicals - Inhalation

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Study Chemical	Weight-of-Evidence Classification	INHALATION EXPOSURE PATHWAY						
		Inhalation Unit Risk Factor (UR) $(ug/m3)^{-1}$	Cancer Slope Factor (CSF) $(mg/(kg/day))^{-1}$	Medium of Exposure Study	Species Tested in Critical Study	Type of Cancer in Critical Study	Inhalation Unit Risk Source
VOCs							
Acetophenone	D	na	na	---	---	---	EPA, 2007
Benzene	A	5.00E-06	2.70E-02	inhalation	human	leukemia	EPA, 2007
Bromodichloromethane	B2	na	na	---	---	---	EPA, 2007
Chlorobenzene	D	na	na	---	---	---	EPA, 2007
Chloroethane	ne	na	na	---	---	---	EPA, 2007
Chloroform	B2	2.30E-05	8.10E-02	Oral (gavage)	mouse	hepatocellular carcinoma	EPA, 2007
1,1-Dichloroethane	C	na	na	bioassay	female rat	adenocarcinomas and hemangiosarcomas	EPA, 2007
1,2-Dichlorobenzene	D	na	na	---	---	---	EPA, 2007
1,1-Dichloroethene	C	na	na	---	---	---	EPA, 2007
1,2-Dichloroethane	B2	2.60E-05	9.10E-02	gavage	male	hemangiosarcomas	EPA, 2007
cis-1,2-Dichloroethene	D	na	na	- - -	- - -	- - -	EPA, 2007
1,4-Dichlorobenzene	ne	6.29E-06	2.20E-02				NCEA
Ethylbenzene	D	na	na	- - -	- - -	- - -	EPA, 2007
2-Hexanone	na	na	na	- - -	- - -	- - -	EPA, 2007
Isopropylbenzene	D	na	na	- - -	- - -	- - -	EPA, 2007
4-Methyl-2-pentanone	na	na	na	- - -	- - -	- - -	EPA, 2007
Methyl tert butyl ether	na	na	na	- - -	- - -	- - -	EPA, 2007
Methylcyclohexane	na	na	na	- - -	- - -	- - -	EPA, 2007
Methylene chloride	B2	4.70E-07	1.65E-03	inhalation	mouse	carcinomas	EPA, 2007
Tetrachloroethene	na	6.00E-06	2.10E-02	---	- - -	- - -	Other
Toluene	na	ne	na	---	- - -	- - -	EPA, 2007
1,1,1-Trichloroethane	D	na	na	---	- - -	- - -	EPA, 2007
1,1,2-Trichloroethane	C	1.60E-05	5.60E-02	gavage	Mouse/B6C3F1	hepatocellular carcinoma	EPA, 2007
Trichloroethene	na	1.10E-04	3.85E-01	- - -	- - -	- - -	NCEA (1)
Vinyl chloride	A	4.40E-06	1.54E-02	inhalation	rats	liver angiosarcomas,	EPA, 2007
Xylenes (Total)	ne	na	na	---	---	---	EPA, 2007

Table 5-5
Summary of Key Toxicological Properties for Carcinogenic Effects of Study Chemicals - Inhalation

Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Study Chemical	Weight-of-Evidence Classification	INHALATION EXPOSURE PATHWAY					
		Inhalation Unit Risk Factor (UR) $(ug/m3)^{-1}$	Cancer Slope Factor (CSF) $(mg/(kg/day))^{-1}$	Medium of Exposure Study	Species Tested in Critical Study	Type of Cancer in Critical Study	Inhalation Unit Risk Source
SVOCs							
2-Chlorophenol	na	ne	na	---	---	---	EPA, 2007
Bis(2-ethylhexyl)phthalate	B2	na	na	---	---	---	EPA, 2007
Naphthalene	C	na	na	---	---	---	EPA, 2007
Metals							
Arsenic	A	4.30E-03	1.51E+01	occupational inhalation	human, male	lung cancer	EPA, 2007
Iron	na	na	na	---	---	---	EPA, 2007
Manganese	D	na	na	---	---	---	EPA, 2007
Thallium	na	na	na	---	---	---	EPA, 2007
Vanadium	ne	na	na	- - -	- - -	- - -	EPA, 2007

Notes:
(1): The Inhalation Unit Risk factor was extrapolated from the Cancer Slope Factor.
(2): The Cancer Slope Factor was extrapolated from the Inhalation Unit Risk factor.
(na): The chemical is listed, value is not available.
(nl): The chemical is not listed by the reference source.
EPA, 2007. Integrated Risk Information System (IRIS). Chemical-specific database.
NCEA: National Center for Environmental Assessment.
EPA PPRV - EPA Provisional Peer-Reviewed Value. EPA Region 3 RBC Table.
ATSDR MRL (chronic). EPA Region 3 RBC Table.

Table 5-6
Risk and Hazard Evaluation
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

	Excess Lifetime Cancer Risk [1]	Percent Distribution of Risk by Pathway	Exceeds Acceptable Risk Range?	Hazard Index [2]	Percent Distribution of Risk by Pathway	Exceeds Noncancer HI Threshold?
CURRENT EXPOSURE TO CHEMICALS SURFACE SOIL (EXCLUDING HOT SPOTS AND BENEATH STRUCTURES) AND GROUNDWATER						
O&M Worker						
Ingestion of Surface Soil	5E-07	0%		3E-01	33%	
Dermal Contact with Surface Soil	2E-07	0%		2E-01	22%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	6E-10	0%		3E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	9E-05	99%		3E-01	45%	
Total Risk =	**9E-05**		**No**	**0.8**		**No**
Trespasser						
Ingestion of Surface Soil	7E-07	67%		8E-01	57%	
Dermal Contact with Surface Soil	3E-07	32%		6E-01	43%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	7E-10	0%		1E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**1E-06**		**No**	**1**		**No**
CURRENT EXPOSURE TO CHEMICALS IN HOT SPOT 1 SURFACE SOIL AND GROUNDWATER						
O&M Worker						
Ingestion of Surface Soil	5E-07	0%		3.E-01	35%	
Dermal Contact with Surface Soil	2E-07	0%		2E-01	23%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	4E-10	0%		1E-02	2%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	9E-05	99%		3E-01	41%	
Total Risk =	**9E-05**		**No**	**0.8**		**No**
FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT 1 SURFACE SOIL AND GROUNDWATER						
Industrial Worker						
Ingestion of Surface Soil	8E-07	0%		5E-01	1%	
Dermal Contact with Surface Soil	3E-07	0%		3E-01	1%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	6E-07	0%		2E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	49%		3E+01	49%	
Dermal Contact with All Groundwater	5E-03	49%		3E+01	49%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**9E-03**		**Yes**	**63**		**Yes**
Resident						
Ingestion of Surface Soil	7E-06	0%		1E+01	3%	
Dermal Contact with Surface Soil	7E-07	0%		2E+00	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-06	0%		7E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	50%		2E+02	48%	
Dermal Contact with All Groundwater	2E-02	50%		2E+02	48%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**3E-02**		**Yes**	**409**		**Yes**

Table 5-6
Risk and Hazard Evaluation
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

	Excess Lifetime Cancer Risk (1)	Percent Distribution of Risk by Pathway	Exceeds Acceptable Risk Range?	Hazard Index (2)	Percent Distribution of Risk by Pathway	Exceeds Noncancer HI Threshold?
CURRENT/FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT 1 SURFACE SOIL AND GROUNDWATER						
Trespasser / Recreational						
Ingestion of Surface Soil	7E-07	62%		9E-01	57%	
Dermal Contact with Surface Soil	4E-07	32%		7E-01	43%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	7E-08	7%		5E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**1E-06**		**No**	**2**		**Yes**
CURRENT EXPOSURE TO CHEMICALS IN HOT SPOT 2 SURFACE SOIL AND GROUNDWATER						
O&M Worker						
Ingestion of Surface Soil	5E-08	0%		2.E-05	0%	
Dermal Contact with Surface Soil	2E-08	0%		1E-05	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-13	0%		1E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	9E-05	100%		3E-01	100%	
Total Risk =	**9E-05**		**No**	**0.3**		**No**
FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT 2 SURFACE SOIL AND GROUNDWATER						
Industrial Worker						
Ingestion of Surface Soil	8E-08	0%		4E-05	0%	
Dermal Contact with Surface Soil	4E-08	0%		2E-05	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-07	0%		2E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	49%		3E+01	50%	
Dermal Contact with All Groundwater	5E-03	49%		3E+01	50%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**9E-03**		**Yes**	**62**		**Yes**
Resident						
Ingestion of Surface Soil	7E-07	0%		1E-03	0%	
Dermal Contact with Surface Soil	8E-08	0%		1E-04	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	6E-07	0%		8E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	50%		2E+02	50%	
Dermal Contact with All Groundwater	2E-02	50%		2E+02	50%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**3E-02**		**Yes**	**395**		**Yes**
CURRENT/FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT 2 SURFACE SOIL AND GROUNDWATER						
Trespasser / Recreational						
Ingestion of Surface Soil	7E-08	46%		8E-05	10%	
Dermal Contact with Surface Soil	6E-08	39%		4E-05	6%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-08	15%		6E-04	84%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**2E-07**		**No**	**0.0007**		**No**

Table 5-6
Risk and Hazard Evaluation
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

	Excess Lifetime Cancer Risk (1)	Percent Distribution of Risk by Pathway	Exceeds Acceptable Risk Range?	Hazard Index (2)	Percent Distribution of Risk by Pathway	Exceeds Noncancer HI Threshold?
FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT 3 SURFACE SOIL AND GROUNDWATER						
Trespasser / Recreational						
Ingestion of Surface Soil	7E-07	61%		2E+00	57%	
Dermal Contact with Surface Soil	3E-07	32%		2E+00	43%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	8E-08	7%		7E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**1E-06**		**No**	**4**		**Yes**
Industrial Worker						
Ingestion of Surface Soil	7E-07	0%		1E+00	2%	
Dermal Contact with Surface Soil	3E-07	0%		7E-01	1%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	6E-07	0%		3E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	49%		3E+01	48%	
Dermal Contact with All Groundwater	5E-03	49%		3E+01	48%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**9E-03**		**Yes**	**63**		**Yes**
Resident						
Ingestion of Surface Soil	7E-06	0%		2E+01	5%	
Dermal Contact with Surface Soil	7E-07	0%		3E+00	1%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-06	0%		9E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	50%		2E+02	47%	
Dermal Contact with All Groundwater	2E-02	50%		2E+02	47%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**3E-02**		**Yes**	**419**		**Yes**
FUTURE EXPOSURE TO CHEMICALS IN SURFACE SOIL (EXCLUDING HOT SPOTS) AND GROUNDWATER						
Industrial Worker						
Ingestion of Surface Soil	7E-07	0%		4E-01	1%	
Dermal Contact with Surface Soil	3E-07	0%		3E-01	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-07	0%		6E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	49%		3E+01	49%	
Dermal Contact with All Groundwater	5E-03	49%		3E+01	49%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**9E-03**		**Yes**	**62**		**Yes**
Trespasser / Recreational						
Ingestion of Surface Soil	7E-07	62%		8E-01	57%	
Dermal Contact with Surface Soil	3E-07	32%		6E-01	43%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	6E-08	6%		2E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**1E-06**		**No**	**1**		**No**
Resident						
Ingestion of Surface Soil	7E-06	0%		1E+01	3%	
Dermal Contact with Surface Soil	1E-06	0%		2E+00	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-06	0%		2E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	50%		2E+02	48%	
Dermal Contact with All Groundwater	2E-02	50%		2E+02	48%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**3E-02**		**Yes**	**408**		**Yes**

Table 5-6
Risk and Hazard Evaluation
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

	Excess Lifetime Cancer Risk (1)	Percent Distribution of Risk by Pathway	Exceeds Acceptable Risk Range?	Hazard Index (2)	Percent Distribution of Risk by Pathway	Exceeds Noncancer HI Threshold?
FUTURE EXPOSURE TO CHEMICALS IN SUBSURFACE SOIL (EXCLUDING HOT SPOTS) AND GROUNDWATER						
Excavation Worker						
Ingestion of Subsurface Soil	1E-07	45%		5E+00	90%	
Dermal Contact with Subsurface Soil	8E-09	3%		5E-01	9%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	3E-08	11%		1E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	1E-07	42%		4E-02	1%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**3E-07**		**No**	**5**		**Yes**
Industrial Worker						
Ingestion of Subsurface Soil	5E-07	0%		3E+00	5%	
Dermal Contact with Subsurface Soil	2E-07	0%		2E+00	3%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	7E-07	0%		1E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	49%		3E+01	46%	
Dermal Contact with All Groundwater	5E-03	49%		3E+01	46%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**9E-03**		**Yes**	**67**		**Yes**
Resident						
Ingestion of Subsurface Soil	4E-06	0%		8E+01	16%	
Dermal Contact with Subsurface Soil	1E-06	0%		1E+01	2%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	4E-06	0%		5E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	50%		2E+02	41%	
Dermal Contact with All Groundwater	2E-02	50%		2E+02	41%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**3E-02**		**Yes**	**486**		**Yes**
FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT RIMW-6 SUBSURFACE SOIL AND GROUNDWATER						
Industrial Worker						
Ingestion of Subsurface Soil	6E-07	0%		7E-03	0%	
Dermal Contact with Subsurface Soil	3E-07	0%		3E-03	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	1E-05	0%		3E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	49%		3E+01	50%	
Dermal Contact with All Groundwater	5E-03	49%		3E+01	50%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**9E-03**		**Yes**	**62**		**Yes**
Excavation Worker						
Ingestion of Subsurface Soil	2E-07	22%		4E-02	33%	
Dermal Contact with Subsurface Soil	1E-08	2%		3E-03	2%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	5E-07	62%		3E-02	29%	
Inhalation of Ambient Air, Shallow Groundwater	1E-07	15%		4E-02	36%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**8E-07**		**No**	**0.1**		**No**
Resident						
Ingestion of Subsurface Soil	6E-06	0%		2E-01	0%	
Dermal Contact with Subsurface Soil	3E-06	0%		1E-02	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	8E-05	0%		1E-01	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	49%		2E+02	50%	
Dermal Contact with All Groundwater	2E-02	49%		2E+02	50%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**3E-02**		**Yes**	**395**		**Yes**

Table 5-6
Risk and Hazard Evaluation
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

	Excess Lifetime Cancer Risk (1)	Percent Distribution of Risk by Pathway	Exceeds Acceptable Risk Range?	Hazard Index (2)	Percent Distribution of Risk by Pathway	Exceeds Noncancer HI Threshold?
FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT RISB-12 SUBSURFACE SOIL AND GROUNDWATER						
Industrial Worker						
Ingestion of Subsurface Soil	5E-07	0%		5E-01	1%	
Dermal Contact with Subsurface Soil	2E-07	0%		4E-01	1%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-06	0%		3E-01	1%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	49%		3E+01	49%	
Dermal Contact with All Groundwater	5E-03	49%		3E+01	49%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**9E-03**		**Yes**	**63**		**Yes**
Excavation Worker						
Ingestion of Subsurface Soil	1E-07	37%		3E+00	81%	
Dermal Contact with Subsurface Soil	7E-09	2%		3E-01	8%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	1E-07	28%		3E-01	10%	
Inhalation of Ambient Air, Shallow Groundwater	1E-07	33%		4E-02	1%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**3E-07**		**No**	**3**		**Yes**
Resident						
Ingestion of Subsurface Soil	4E-06	0%		1E+01	3%	
Dermal Contact with Subsurface Soil	4E-07	0%		2E+00	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	8E-06	0%		1E+00	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	50%		2E+02	48%	
Dermal Contact with All Groundwater	2E-02	50%		2E+02	48%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**3E-02**		**Yes**	**412**		**Yes**
FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT RISB-18 SUBSURFACE SOIL AND GROUNDWATER						
Industrial Worker						
Ingestion of Subsurface Soil	3E-07	0%		2E-01	0%	
Dermal Contact with Subsurface Soil	1E-07	0%		1E-01	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	5E-06	0%		8E-03	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	49%		3E+01	49%	
Dermal Contact with All Groundwater	5E-03	49%		3E+01	49%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**9E-03**		**Yes**	**62**		**Yes**
Excavation Worker						
Ingestion of Subsurface Soil	1E-07	24%		1E+00	88%	
Dermal Contact with Subsurface Soil	5E-09	1%		1E-01	9%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-07	47%		8E-03	1%	
Inhalation of Ambient Air, Shallow Groundwater	1E-07	28%		4E-02	3%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**4E-07**		**No**	**1**		**No**
Resident						
Ingestion of Subsurface Soil	6E-06	0%		6E+00	1%	
Dermal Contact with Subsurface Soil	8E-06	0%		8E-01	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	3E-05	0%		3E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	50%		2E+02	49%	
Dermal Contact with All Groundwater	2E-02	50%		2E+02	49%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**3E-02**		**Yes**	**401**		**Yes**

Table 5-6
Risk and Hazard Evaluation
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

	Excess Lifetime Cancer Risk (1)	Percent Distribution of Risk by Pathway	Exceeds Acceptable Risk Range?	Hazard Index (2)	Percent Distribution of Risk by Pathway	Exceeds Noncancer HI Threshold?
FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT RISB-25 SUBSURFACE SOIL AND GROUNDWATER						
Industrial Worker						
Ingestion of Subsurface Soil	8E-07	0%		2E-01	0%	
Dermal Contact with Subsurface Soil	3E-07	0%		2E-01	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	3E-05	0%		1E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	49%		3E+01	49%	
Dermal Contact with All Groundwater	5E-03	49%		3E+01	49%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**9E-03**		**Yes**	**62**		**Yes**
Excavation Worker						
Ingestion of Subsurface Soil	4E-07	22%		1E+00	88%	
Dermal Contact with Subsurface Soil	3E-08	2%		1E-01	9%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	1E-06	70%		1E-02	1%	
Inhalation of Ambient Air, Shallow Groundwater	1E-07	6%		4E-02	3%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**2E-06**		**No**	**2**		**Yes**
Resident						
Ingestion of Subsurface Soil	4E-05	0%		6E+00	2%	
Dermal Contact with Subsurface Soil	7E-05	0%		9E-01	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-04	1%		3E-02	0%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	49%		2E+02	49%	
Dermal Contact with All Groundwater	2E-02	49%		2E+02	49%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**3E-02**		**Yes**	**402**		**Yes**
FUTURE EXPOSURE TO CHEMICALS IN HOT SPOT RISB-64 SUBSURFACE SOIL AND GROUNDWATER						
Industrial Worker						
Ingestion of Subsurface Soil	2E-05	0%		3E-01	0%	
Dermal Contact with Subsurface Soil	9E-06	0%		1E-01	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	5E-04	5%		7E-01	1%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	5E-03	46%		3E+01	49%	
Dermal Contact with All Groundwater	5E-03	46%		3E+01	49%	
Inhalation of Indoor Air, Shallow Groundwater	2E-04	2%		6E-01	1%	
Total Risk =	**1E-02**		**Yes**	**63**		**Yes**
Excavation Worker						
Ingestion of Subsurface Soil	5E-06	18%		2E+00	66%	
Dermal Contact with Subsurface Soil	3E-07	1%		1E-01	5%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-05	81%		7E-01	28%	
Inhalation of Ambient Air, Shallow Groundwater	1E-07	0%		4E-02	2%	
Ingestion of All Groundwater	NA	0%		NA	0%	
Dermal Contact with All Groundwater	NA	0%		NA	0%	
Inhalation of Indoor Air, Shallow Groundwater	NA	0%		NA	0%	
Total Risk =	**3E-05**		**No**	**2**		**Yes**
Resident						
Ingestion of Subsurface Soil	2E-04	0%		7E+00	2%	
Dermal Contact with Subsurface Soil	4E-05	0%		7E-01	0%	
Inhalation of Fugitive Dust and Vapors of Soil Origin	2E-03	5%		2E+00	1%	
Inhalation of Ambient Air, Shallow Groundwater	NA	0%		NA	0%	
Ingestion of All Groundwater	2E-02	47%		2E+02	49%	
Dermal Contact with All Groundwater	2E-02	47%		2E+02	49%	
Inhalation of Indoor Air, Shallow Groundwater	3E-04	1%		8E-01	0%	
Total Risk =	**4E-02**		**Yes**	**405**		**Yes**

1: EPA's target risk range is $1E^{-6}$ to $1E^{-4}$.
2: EPA's noncancer threshold is 1.

Table 5-7
Final Chemicals of Concern (COCs)
Remedial Investigation Report
September 2008
PSC Site - Rock Hill, South Carolina

Soil COCs	Selection Rationale
Metals	
Chromium	Exceeds SSL
Iron	Exceeds Non-Cancer HI of 1.0
Manganese	Exceeds Non-Cancer HI of 1.0
Nickel	Exceeds SSL
Thallium	Exceeds Non-Cancer HI of 1.0
Vanadium	Exceeds Non-Cancer HI of 1.0
SVOCs	
N-Nitrosodiphenylamine	Exceeds SSL
VOCs	
1,1,1-Trichloroethane	Exceeds SSL
1,1,2-Trichloroethane	Exceeds SSL
1,1-Dichloroethene	Exceeds SSL
1,2,4-Trichlorobenzene	Exceeds SSL
1,2-Dichlorobenzene	Exceeds SSL
1,2-Dichloroethane	Exceeds Cancer Risk Range
1,4-Dichlorobenzene	Exceeds SSL
Acetone	Exceeds SSL
Benzene	Exceeds SSL
Chlorobenzene	Exceeds SSL
Chloroform	Exceeds SSL
cis-1,2-Dichloroethene	Exceeds SSL
Ethylbenzene	Exceeds SSL
Methylene chloride	Exceeds SSL
Tetrachloroethene	Exceeds Cancer Risk Range
Toluene	Exceeds SSL
Trichloroethene	Exceeds Cancer Risk Range
Vinyl chloride	Exceeds SSL
Xylenes (Total)	Exceeds SSL

Groundwater COCs	Selection Rationale
Metals	
Manganese	Exceeds Non-Cancer HI of 1.0
VOCs	
1,1,1-Trichloroethane	Exceeds MCL
1,1,2-Trichloroethane	Exceeds MCL
1,1-Dichloroethene	Exceeds MCL
1,2,4-Trichlorobenzene	Exceeds MCL
1,2-Dichlorobenzene	Exceeds MCL
1,2-Dichloroethane	Exceeds Cancer Risk Range
1,4-Dichlorobenzene	Exceeds Cancer Risk Range
Benzene	Exceeds Cancer Risk Range
Carbon Tetrachloride	Exceeds MCL
Chloroethane	Exceeds Non-Cancer HI of 1.0
cis-1,2-Dichloroethene	Exceeds Cancer Risk Range
Ethylbenzene	Exceeds Non-Cancer HI of 1.0
Isopropylbenzene	Exceeds Non-Cancer HI of 1.0
Methylene chloride	Exceeds Cancer Risk Range
Tetrachloroethene	Exceeds Cancer Risk Range
Toluene	Exceeds Non-Cancer HI of 1.0
Trichloroethene	Exceeds Cancer Risk Range
Vinyl chloride	Exceeds Cancer Risk Range
Xylenes (Total)	Exceeds Non-Cancer HI of 1.0

Notes:
HI - Hazard Index
MCL - EPA Maximum Contaminant Level
SSL - EPA Region 9 Soil Screening Level with a Dilution Attenuation Factor of 20
SVOCs - Semi-Volatile Organic Compounds
VOCs - Volatile Organic Compounds

CDM

Remedial Investigation Report

Former Philip Services Corporation Site
Rock Hill, South Carolina

Prepared For: **South Carolina Department of Health & Environmental Control**

September 2008

Appendices

Appendix A
Soil Boring Logs

Phase I Boring Logs

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	M.Walters	Total Depth:	11 ft
Location Code:	RISB-1	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, reddish brown, dense	0	11:30	0-1 ft
2 3	Silty sand, brownish gray with black mottling, medium dense	0	11:35	1-5 ft
4 5	Sand, brownish gray, fine to medium, loose	0		
6 7	Sand, brownish gray, fine to medium, mottled with orange, soft	0	11:40	5-9 ft
8 9	Same as Above	0		
10 11	Sand, brownish gray, fine to medium, mottled with orange, loose	0	11:50	Refusal at 11 ft, sample 9-11 ft.

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	J. Weeber	Total Depth:	24.3 ft
Location Code:	RISB-2	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, dark red, some surface rock	2	10:41	0-1 ft, Dup (RISB-92)
2 3	Same as Above, Clay competent red and dense.	4	11:00	1-5 ft
4 5	Same as Above, Clay competent red and dense going orange with depth.	4		
6 7	Same as Above	3	11:10	5-9 ft
8 9	Sandy clay, orange with white mottling, sand medium to fine	3		
10 11	Sandy clay, orange with grey mottling, sand medium to fine	13	11:15	9-13 ft
12 13	Clayey silt, grey, damp	13		
14 15	Same as Above	10	11:25	13-17 ft
16 17	Clay, greenish grey, some silt	10		
18 19	Same as Above with sand	60		
20 21	Same as Above	60		
22 23	Same as Above	60		Refusal at 24.3 ft

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	J. Weeber	Total Depth:	17.2 ft
Location Code:	RISB-3	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, reddish brown, dense	0	9:35	0-1 ft
2 3	Clay, reddish brown, moderately dense	0	9:40	1-5 ft
4 5	Clayey sand, brown, medium to fine	0		
6 7	Same as Above	0	9:45	5-9 ft
8 9	Same as Above	0		
10 11	Sand, greyish brown, loose medium to fine	0	9:48	5-9 ft
12 13	Same as Above	0		
14 15	Same as Above	0	9:52	14-17 ft, Refusal at 17.2 ft
16 17	Same as Above	0		

Boring Log

Project:	Former PSC Site	Start Date:	6/6/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/6/06
Logged By:	P. Nicholson	Total Depth:	25.0 ft
Location Code:	RISB-4	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clay, orange brown, dry dense	See ColorTec results (Appendix C of Phase I Technical Memorandum)	12:50	0-1 ft
2 3	Clay, orange brown, then silt, medium soft, moist		12:55	1-5 ft
4 5	Same as Above			
6 7	Clayey silt, dark brown, soft, moist		13:00	5-9 ft
8 9	Same as Above			
10 11	Same as Above		13:05	9-13 ft
12 13	Silt, sand and clay, grey soft wet			
14 15	Silty sand, grey, saturated, very fine,		13:10	13-17 ft
16 17	Sand, some silt, grey saturated, medium to coarse			
18 19	Sand, greyish brown, medium to coarse, saturated		13:15	13-17 ft
20 21	Saprolite, brown, greyish yellow with black mottling, very dense, moist			
22 23	Same as Above		13:20	Refusal at 25 ft
24 25	Same as Above			

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	M.Walters	Total Depth:	17.2 ft
Location Code:	RISB-5	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, reddish brown, dense	2	9:00	0-1 ft
2 3	Clay, red, dense	1.5	9:07	1-5 ft
4 5	Clay, reddish brown, moderately dense, some sand with depth	0		
6 7	Same as Above, then more Sandy clay, with black/white mottling, tight	0	9:10	5-9 ft
8 9	Clayey sand, brown, loose.	0		
10 11	Same as Above	0	9:15	5-9 ft
12 13	Same as Above	0		
14 15	Sand, brownish grey, medium to fine, trace clays	0	9:20	14-17 ft, Refusal at 17.2 ft
16 17	Same as Above	0		

Boring Log

Project:	Former PSC Site	Start Date:	6/5/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/5/06
Logged By:	P. Nicholson	Total Depth:	15.0 ft
Location Code:	RISB-6	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, brownish red, dry dense	2.9	17:20	0-1 ft
2 3	Clay, orange brown, dense	9	17:30	1-5 ft
4 5	Silt and some clay, yellowish brown	13		
6 7	Same as Above	3	17:40	5-9 ft
8 9	Weathered rock starting at 8.5 ft	1		
10 11 12 13	Weathered rock - saprolite - orange brown and yellowish grey, tan, dense, moist	3 12	17:45	9-13 ft
14 15	Same as Above. Hard at 15'. Refusal at 15'.	38	17:50	13-15 ft

Boring Log

Project:	Former PSC Site	Start Date:	6/5/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/5/06
Logged By:	P. Nicholson	Total Depth:	12.75 ft
Location Code:	RISB-7	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, tan to brownish orange, stiff, dry	See ColorTec results (Appendix C of Phase I Technical Memorandum)	16:30	0-1 ft
2 3	Silt, tan/brown, very fine, dry		16:40	1-5 ft
4 5	Same as Above			
6 7	Clayey silt, tan/brown		16:50	5-9 ft
8 9	Same as Above			
10 11	Silt, brown, weathered rock at 11 ft		16:55	Refusal at 12.75 ft
12 13	Refusal at 12.75 ft			

CDM

Boring Log

Project:	Former PSC Site	Start Date:	6/6/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/6/06
Logged By:	P. Nicholson	Total Depth:	8.0 ft
Location Code:	RISB-8	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silt, clay, and gravel, dark brown	See ColorTec results (Appendix C of Phase I Technical Memorandum)	10:40	0-1 ft
2 3	Silt, greyish yellow		10:45	1-5 ft
4 5	Same as Above with light brown/orange mottling with black specks			
6 7	Same as Above with more weather rock		10:50	6-7 ft
8	Refusal at 8 ft			

Boring Log

Project:	Former PSC Site	Start Date:	6/6/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/6/06
Logged By:	P. Nicholson	Total Depth:	17.0 ft
Location Code:	RISB-9	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silt, clay, and gravel, dark brown	0	10:00	0-1 ft
2 3 4 5	Silt, light brown to yellowish brown, some weathered rock soft to medium density	0	10:05	1-5 ft
6 7 8 9	Same as Above with more weather rock	0	10:05	5-9 ft
10 11	Same as Above to 12 ft bls	0	10:10	9-13 ft
12 13	Weathered rock, brown and yellowish grey with black speckles			
14 15 16 17	Same as Above with more weather rock and refusal at 17 ft	0	10:20	13-17 ft

Boring Log

Project:	Former PSC Site	Start Date:	6/6/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/6/06
Logged By:	P. Nicholson	Total Depth:	15 ft
Location Code:	RISB-10	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1–5	Very soft - no recovery 0-5 ft bls	See ColorTec results (Appendix C of Phase I Technical Memorandum)	No Recovery	
6–9	5-8' Clay, silty, yellow to light orange brown, hard 8-9' Silt, light brown, very hard		9:25	
10–13	9-12' silt, slightly sandy and clayey, light brown, med. dense moist 12-13' weathered rock, saprolite		9:30	
14–17	13-15' weathered rock, saprolite. Refusal at 15' bls		9:35	

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	J. Weeber	Total Depth:	14.4 ft
Location Code:	RISB-11	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Rock, gray clayey sand	0	17:35	
2 3	Red, moderately stiff clay, moist	0	17:45	
4 5		0		
6 7	5-6' Same as Above 6-7' Clayey orange sand - start of weathered rock	0	18:00	
8 9	Orange sand w/ black and white mottling, weathered rock	0		
10 11	Gray-orange sand, medium fine, weathered rock - saprolite	0.5	18:05	
12 13	Same as Above. Refusal at 14.4' bls	0.5		

Boring Log

Project:	Former PSC Site	Start Date:	6/5/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/5/06
Logged By:	P. Nicholson / A. Tartaglia	Total Depth:	21'
Location Code:	RISB-12	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silt w/ little clay, red brown, some gravel, dry	12	14:35	Strong odor
2 3	Brown silt	533	14:50	Strong odor
4 5		498		
6 7	Silt, very fine, medium density, light brown to tan	563	15:00	Strong odor
8 9	Same as Above. Slightly sandy, very fine	441		
10 11	Silt, light brownish to yellow gray, mottled	253		Strong odor
12 13		319		
14 15	Same As Above	140		Strong odor
16 17	Silt, brownish gray and yellow weathered rock, dense	78		
18 19	Gray-orange sand, medium fine, weathered rock - saprolite	18		
20 21	Same as Above. Refusal at 14.4' bls	11		

Boring Log

Project:	Former PSC Site	Start Date:	6/5/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/5/06
Logged By:	M. Walters	Total Depth:	14.5'
Location Code:	RISB-13	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, orange brown	12	15:05	Organic odor
2 3	Silty clay, light brown	0	15:10	Slight odor
4 5	Silty clay, dark gray	0		
6 7	Clayey silt, dark gray to brown	12	15:25	Slight odor Duplicate sample collected
8 9	Same as Above	4		
10 11	Silty sand, fine to medium, gray green	0	15:40	
12 13	Clayey silt, gray green	0		
14 15	13'-13.5' Rock, dry, gray 13.5'-14' Clayey silt, moist, yellow brown	0	15:45	ColorTec only, per DHEC Refusal at 14.5'

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	M. Walters	Total Depth:	17'
Location Code:	RISB-14	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Sandy silt, reddish brown, firm	0	17:45	
2–3	Clayey silt, reddish brown, firm	0	17:50	
4–5	Same as Above	0		
6–7	Silty sand, gray with black mottling, firm	0	18:00	Duplicate sample collected.
8–9	Same as Above	0		
10–11	Silty sand, fine to medium, tan brown, mottled orange and black	0	18:15	
12–13	Same as Above	0		
14–15	Silty sand, gray to brown	0	18:20	
16–17	Same as Above	0		Refusal at 17'

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	M. Walters	Total Depth:	21'
Location Code:	RISB-15	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, reddish brown	0	15:55	
2 3	Clayey silt, brown	0	16:05	
4 5	Clayey silt, yellow brown, mottled with black	0		
6 7	Clayey silt, brown orange, dense	0	16:10	
8 9	Same as Above	0		
10 11	Silty sand, orange brown, with black mottling, firm	0	16:30	
12 13	Same as Above	0		
14 15	Sand, fine to medium, orange brown	0	16:35	
16 17	Same as Above	0		
18 19	Sand, fine to medium, orange brown, with black mottling	0	16:40	Refusal at 21' Set temp well with 15' screen.
20 21	Same as Above	0		

CDM

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	M. Walters	Total Depth:	15'
Location Code:	RISB-16	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, reddish brown, dense	0	18:35	
2 3	Same as Above	0	18:40	
4 5	Same as Above	0		
6 7	Silty sand, fine to medium, tan with black mottling	0	18:45	
8 9	Same as Above	0		
10 11	Silty sand, light tan to gray	0	18:50	
12 13	Same as Above	0		
14 15	Same as Above	0	18:55	Refusal at 15'

Boring Log

Project:	Former PSC Site	Start Date:	6/2/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/2/06
Logged By:	J. Weeber	Total Depth:	20'
Location Code:	RISB-17	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Stone on top w/ red brown, moderately firm clay	2	8:35	
2 3	Silty clay, reddish brown, moderate firm, med. Moist	0	8:40	
4 5	Same as Above	0		
6 7	Silty clay, red orange, moderate firm, med. Moist, becoming lighter w/ depth	0	8:45	
8 9	Silty sandy clay, dark brown to black gray, becoming darker w/ depth	0		
10 11	Clay, gray green, firm, some discolored black material interspersed, becoming lighter w/ depth	0	8:50	
12 13	Clay, gray green, firm	0		
14 15	Sandy clay with some silt, light gray and green color	1.5	8:55	
16 17	Same as Above; darker gray green color w/ more sand (med-fine grained)	1.5		
18 19	Sand, medium-fine grained w/ black mottling, material becoming lighter with depth	0	9:00	
20 21	Refusal at 20'			

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	J. Weeber	Total Depth:	17'
Location Code:	RISB-18	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling		OVM	Lab Sample	Comments
Depth (ft)	Sample Description	Reading	Collect Time	
1	Clay, red with purple staining	0	16:00	
2 3	Clay, purple	0		Core through concrete, drove 0-5 ft. No sample collected.
4 5	Sandy clay, purple	0		
6 7	Same as Above	3	16:30	
8 9	Sand, gray yellow, with white mottling, odor	14		
10 11	Same as Above - odor	10.3	16:45	
12 13	Same as Above - odor	14.2		
14 15	Sand, gray, medium-fine	3	17:10	
16 17	Same as Above - Refusal at 17'	0.5		

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	M. Walters	Total Depth:	20'
Location Code:	RISB-19	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, reddish brown, moist	0	17:30	
2 3	Silty clay, grayish green, moist	0	17:40	
4 5	Same as Above, with purple mottling	10		
6 7	Silty sand, brown, dry	6	17:45	
8 9	Same as Above	8		
10 11	Silty sand, light brown, with black mottling, dry	11	17:48	
12 13	Silty sand, grayish green, dry	7		
14 15	Silty sand, light gray with black mottling, dry	10	17:50	
16 17	Same as Above	30		
18 19	Sand, fine to medium, greenish gray	10	17:54	
20 21	Same as Above - Refusal at 20'	12		

Boring Log

Project:	Former PSC Site	Start Date:	6/2/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/2/06
Logged By:	J. Weeber	Total Depth:	17'
Location Code:	RISB-20	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	N/A			Pushed 0-5'. No recovery because there is apparently another concrete slab under the top slab. Will run full analytical on 5-9' sample
2 3	N/A			
4 5	N/A			
6 7	Silty clay, orange, very firm	23	10:55	
8 9	Clay, dark orange to brown, looser, sl. Moist, with black mottling	23		
10 11	Sand, orange-brown, loose, with black mottling	3.2	11:00	
12 13	Sand, gray, medium to fine, becoming looser with depth, apparent weathered rock	3.2		
14 15	Same as Above - weathered rock	8	11:05	
16 17	Same as Above. Refusal at 17'.	8		

Boring Log

Project:	Former PSC Site	Start Date:	6/2/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/2/06
Logged By:	J. Weeber	Total Depth:	19'
Location Code:	RISB-21	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, red-orange, med. Moist	0	9:35	
2 3	Same as Above	0	9:38	
4 5	Clay, with some silt and sand, dark red-brown, firm, color becoming lighter with depth	0		
6 7	Silty clay, red brown, med. Moist, mod. Firm, slight solvent-like odor	110	9:40	Collect SVOCs and metals from 5-9'
8 9	Same as Above, lightening to a gray color with depth, odor	110		
10 11	Clay, gray with some light green, very firm, dry	40	9:45	
12 13	Sandy clay, red-brown to dark gray	40		
14 15	Sand, gray brown, medium to fine, moist, becoming dark gray and purple clayey sand at 15'	1	9:50	
16 17	Sand, red brown, med. Moist, with black and white mottling	1		
18 19	Sand, brown to dark gray, medium dense, becoming looser with depth. Refusal at 19'.	0	9:55	

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	J. Weeber	Total Depth:	10'
Location Code:	RISB-22	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Coarse stone and clayey sand, reddish brown	0	10:00	
2 3	Same as Above	0	10:15	
4 5	3-4' Same as Above 4-5' Silty Clay, red-brown	0		
6 7	Clay, red, very soft	0.2	10:25	Very little recovery 6-8' because of soft material.
8 9	7-8' Same as Above 8-9' Sand, dark gray, medium to fine grained, dry	0		
10 11	Sand, gray brown, medium to fine Saprolite. Refusal at 10'.	0		

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	J. Weeber	Total Depth:	11'
Location Code:	RISB-23	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Sand, red gray, medium to fine, with stone	0	11:05	
2 3	Same as Above	0	11:20	
4 5	3-4' Clay, red brown, stiff 4-5' Clayey sand, red brown, medium to fine	0		
6 7	Same as Above, with black and white mottling	0	11:28	
8 9	Same as Above	0		
10 11	Clayey sand, brown, with black mottling. Refusal at 11.2'	0	11:43	

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	J. Weeber	Total Depth:	15'
Location Code:	RISB-24	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Stone and sand, brown, medium grained	0	12:00	
2 3	1-2' Same as Above 2-3' Clayey sand, dark red, moist	0	12:15	
4 5	3-4' Clay with some silt, orange 4-5' Sand, brownish yellow, sl. Moist, with green mottling	0		
6 7	Same as Above	0	12:30	
8 9	Same as Above	0		
10 11	Same as Above	0	12:38	
12 13	Same as Above, becoming more dense and dry with depth	0		
14 15	Sand, gray, medium to fine, soft, with black mottling. Refusal at 15'	0	12:50	

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	J. Weeber	Total Depth:	15'
Location Code:	RISB-25	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Stone with sand, gray brown	0	17:25	
2 3	Same as Above	0	17:37	
4 5	Silty clay, stiff, red, moist	0		
6 7	Same as Above, slight odor	2	17:45	
8 9	7-8' Same as Above 8-9' Sand, gray with white mottling	2		
10 11	9-10' Same as Above 10-11' Silty clay, red gray	3	18:00	
12 13	Silty clay, gray	3		
14 15	Silty clay, red-gray, moist, with black and white mottling, odor	7	18:10	
16 17	Silty clay, gray, moist, with black and white mottling, odor	7		
18 19 20 21	No description. Refusal at 19.8'.	10	18:20	

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	J. Weeber	Total Depth:	19.3'
Location Code:	RISB-26	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Sandy clay, dark brown, with concrete	0	14:40	
2 3	Clay, red brown, stiff, with trace silt	0	14:50	
4 5	Same as Above	0		
6 7	Same as Above	0	15:00	
8 9	Sandy clay, dark gray, fine	0		
10 11	Sandy to silty clay, dark gray to red, with green mottling	0	15:15	
12 13	11-12' Same as Above 12-13' Sand, gray-green, fine, with white mottling, Saprolite	0		
14 15	Same as Above	0	15:27	
16 17	Same as Above	0		
18 19	Silty clay, brown-green, green is nickel-like in color. Refusal at 19.3'	0	15:40	

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	M. Walters	Total Depth:	15.0 ft
Location Code:	RISB-27	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, reddish brown, dry	0	14:05	0-1 ft
2 3 4 5	Same as Above	0	14:25	1-5 ft
6 7	Clayey silt, yellowish brown, with black mottling, dry	0	14:30	5-9 ft
8 9	Sand, medium to fine, yellowish brown			
10 11	Silty sand, reddish brown with black mottling	0	14:40	9-13 ft
12 13	Same as Above			
14 15	Same as Above	0	14:50	13-15 ft

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	M. Walters	Total Depth:	16.5 ft
Location Code:	RISB-28	Abandonment Details:	Convert to monitor well
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, reddish brown	0	11:50	0-1 ft
2 3	Same as Above with some black mottling	2	11:55	1-5 ft
4 5	Same as Above	2		
6 7	Sandy silt, brown to grey	0	12:05	5-9 ft
8 9	Sand, medium to fine, lite grey with black mottling	0		
10 11	Same as Above	0	12:15	9-13 ft
12 13	Same as Above	0		
14 15	Same as Above	0	12:20	13-16.5 ft
16	Same as Above	0		
17	Refusal at 16.5 ft			

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	M. Walters	Total Depth:	16.5 ft
Location Code:	RISB-29	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, reddish brown	2	10:55	0-1 ft
2 3	Clayey silt, reddish brown with black mottling	4	11:05	1-5 ft
4 5	Same as Above	0		
6 7	Silty sand, medium to fine, orange brown	15	11:15	5-9 ft
8 9	Same as Above, greyish brown	10		
10 11	Silty sand, medium to fine, orange brown with black mottling	5	11:20	9-13 ft
12 13	Silty sand, grey with black mottling	30		
14 15	Sand, medium to fine, green/grey	0	11:25	13-16.5 ft
16	Same as Above with brown mottling	4		
17	Refusal at 16.5 ft			

Boring Log

Project:	Former PSC Site	Start Date:	5/30/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/30/06
Logged By:	M. Walters	Total Depth:	20.0 ft
Location Code:	RISB-30	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty sand, light brown, very fine, dry	5	16:05	0-1 ft
2 3	Clayey silt, reddish brown	0	16:15	1-5 ft
4 5	Same as Above	0		
6 7	Silty clay, brown	0	16:30	5-9 ft
8 9	Silty clay, light grey with black mottling	0		
10 11	Silty sand, light grey, with black mottling	0	16:40	9-13 ft
12 13	Same as Above	0		
14 15	Sand, medium to fine, brown to reddish brown	2	16:48	13-17 ft
16 17	Same as Above	0		
18 19	Same as Above	0	17:07	17-20 ft

Boring Log

Project:	Former PSC Site	Start Date:	5/30/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/30/06
Logged By:	J. Weeber	Total Depth:	19.0 ft
Location Code:	RISB-31	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Sandy clay, reddish brown	0	18:00	0-1 ft
2 3	Silty clay, reddish brown, dense	0	18:15	1-5 ft
4 5	Same as Above	0		
6 7	Silty clay, gray, dense	0	18:40	5-9 ft
8 9	Clay, grey, kaolinic, dry with sand	0		
10 11	Silty clay, dark grey	0	18:50	9-13 ft
12 13	Same as Above with specks of black, red, and white minerals	0		
14 15	Same as Above	0	19:00	13-17 ft
16 17	Same as Above	0		
18 19	Same as Above, refusal at 19 ft	0	19:10	17-19 ft

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	J. Weeber	Total Depth:	13.8 ft
Location Code:	RISB-32	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, reddish brown, dry	0	8:50	0-1 ft
2 3	Same as Above	0	9:00	1-5 ft
4 5	Same as Above	0		
6 7	Same as Above	0	9:07	5-9 ft
8 9	Silty clay, grey, with some sand	0		
10 11	Sandy silt, dark grey sand medium to fine	0	9:20	9-13 ft
12 13	Same as Above	0		
14	Same as Above, refusal at 13.8 ft			

Boring Log

Project:	Former PSC Site	Start Date:	6/6/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/6/06
Logged By:	P. Nicholson	Total Depth:	20 ft
Location Code:	RISB-33	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silt and gravel	0		
2 3	Silt, minor clay, orangish red, brown, medium dense, dry	0	15:00	1-5 ft
4 5	Same as Above	0		
6 7	Silty clay, orange brown with light grey mottling	0	15:05	5-9 ft
8 9	Same as Above	0		
10 11	Same as above but more dense clay	0	No Sample	
12 13	Sandy silt, light brown to yellow, quartz interbedded, stiff, dense	0		
14 15	Sandy silt, light brown to yellow, quartz interbedded, stiff, dense	0	No Sample	
16 17	Sandy silt, light brown to yellow, quartz interbedded, stiff, dense	0		
18 19	Sandy silt, light brown to yellow, quartz interbedded, stiff, dense	0	15:20	18-20 ft, Duplicate RISB-522
20	Refusal at 20 ft			

Boring Log

Project:	Former PSC Site	Start Date:	6/6/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/6/06
Logged By:	P. Nicholson	Total Depth:	20 ft
Location Code:	RISB-34	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clay, orange to reddish brown, medium dense	0	No Sample	0-1 ft
2 3	Silt, minor clay, brown dry	0	13:55	1-5 ft
4 5	Same as Above	0		
6 7	Silty clay, orange brown with light grey mottling	0	No Sample	5-9 ft
8 9	Same as Above	0		
10 11	Same as Above	0	14:10	9-13 ft (Black, red discoloration, slight odor)
12 13	Silt, minor clay, dark grey with black, light red and brown mottling, moist	12		
14 15	Same as Above with light green banding	0	No Sample	13-18
16 17	Silt, brown and greyish yellow, light grey mottling, medium dense, moist	0		
18 19	Silt then weathered rock, brown, orange, tan and grey mottling, moist	0	14:25	18-20 ft
20	Refusal at 20 ft			

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	J. Weeber	Total Depth:	14.4 ft
Location Code:	RISB-35	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clay, red, dense, gravel	0	15:25	0-1 ft
2 3	Silty clay, reddish orange, medium dense	0	15:35	1-5 ft
4 5	Clayey silt, grey	0		
6 7	Clay, orange grey, some silt	0	15:40	5-9 ft
8 9	Clayey silt, grey	0		
10 11	Silty clay, greyish green, soft	0	15:45	9-13 ft and a Duplicate as RISB-935
12 13	Silt, minor clay, dark grey with black, light red and brown mottling, moist	0		
14 15	Same as Above, refusal at 14.4 ft	0	15:50	13-15 ft

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	J. Weeber	Total Depth:	16.4 ft
Location Code:	RISB-36	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty sand, greyish brown, medium to fine	0	14:40	0-1 ft
2 3	Same as Above, with red moist silty clay	0	14:45	1-5 ft
4 5	Clay, dark greyish brown, dense	0		
6 7	Clay, orange grey, dense	0	14:55	5-9 ft
8 9	Clayey sand, reddish orange	0		
10 11	Clayey sand, reddish brown, with green mottling	0	15:00	9-13 ft
12 13	Clayey sand, reddish orange, with grey/black mottling, sand medium to fine	0		
14 15	Same as Above, refusal at 14.4 ft	0		
16	Refusal at 16.4 ft			

Boring Log

Project:	Former PSC Site	Start Date:	5/30/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/30/06
Logged By:	J. Weeber	Total Depth:	24 ft
Location Code:	RISB-37	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, reddish brown	0	16:10	0-1 ft
2-3	Same as Above	0	16:25	1-5 ft
4-5	Same as Above	0		
6-7	Silty clay, light grey	0	No Sample	5-9 ft
8-9	Same as Above	0		
10-11	Same as Above, alluvial origin, plant debris	0	16:45	9-13 ft
12-13	Sand, brown and grey, coarse, wet	0		
14-15	Same as Above	0	17:00	13-17 ft
16-17	Same as Above, alluvial origin, plant debris	0		
18-19	Sand, brown and grey, coarse, wet	0	17:20	17-21 ft
20-21	Same as Above	0		
22-23	Sand, brown and grey, coarse, wet	0	17:30	21-24 ft
24	Refusal at 24 ft			

Boring Log

Project:	Former PSC Site	Start Date:	5/30/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/30/06
Logged By:	M. Walters	Total Depth:	25 ft
Location Code:	RISB-38	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Sand, light brown, fine, dry	0	18:05	0-1 ft
2 3	Clayey silt, reddish brown, with trace sand	1	18:10	1-5 ft
4 5	Same as Above	0		
6 7	Clayey silt, reddish brown	1	18:16	5-9 ft
8 9	Same as Above	0		
10 11	Silty sand, grey to brown, with black mottling	0	18:22	9-13 ft
12 13	Silty sand, brown	0		
14 15	Clayey silt, grey brown, moist	0	18:35	13-17 ft
16 17	Sandy silt, grey brown with black mottling, moist	0		
18 19	Sand, grey to brown, medium to fine,	0	18:45	17-21 ft
20 21	Same as Above	0		
22 23	Same as Above	0	18:55	21-24 ft
24 25	Same as Above, refusal at 25 ft			

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	M. Walters	Total Depth:	23.5 ft
Location Code:	RISB-39	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, reddish brown, dry	0	9:35	0-1 ft
2 3	Same as Above	2	9:45	1-5 ft
4 5	Silty clay, brown to grey, dry	5		
6 7	Clayey silt, grey to brown, dry	40	9:55	5-9 ft (organic odor)
8 9	Silty clay, dark brown, dry	159		
10 11	Same as Above, reddish brown, moist	13	10:05	9-13 ft
12 13	Same as Above, brown to grey, moist	2		
14 15	Silty clay, greyish green, wet	4	10:20	13-17 ft
16 17	Same as Above	0		
18 19	Silty sand, with clay, dark green with grey	4	10:28	17-21 ft (strong organic odor)
20 21	Same as Above	8		
22 23	Silty sand, light green with grey mottling	12	10:35	21-23.5 ft
24 25	Refusal at 23.5 ft			

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	J. Weeber	Total Depth:	13.3 ft
Location Code:	RISB-40	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clay, red, dense, gravel	0	16:25	0-1 ft
2 3	Same as Above	0	16:40	1-5 ft
4 5	Same as Above	0		
6 7	Same as Above, silt with coarse weathered rock	0	16:45	5-9 ft
8 9	Same as Above	0		
10 11	Same as Above	0	16:50	9-13 ft
12 13	Same as Above with refusal at 13.3 ft	0		
14 15				

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	J. Weeber/M. Walters	Total Depth:	8 ft
Location Code:	RISB-41	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Sandy silt, brown, dense	2	13:15	0-1 ft
2 3	Same as Above	2	13:30	1-5 ft
4 5	Sand, grey, medium to fine	2		
6 7	Sand, reddish brown with black mottling	2	No sample	5-8 ft
8 9	Same as Above, refusal at 8.5 ft			

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	M. Walters	Total Depth:	8.5 ft
Location Code:	RISB-42	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Gravel, sand, brown	0	8:25	0-1 ft
2 3	Sand, brown, some clay, dark brown, slight odor	0	8:35	1-5 ft
4 5	Sand, reddish brown, some clay, refusal at 4 ft, move over 10 feet	0		
6 7	Same as Above	0	8:50	5-8 ft
8 9	Refusal at 8 ft	0		

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	M. Walters	Total Depth:	13 ft
Location Code:	RISB-43	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, reddish brown, gravel on top	0	14:00	0-1 ft
2 3	Clayey silt, reddish brown	0	14:10	1-5 ft
4 5	Same as Above	0		
6 7	Sand, orange brown, medium to fine, dense	0	14:15	5-9 ft
8 9	Same as Above	0		
10 11	Sand, grey to brown, medium to fine, black and orange mottling	0	14:20	8-13 ft
12 13	Same as Above, refusal at 13 ft	0		

Boring Log

Project:	Former PSC Site	Start Date:	6/6/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/6/06
Logged By:	P. Nicholson	Total Depth:	8.5 ft
Location Code:	RISB-44	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, orange brown, dense, dry	See ColorTec Results (Appendix C of Phase I Technical Memorandum)	16:20	0-1 ft
2 3	Clayey silt, reddish orange brown, soft, moist		No Sample	1-5 ft
4 5	Same as Above			
6 7	Silty clay, dark orange brown, soft moist		16:35	5-8 ft
8 9	Samprolite clay matrix, refusal at 8.5 ft			

Boring Log

Project:	Former PSC Site	Start Date:	6/5/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/5/06
Logged By:	P. Nicholson	Total Depth:	15 ft
Location Code:	RISB-45	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, reddish brown, dense, with some gravel	120	15:15	0-1 ft, odor
2 3	Same as Above, then silt at 3 ft, tan/brown, dry	120	15:30	1-5 ft
4 5	Same as Above	116		
6 7	Weathered rock, tan/brown with yellowish grey mottling	23	15:45	5-9 ft, odor
8 9	Same as Above	38		
10 11	Sand, grey to brown, medium to fine, black and orange mottling	57	16:00	8-13 ft, odor
12 13	Same as Above	27		
14 15	Same as Above, refusal at 15 ft	12	16:10	14-15 ft, odor

Boring Log

Project:	Former PSC Site	Start Date:	5/31/06
Project No.:	20958-50105-TSK3.FLD	End Date:	5/31/06
Logged By:	M. Walters	Total Depth:	25 ft
Location Code:	RISB-46	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Clayey silt, dark grey to black, dry	9	15:15	0-1 ft, strong organic odor
2 3	Same as Above	5	15:35	1-5 ft
4 5	Clayey silt, brown, dry	10		
6 7	Clayey silt, brown to orange brown, with black mottling, dry	3	15:45	5-9 ft
8 9	Same as Above	5		
10 11	Clayey silt, greenish grey, moist	0	15:50	9-13 ft
12 13	Same as Above	0		
14 15	Sandy silt, greenish grey, some clay, moist	0	16:00	13-17 ft
16 17	Same as Above	0		
18 19	Same as Above	0	16:10	17-21 ft
20 21	Sandy silt, with black mottling, moist	0		
22 23	Silty sand, grey with green, dry	0	16:15	21-25 ft
24 25	Same as Above, brown with black mottling, refusal at 25 ft			

Boring Log

Project:	Former PSC Site	Start Date:	6/1/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/1/06
Logged By:	J. Weeber	Total Depth:	17.5 ft
Location Code:	RISB-47	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Gravel, sand, red, dry	0	13:10	0-1 ft, strong organic odor
2 3	Same as Above	0	13:23	1-5 ft
4 5	Clay, red with black mottling, soft	0		
6 7	Same as Above, grey-green moist	0	13:30	5-9 ft
8 9	Same as Above	0		
10 11	Same as Above	0	13:40	9-13 ft
12 13	Silty clay, red, soft, moist	0		
14 15	Same as Above	0	13:45	13-17 ft
16 17	Saprolite, sandy clay, red with black and white mottling	0		

Boring Log

Project:	Former PSC Site	Start Date:	6/5/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/5/06
Logged By:	M. Lamar	Total Depth:	15 ft
Location Code:	RISB-48	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Gravel, silt, brown, dry	See ColorTec Results (Appendix C of Phase I Technical Memorandum)	13:45	0-1 ft
2 3	Silt, brown, softer, dry		13:50	1-5 ft
4 5	Sandy silt, light brown, moderately dense, dry			
6 7	Sandy silt, light brown, moderately dense, dry		14:05	5-9 ft
8 9	Same as Above, becoming silty sand			
10 11	Silty sand, light brown grey with black red mottling, loose, dry		14:15	9-13 ft
12 13	Same as Above			
14 15	Same as Above, refusal at 15 ft		14:20	13-15 ft

Boring Log

Project:	Former PSC Site	Start Date:	6/2/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/2/06
Logged By:	M. Walters	Total Depth:	17 ft
Location Code:	RISB-49	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Sand, medium to fine, tan to light brown with some gravel	0	12:20	0-1 ft
2-3	Silty clay, dark red, with black mottling, dense, dry	3	12:35	1-5 ft
4-5	Silty clay, grey green, moderately dense, dry	2		
6-7	Silty sandy clay, grey green changing to red orange sands	5	12:50	5-9 ft
8-9	Sand, black, grey, green, loose, moist, and evidence of ash	5		
10-11	Sand, grey with black white mottling, diesel odor	3	13:25	9-13 ft
12-13	Same as Above, with more grey-green color and more diesel odor	76		
14-15	Same as Above, with more green color	110	13:40	13-17 ft
16-17	Silty sand, dark grey, strong diesel odor, and refusal at 17 ft	110		

Boring Log

Project:	Former PSC Site	Start Date:	6/2/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/2/06
Logged By:	M. Walters	Total Depth:	13 ft
Location Code:	RISB-50	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1				
2				
3				
4				
5				
6				
7	No Recovery	NA	NA	No Recovery 0-9' bls. Sample location was offset from RISB-29 to re-collect 9-13 ft sample.
8				
9				
10				
11				
12				
13				

Boring Log

Project:	Former PSC Site	Start Date:	6/6/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/6/06
Logged By:	P. Nicholson	Total Depth:	15 ft
Location Code:	RISB-51	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, orange brown, moderately dense, some gravel, dry	See ColorTec Results (Appendix C of Phase I Technical Memorandum)	8:20	0-1 ft
2 3	Same as Above, without gravel		8:25	1-5 ft
4 5	Silt, brown and tan, some sand, soft, dry			
6 7	Same as Above		8:30	5-9 ft
8 9	Same as Above			
10 11	Silt with saprolite, brown tan, with white/black speckling		8:35	9-13 ft, Duplicate RISB-951 @11:00
12 13	Same as Above			
14 15	Same as Above, refusal at 15 ft		8:40	13-17 ft

Boring Log

Project:	Former PSC Site	Start Date:	6/6/06
Project No.:	20958-50105-TSK3.FLD	End Date:	6/6/06
Logged By:	P. Nicholson	Total Depth:	15 ft
Location Code:	RISB-52	Abandonment Details:	Bentonite pellets
Location:	Rock Hill, South Carolina		
Driller:	M&W Drilling		
Latitude:		Longitude:	

Geoprobe direct push drilling

Depth (ft)	Sample Description	OVM Reading	Lab Sample Collect Time	Comments
1	Silty clay, orange brown, moderately dense, some gravel, dry	See ColorTec Results (Appendix C of Phase I Technical Memorandum)	11:20	0-1 ft
2 3	Clay, yellow brown, stiff, dense		11:25	1-5 ft
4 5	Clayey silt, yellow brown, dry			
6 7	Same as above to 6 ft		11:30	5-9 ft
8 9	Silt with saprolite, brown tan, with white/black speckling			
10 11	Same as Above		11:35	9-13 ft
12 13	Same as Above			
14 15	Weathered rock, greyish yellow, with black/tan mottling		11:40	13-17 ft
16 17	Same as Above, refusal at 17 ft			

Phase II Boring Logs

Boring Log

Project:	Former PSC Site	Start Date:	12/15/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/15/06	
Logged By:	Nathan Parker	Total Depth:	14 ft	
Location Code:	RISB-56	Abandonment:	Bentonite chips 3/8"	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	12"	18-7-9-10	CLAY, silty, orangish brown mottled with black, some grey clasts, hard, dry	0.6	1445
2					N/A
3	24"	10-14-17-18	SILT, clayey, yellow orangish brown, mottled with grey	0.7	
4					
5	24"	9-7-10-14	CLAY, silty, lt yellow to pale brown mottled with orange stripes, dry	0.5	1455
6					
7	24"	8-10-12-10	CLAY, silty, yellow (top 8"), orange (middle 8"), green with white specs (bottom 8")	1.8	N/A
8					
9	24"	11-22-24-27	SAND, dark green with white specs, saprolite	2.9	1510
10					
11	12"	13-21-25-24	SILT, sandy, dark green with white specs, saprolite	3.3	N/A
12					
13	24"	10-16-22-50		68.2	1530
14					

Boring Log

Project:	Former PSC Site	Start Date:	12/6/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/6/06	
Logged By:	David Rojas & Nathan Parker	Total Depth:	26 ft	
Location Code:	RISB-57	Abandonment:	Bentonite chips 3/8"	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with CME sampler for first 10' then split spoon to completion			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	18"	N/A	GRAVEL, silty sand matrix, grey to brown	0	1550
2			SAND, silty, orangish brown, occational angular clasts	5.5	N/A
3					
4	24"		CLAY, silty, mottled green and orangish brown	8.8	1620
5					
6	0.5"			2.8	N/A
7					
8					
9					
10					
11	24"		CLAY, silty, orangish brown mottled with greenish grey, moist, saprolite	2.5	1645
12					
13	24"				
14					
15	24"		CLAY, silty, lt greenish grey, odor, saprolite	10.6	1700
16					
17	24"			3.2	
18					
19	24"		CLAY, greenish brown mottled with black and white, some soft clay intervals	3.8	1710
20					
21	24"			7.4	
22					
23	24"			12.7	N/A
24					
25	18"			5.8	
26					

Boring Log

Project:	Former PSC Site	Start Date:	12/18/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/18/06	
Logged By:	Nathan Parker	Total Depth:	24 ft	
Location Code:	RISB-58	Abandonment:	Bentonite chips 3/8"	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	24"	5-8-5-7	**CLAY,** silty, orangish brown, plastic	0	905
2					N/A
3	12"	6-4-12-14	**SILT,** clayey, orangish brown, slightly plastic	0	
4					
5	24"	5-18-19-24		0	920
6					
7	6"	12-18-15-17		0	N/A
8					
9	24"	16-19-15-14	**CLAY,** lt yellowish brown with green specs, moist , plastic, sparolite	0	
10					
11	18"	6-5-5-4	**CLAY,** silty, lt greenish brown, saprolite	0	930
12					
13	24"	3-6-6-7	**SILT,** lt greenish grey, saprolite	0	N/A
14					
15	24"	6-8-13-12		0	940
16					
17	24"	5-8-7-10	**SILT,** sandy, lt greenish grey with rust staining, saprolite	0	N/A
18					
19	24"	3-9-11-16		0	950
20					
21	18"	8-14-15-19		0	N/A
22					
23	18"	5-8-11-12		0	
24					

Boring Log

Project:	Former PSC Site	Start Date:	12/18/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/18/06	
Logged By:	Nathan Parker & Dave Rojas	Total Depth:	15.5 ft	
Location Code:	RISB-59	Abandonment:	Bentonite chips 3/8"	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	18"	4-4-2-1	CLAY, reddish orange brown, plastic (top 12"), SILT, clayey, orangish brown with black specs (bottom 6")	0	1125
2					N/A
3	24"	7-9-11-18	SILT, orangish brown to grey with black specs (possible saprolite)	0	
4					
5	24"	21-27-34-47		0	1135
6					
7	12"	12-15-16-12	SILT, mottled greenish grey and lt orangish brown, rust staining, saprolite	0.2	N/A
8					
9	24"	15-18-19-21	SAND, silty, orange, black and pink specs, saprolite	0	
10					
11	24"	15-18-32-47		0	1300
12					
13	24"	13-15-15-29	SAND, orange, black and pink specs, saprolite	7.9	1325
14					
15.5	12"	34-40-R		0.8	N/A

CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/17/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/17/06	
Logged By:	Nathan Parker & Dave Rojas	Total Depth:	24 ft	
Location Code:	RISB-61	Abandonment:	Bentonite chips 3/8"	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	18"	2-6-6-10	SAND, course, deep grey, poorly sorted	0	N/A
2					
3	18"	2-4-18-19		0	
4					
5	24"	13-14-12-18		0	
6					
7	24"	14-15-16-15		0	
8					
9	24"	14-16-10-11		0	
10					
11	9"	8-10-11-14	SILT, yellowish lt brown, saprolite	0	1750
12					
13	18"	9-9-9-13	SILT, sandy, orangish yellow brown with black specs, saprolite	0	N/A
14					
15	18"	9-10-14-13	SILT, sandy, lt green, pink, black specs, saprolite	0	
16					
17	24"	12-14-17-21		0	1805
18					
19	24"	14-18-21-30	SILT, sandy, yellow orangish brown with black specs, saprolite	0	N/A
20					
21	24"	8-6-9-15		0	1830
22					
23	24"	8-13-23-28		0	N/A
24					

Boring Log

Project:	Former PSC Site	Start Date:	12/19/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/19/06	
Logged By:	Nathan Parker	Total Depth:	14 ft	
Location Code:	RISB-62	Abandonment:	Bentonite chips 3/8"	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	12"	3-2-5-3	CLAY, orangish brown, soft, plastic	0	900
2					N/A
3	24"	4-4-3-18	SILT, clayey, yellow orangish brown with black specs, saprolite	31.9	
4					
5	6"	6-9-19-18		50.2	920
6					
7	24"	12-14-22-24	SILT, mottled green, black and white specs, odor, saprolite	70.1	N/A
8					
9	12"	12-17-21-30		79.3	930
10					
11	24"	13-14-15-26		48.2	N/A
12					
13	24"	27-38-54-R		12.9	1000
14					

Boring Log

Project:	Former PSC Site	Start Date:	12/17/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/17/06	
Logged By:	Nathan Parker	Total Depth:	18 ft	
Location Code:	RISB-63	Abandonment:	Bentonite chips 3/8"	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	12"	1-1-1-3	CLAY, orangish brown, plastic	0.6	1415
2					N/A
3	18"	8-10-13-14	GRAVEL, grey clasts, little matrix (top 12"), SILT, clayey, yellowish brown, plastic (bottom 6")	4.3	
4					
5	24"	13-18-17-21	SILT, clayey, yellowish brown with black specs, saprolite	3.7	1430
6					
7	24"	24-30-39-38		9.7	N/A
8					
9	24"	6-10-13-11		24.9	1620
10			SILT, clayey, lt green, odor, saprolite		
11	24"	12-15-16-19		11.7	N/A
12			SILT, clayey, yellowish lt brown, saprolite		
13	18"	6-9-10-11	SILT, yellowish brown with layers of lt green, odor, saprolite	11.2	
14					
15	24"	4-12-23-23		7.2	1645
16					
17	24"	8-18-21-37		7.4	1655
18					

Appendix B
Well Logs and Construction Diagrams

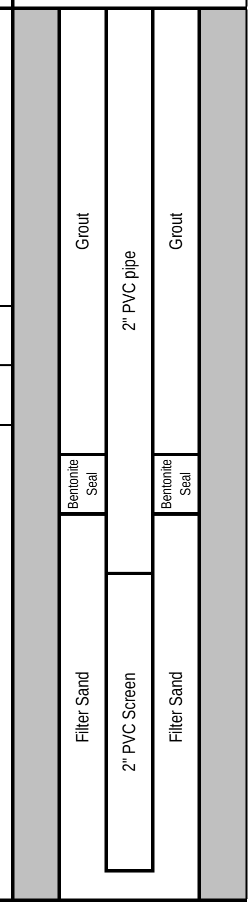
Phase II Well Construction

Boring Log

Project:	Former PSC Site	Start Date:	12/19/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/19/06	
Logged By:	Nathan Parker	Total Depth:	30 ft	
Location Code:	RIMW-1	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1			N/A compare to RISB-23	0	N/A
2					
3					
4					
5					
6				7.2	
7					
8					
9					
10					
11	24"	6-12-14-19	SILT, sandy, orangish brown with black specs, saprolite	82.5	1520
12					
13	24"	21-35-51-63	SILT, sandy, yellow orangish brown with black specs, saprolite	118.2	1525
14					
15	Cuttings from Auger	N/A	SILT, sandy, brown to orangish brown	N/A	N/A
16					
17					
18					
19					
20					
21				12.7	
22					
23					
24					
25					
26				9.5	
27					
28					
29					
30					

RIMW- 1 Well as built



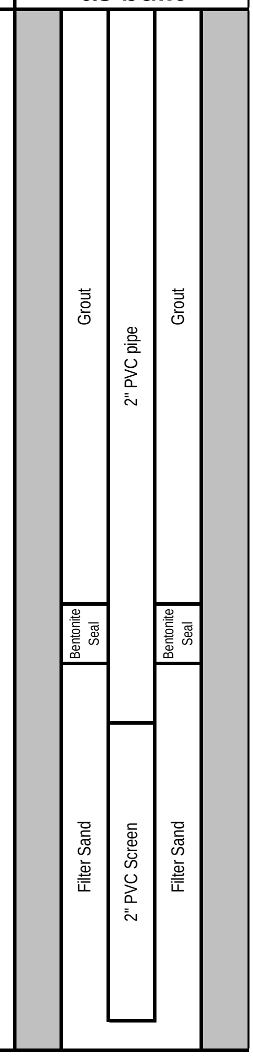
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/19/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/19/06	
Logged By:	Nathan Parker	Total Depth:	31 ft	
Location Code:	RIMW-3	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger			

RIMW- 3 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18			N/A compare to RISB-23		
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					

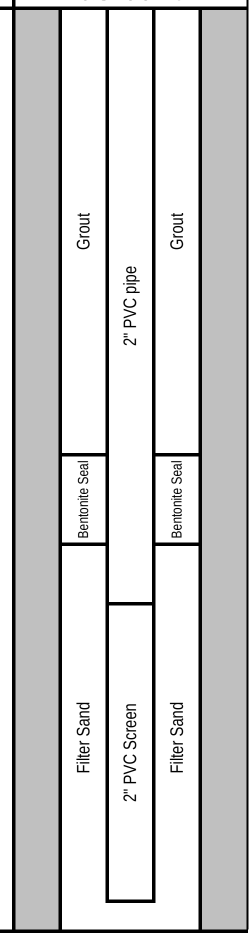


Boring Log

Project:	Former PSC Site	Start Date:	12/19/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/19/06	
Logged By:	Nathan Parker	Total Depth:	31 ft	
Location Code:	RIMW-4	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Air Rotary			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16			N/A compare to RIMW-19		
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					

RIMW- 4 Well as built

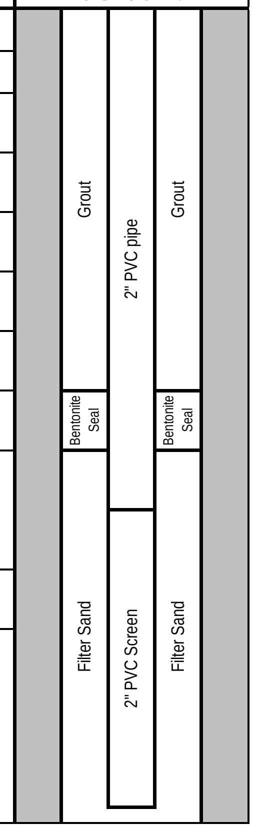


CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/15/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/15/06	
Logged By:	Nathan Parker	Total Depth:	26.5 ft	
Location Code:	RIMW-5	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

RIMW- 5 Well as built



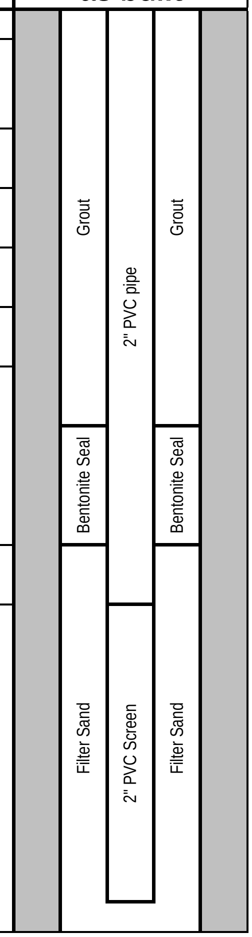
Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	18"	15-5-4-3	ORGANIC, silty(major) gravel(minor), black to brownish (top 6"), GRAVEL, sand(major) silt(minor), grey (middle 6"), CLAY, sandy, mottled oranish brown and olive green, plastic (bottom 6")	0	920
2					N/A
3	21"	6-9-15-9	CLAY, with intermittent layers of sandy clay, yellow orangish brown	0	935
4					
5	12"	8-10-9-8	CLAY, sandy, yellow orangish brown, cohesive	0	1650
6					
7	24"	7-9-20-23	SILT, clayey, mottled with greenish grey and orangish brown, moist, saprolite	0	N/A
8					
9	24"	7-15-21-23	SILT, sandy, greenish grey, slight rust staining, moist, saprolite	0	1705
10					
11	24"	7-19-16-21	SAND, silty, greenish grey, slight rust staning, moist, saprolite	1.9	1710
12					
13	18"	16-21-23-31	SILT, clayey, mottled black and white, moist, saprolite	1.9	1045
14					
15	24"	17-29-30-40	SILT, clayey, mottled green and white specs, moist, saprolite	0.5	N/A
16					
17	24"	21-32-41-49		2.9	
18					
19	12"	47-50	SILT, clayey, lt brown, moist, saprolite	2	1120
20					
21	Cuttings from Auger	N/A	SILT, sandy, grey to lt brown	2.9	N/A
22					
23					
24					
25					
26.5					

Boring Log

Project:	Former PSC Site	Start Date:	12/12/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/18/06	
Logged By:	Nathan Parker	Total Depth:	30 ft	
Location Code:	RIMW-6	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

RIMW- 6 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	12"	12-16-10-8	GRAVEL, silty-sand matrix, grey (top 6"), CLAY, silty, orangish brown, plastic (bottom 6")	25.5	1630
2					N/A
3	12"	7-8-12-15	CLAY, silty, orangish brown, plastic	19	
4					
5	24"	3-3-5-7	CLAY, silty, orangish brown mottled with bluish grey, plastic	52.3	1650
6					
7	24"	2-4-7-9	CLAY, silty, greenish grey, plastic on top ft, stiff on bottom ft	144.7	N/A
8					
9	24"	5-10-12-9	CLAY, silty, greenish grey, plastic, odor	182.2	1705
10					
11	18"	4-5-7-8	CLAY, silty , orangish brown mottled with greenish grey, plastic	262.2	1710
12					
13	24"	2-4-7-9		95.7	N/A
14					
15	24"	6-9-21-31	SILT, clayey, mottled black white and green specs, saprolite	161.5	
16					
17	24"	5-17-32-42	SILT, mottled black white green and orangish brown specs, saprolite	218.1	
18					
19	12"	16-23-50	SAND, silty, mottled black white green and orangish brown specs, saprolite	115.3	1740
20					
21	Cuttings from Auger	N/A	SILT, clayey, brown to orangish brown	45	N/A
22					
23					
24					
25					
26					
27					
28			N/A	N/A	
29					
30					
31					

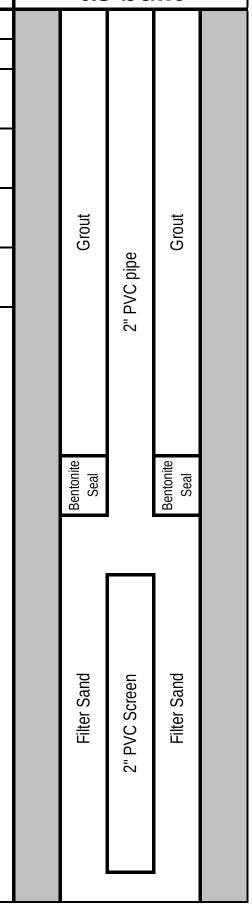


Boring Log

Project:	Former PSC Site	Start Date:	12/20/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/20/06	
Logged By:	Nathan Parker	Total Depth:	30 ft	
Location Code:	RIMW-7	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	12"	3-3-5-4	SAND, silty (major) clay (minor), dark brown	0	920
2					N/A
3	12"	3-3-5-8	SILT, clayey, brown	0	N/A
4					
5	18"	7-12-21-20	SILT, orangish brown with black specs	0	930
6					
7	6"	30-40-41-43	SILT, sandy, orangish brown with black and white specs, sparolite	0	N/A
8					
9	24"	23-17-20-21		0	940
10					
11	24"	22-31-27-29	SILT, yellow orangish brown	0	N/A
12			SILT, sandy, black and white specs with rust staining, saprolite		
13	6"	12-R		0	
14	Cuttings from Auger	N/A	SAND, silty, lt brown	0	
15					
16					
17					
18					
19					
20					
21				0.7	
22					
23					
24					
25					
26				0	
27					
28					
29					
30					

RIMW- 7 Well as built



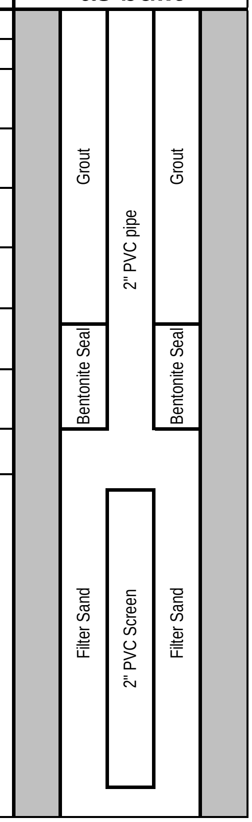
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/18/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/18/06	
Logged By:	Nathan Parker	Total Depth:	27 ft	
Location Code:	RIMW-8	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

RIMW- 8 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	24"	2-3-5-4	CLAY, reddish orange, plastic	0	1420
2			CLAY, silty, lt orangish brown		N/A
3	24"	6-8-10-14	CLAY, silty, orangish brown, plastic	9.8	1430
4					
5	24"	4-10-16-16	SILT, sandy, orangish brown with black specs, saprolite	40.1	1435
6			SILT, sandy, pale brownish grey with black specs, saprolite		
7	24"	12-19-28-34	SILT, sandy, orangish pink with black specs, saprolite	200	1445
8					
9	24"	10-9-16-26		276	1455
10					
11	24"	10-16-17-22	SAND, silty, green black and pink specs, saprolite	297	1505
12					
13	18"	16-26-50-48		859	1530
14					
15	12"	18-37-58		773	1535
16					
17	Cuttings from Auger	N/A	N/A	167	N/A
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					



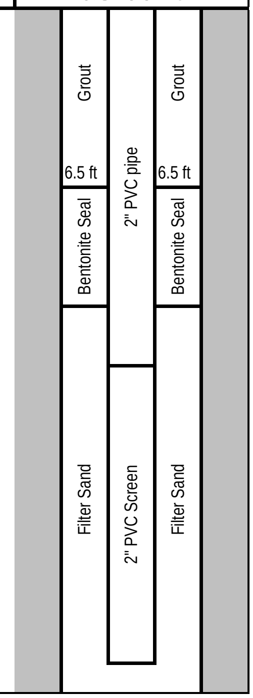
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/18/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/18/06	
Logged By:	David Rojas	Total Depth:	23 ft	
Location Code:	RIMW-9	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Air Rotary			

RIMW- 9 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12			N/A. Entire well drilled with air rig.		
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					



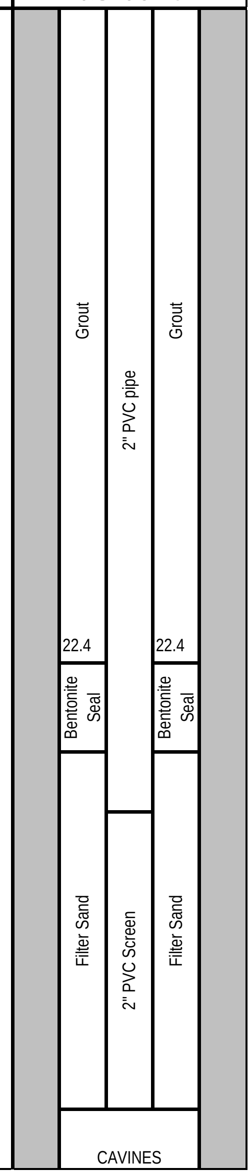
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/14/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/14/06	
Logged By:	David Rojas	Total Depth:	39 ft	
Location Code:	RIMW-10	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Air Rotary			

RIMW- 10 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20			N/A compare to RISB-25. Entire well drilled with air rig.		
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					



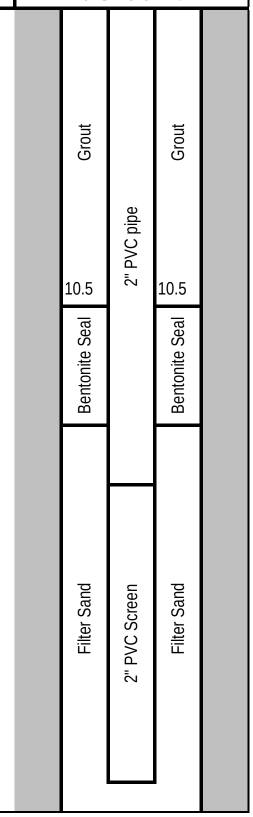
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/18/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/18/06	
Logged By:	David Rojas	Total Depth:	36 ft	
Location Code:	RIMW-11	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Air Rotary			

RIMW- 11 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14			N/A compare to RIMW-18. Entire well drilled with air rig.		
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					

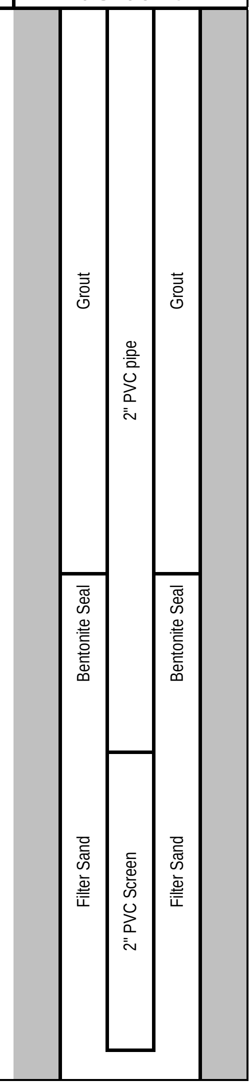


Boring Log

Project:	Former PSC Site	Start Date:	12/18/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/18/06	
Logged By:	David Rojas	Total Depth:	36 ft	
Location Code:	RIMW-12	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Air Rotary			

RIMW- 12 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19			N/A. Entire well drilled with air rig.		
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					



Boring Log

Project:	Former PSC Site	Start Date:	12/11/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/15/06	
Logged By:	Nathan Parker	Total Depth:	102 ft	
Location Code:	RIMW-13	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon to 35' then Air Drilled to completion			

RIMW- 13 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1–2	24"	4-4-6-9	GRAVEL, sandy matrix, grey (top 12"), CLAY, orange mottled with black bands, plastic (bottom 12")	0	N/A
3–4	24"	9-10-25-35	SILT, orange with black specs, dry	0.5	
5–6	24"	14-23-26-25	SILT, clayey, orangish brown with black and white specs, dry, sparolite	0	
7–8	24"	16-18-19-34	SILT, black and white specs with rust staining, dry, sprolite	0	
9–10	18"	18-20-33-50	SILT, sandy, orangish pink with black specs, dry, saprolite	0	
11–12	18"	13-30-33-50	SAND, course, silt (minor), orangish grey with black specs, dry, saprolite	0	
13–14	0	18-18-R	N/A, this sample had no recovery due to the drillers helper dropping a piece of pvc pipe in the hole between split spoons	N/A	
14–15	12"	23-50-R	SILT, sandy, lt orangish grey, saprolite	0	
16–25	Cuttings from Auger	N/A	SILT, lt brown, dry	0.6	
26–35	Cuttings from Auger	N/A	SILT, lt brown, dry	0	
36–46	Cuttings from Auger	N/A	N/A, due to Air Drilling	N/A	

Well construction (as built): 6" Steel Casing | Grout | 2" PVC pipe | Grout | 6" Steel Casing

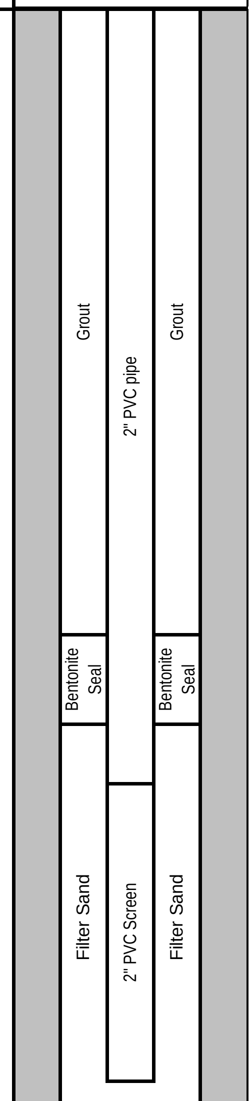
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/11/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/15/06	
Logged By:	Nathan Parker	Total Depth:	102 ft	
Location Code:	RIMW-13	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon to 35' then Air Drilled to completion			

RIMW- 13 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
47	Cuttings from Auger	N/A	N/A, due to Air Drilling	N/A	N/A
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
90					
91					
92					



CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/11/06		
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/15/06		
Logged By:	Nathan Parker	Total Depth:	102 ft		
Location Code:	RIMW-13	Abandonment:	well installed		
Location:	Rock Hill, South Carolina	Latitude			
Driller:	Miller Drilling Co.	Longitude:			
Method:	Hollow Stem Auger with split spoon to 35' then Air Drilled to completion				

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time	RIMW- 13 Well as built
93						Bentonite Plugback
94						
95						
96						
97						
98						
99						
100						
101						
102						

Boring Log

Project:	Former PSC Site	Start Date:	12/8/06
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/14/06
Logged By:	Nathan Parker	Total Depth:	86.5 ft
Location Code:	RIMW-14	Abandonment:	well installed
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Miller Drilling Co.	Longitude:	
Method:	Hollow Stem Auger with split spoon to 43' then Air Drilled to completion		

RIMW- 14 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1–2	24"	4-9-8-5	SAND, clayey,orangish brown with stringers of pale greenish grey (top 18"), CLAY, silty, mottled orangish and reddish brown (bottom 6")	0.7	N/A
3–4	12"	6-10-13-15	CLAY, silty, mottled orangish and reddish brown	0.7	
5–6	24"	12-16-16-11	CLAY, sandy, green and grey, high placisity	0.7	
7–8	24"	11-19-11-20	CLAY, silty, greenish grey with white specs, non-cohesive	0.7	
9–10	24"	25-40-43-23		0.7	
			SILT, clayey, yellowish brown with white and black specs, dry		
11–12	24"	4-4-9-11	SILT, clayey, pink(main) white, black and green specs, dry	0.9	
13–14	24"	4-8-10-14	SILT, greenish grey with white specs, dry, sparolite	0.7	
15–16	24"	8-11-14-18		0.7	
17–18	24"	6-10-18-17		0.7	
19–20	24"	11-8-15-13	SILT, greenish grey with white specs, moist, sparolite	0.7	
21–22	18"	5-6-4-8	SAND, silty, lt orangish brown, moist, sparolite	0.7	
23–24	24"	4-6-11-19	SAND, silty, greenish grey with white specs, saprolite	0.6	
25–26	24"	4-12-20-31		0.6	
27–28	0	48-R	N/A	N/A	
29–30	Cuttings from Auger	N/A	SILT, greenish grey, saprolite, moist	0.6	
31–33				0.4	
34–35			SILT,greenish brown, saprolite, wet		
36–40				N/A	
41–43			SAND, sitly, some weather rock fragments (gabbro), saprolite, wet		
44–46			N/A, due to Air Drilling		

Well construction (as built), 1–46 ft: 6" Steel Casing | Grout | 2" PVC pipe | Grout | 6" Steel Casing

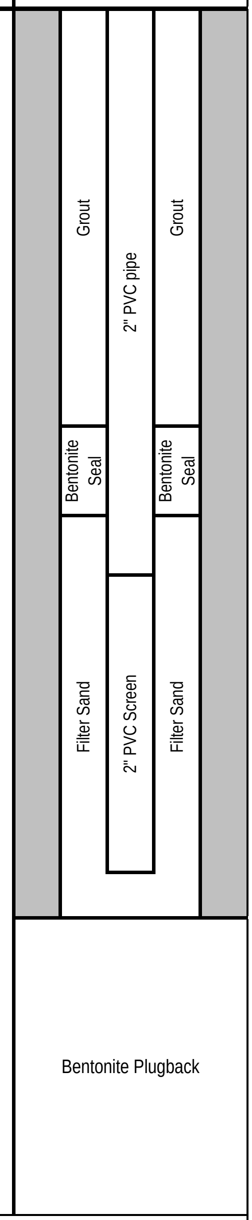
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/8/06
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/14/06
Logged By:	Nathan Parker	Total Depth:	86.5 ft
Location Code:	RIMW-14	Abandonment:	well installed
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Miller Drilling Co.	Longitude:	
Method:	Hollow Stem Auger with split spoon to 43' then Air Drilled to completion		

RIMW- 14 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67	Cuttings from Auger	N/A	N/A, due to Air Drilling	N/A	N/A
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86.5					



Boring Log

Project:	Former PSC Site	Start Date:	12/7/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/20/06	
Logged By:	Nathan Parker	Total Depth:	102.5 ft	
Location Code:	RIMW-15	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

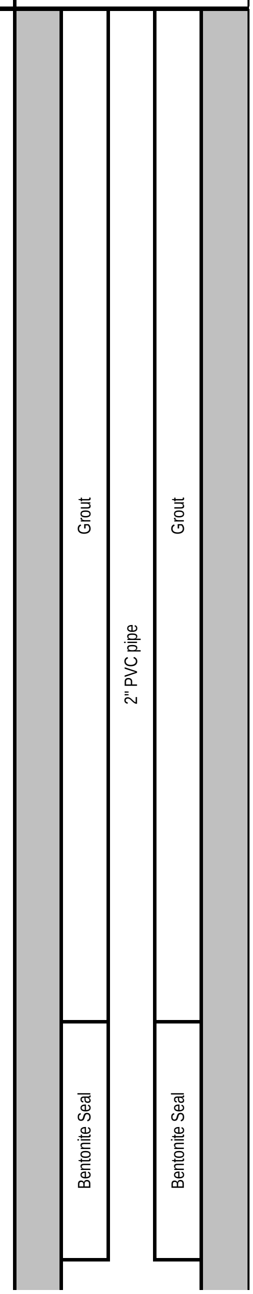
Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time	RIMW- 15 Well as built
1	18"	-	GRAVEL, sandy, fine, grey to lt brown	3.9	N/A	Grout / 2" PVC pipe / Grout
2			CLAY, silty, orangish brown, odor	12.9		
3	24"	-		63		
4						
5	0	-	N/A	N/A		
6						
7	24"	-	CLAY, orangish brown, soft	17.8		
8			CLAY, silty, pale greenish grey	634		
9	24"	4-8-8-9		354		
10			SILT, sandy, orangish brown			
11	24"	4-6-8-9	SILT, sandy, yellowish brown, odor	704		
12						
13	24"	6-12-16-19	SILT, sandy, mottled orangish brown and geenish grey	35		
14						
15	24"	6-15-21-36	SILT, sandy, greenish grey	540		
16						
17	24"	14-30-48-65	CLAY, sandy, redish orange	56		
18						
19	18"	27-50-R	SAND, course grain minerals, feldspar (main), mottled black grey and greenish grey, moist, saprolite	30		
20						
21	Cuttings from Auger	N/A	SILT, sandy, grey to greenish grey, moist, saprolite	N/A		
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36			SILT, sandy, greenish grey, wet, saprolite			
37						
38						
39						
40						
41						
42						
43						
44						
45						
46						

Boring Log

Project:	Former PSC Site	Start Date:	12/7/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/20/06	
Logged By:	Nathan Parker	Total Depth:	102.5 ft	
Location Code:	RIMW-15	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

RIMW- 15 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75	Cuttings from Auger	N/A	SILT, sandy, greenish grey, wet, saprolite	N/A	N/A
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					

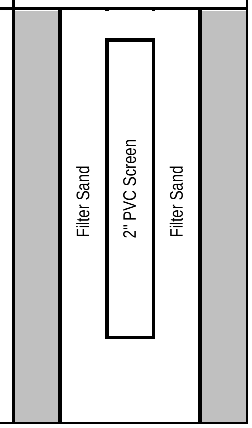


Boring Log

Project:	Former PSC Site	Start Date:	12/7/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/20/06	
Logged By:	Nathan Parker	Total Depth:	102.5 ft	
Location Code:	RIMW-15	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

RIMW- 15 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
90					
91					
92					
93					
94					
95					
96					
97					
98					
99					
100					
101					
102.5					



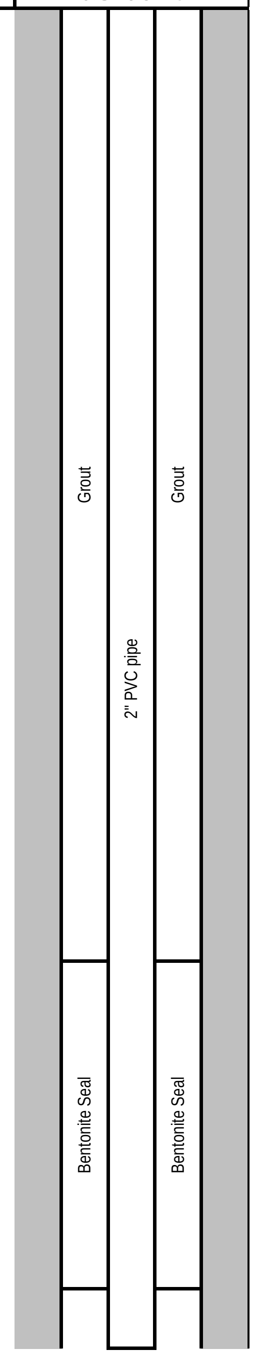
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/20/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/20/06	
Logged By:	Nathan Parker	Total Depth:	56 ft	
Location Code:	RIMW-16	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon & corer, reamed with Air Drill			

RIMW- 16 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28			N/A compare to RISB-??		
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					



CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/20/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/20/06	
Logged By:	Nathan Parker	Total Depth:	56 ft	
Location Code:	RIMW-16	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon & corer, reamed with Air Drill			

RIMW- 16 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					

Filter Sand | 2" PVC Screen | Filter Sand

Boring Log

Project:	Former PSC Site	Start Date:	12/8/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/17/06	
Logged By:	Nathan Parker	Total Depth:	80.5 ft	
Location Code:	RIMW-18	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon & corer, reamed with Air Drill			

RIMW- 18 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1–2	18"	18-24-9-10	GRAVEL, silty-sand matrix, chalky grey clasts, orangish brown matrix (top12"), SILT, sandy, dark brown (bottom 6")	0	N/A
3–4	6"	4-4-10-30	CLAY, greenish brown, plastic	0.9	
5–6	24"	30-21-16-17	CLAY, silty, greenish grey, partial rock texture	0.8	
7–8	24"	15-18-21-23	SILT, greenish grey, greener with depth, yellow staining, saprolite	0.2	
9–10	18"	21-33-44-46		1.8	
11–12	24"	8-25-27-33	SAND, silty, greenish grey, moist, saprolite	0	
13–14	18"	11-24-20-35		0.7	
15–16	20"	10-13-20-25	SILT, sandy, yellowish brown, saprolite	0.3	
17–18	24"	8-10-20-25	SAND, silty, yellowish brown, saprolite	0.4	
19–20	24"	11-15-25-21		0.6	
21–22	24"	17-15-20-21		0.4	
23–24	18"	11-30-29-32	SAND, orangish brown, saprolite	0.8	
25–26	12"	17-20-22-50	SAND, orangish brown, wet, saprolite	0.2	
27–28	24"	43-40-44-45	SAND, silty, more silty with depth orangish brown with green tint, wet, saprolite	0	
29	12"	40-47-R		0	
30–38	Cuttings from Auger	N/A	SILT, sandy, greenish grey to brownish grey, saprolite	N/A	

Well construction columns (depths 1–38): 6" Steel Casing | Grout | 2" PVC pipe | Grout | 6" Steel Casing

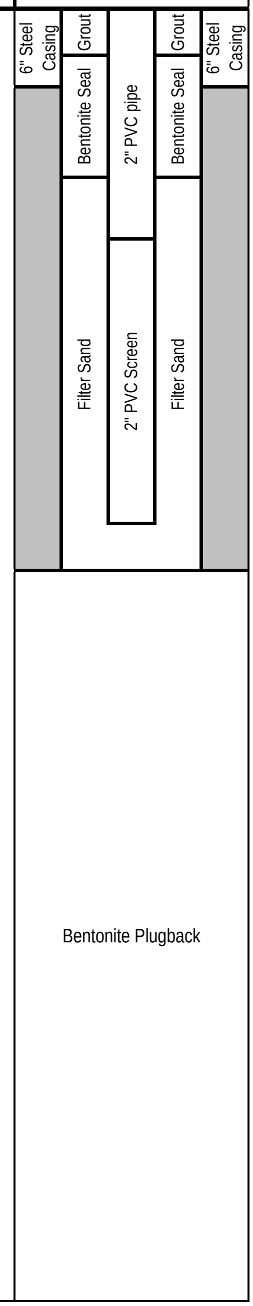
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/8/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/17/06	
Logged By:	Nathan Parker	Total Depth:	80.5 ft	
Location Code:	RIMW-18	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon & corer, reamed with Air Drill			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
39	Cuttings from Auger	N/A	PARTIALLY WEATHERED ROCK	N/A	N/A
40					
41	Core		COMPETENT ROCK, Gabbro		
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					

RIMW- 18 Well as built



CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/12/06
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/19/06
Logged By:	Nathan Parker	Total Depth:	95 ft
Location Code:	RIMW-19	Abandonment:	well installed
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Miller Drilling Co.	Longitude:	
Method:	Hollow Stem Auger with split spoon & corer, reamed and completed with Air Drill		

RIMW- 19 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1	24"	35-33-19-10	GRAVEL, grey to lt brown	0	N/A
2					
3	18"	10-10-12-35	CLAY, silty, orangish red, plastic	0	
4					
5	24"	17-8-16-11	SILT, clayey, orangish red to brown, dry	0	
6					
7	18"	17-8-16-11	SILT, orangish brown with black and white specs	0	
8					
9	24"	17-30-49-46		3.8	845
10					
11	24"	4-7-9-10	CLAY, silty , orangish brown with black specs	3.3	N/A
12					
13	24"	5-5-9-10	SILT, clayey, lt orangish brown, saprolite	1.6	915
14					
15	24"	6-8-13-15	SILT, sandy, lt greenish brown, saprolite	0.3	N/A
16					
17	12"	9-19-26-50	SILT, sandy, lt brown, saprolite	1.7	935
18					
19	12"	22-50	SAND, black, orange, white, green weathered minerals, wet, saprolite	0	N/A
20					
21	Cuttings from Auger	N/A	SILT, sandy (fine), lt brown	3.7	
22					
23					
24					
25					
26				4.5	
27					
28					
29					
30					
31				2.5	
32					
33					
34					
35					
36			SILT, sandy (course), brown	5.9	
37					
38					
39					
40					
41			SILT, sandy (fine),dark brown, wet	8.3	
42					
43					
44					
45					
46				4.1	

Well construction (depth 1–46): 6" Steel Casing | Grout | 2" PVC pipe | Grout | 6" Steel Casing

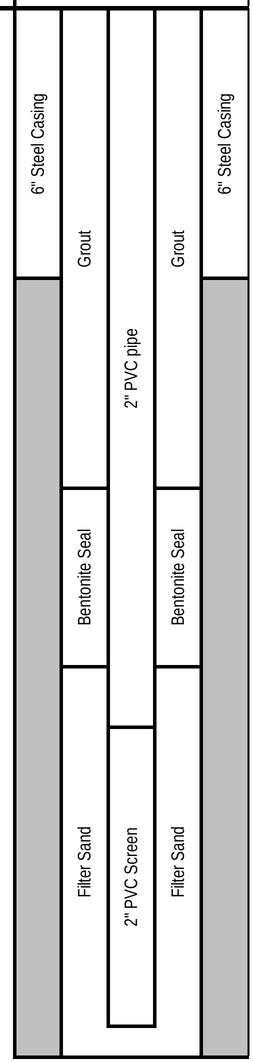
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/12/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/19/06	
Logged By:	Nathan Parker	Total Depth:	95 ft	
Location Code:	RIMW-19	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon & corer, reamed and completed with Air Drill			

RIMW- 19 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
47	Cuttings from Auger	N/A	SILT, sandy (fine),dark brown, wet	4.1	N/A
48					
49					
50					
51					
52			N/A due to Air Drilling	N/A	
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					



Boring Log

Project:	Former PSC Site	Start Date:	12/12/06		
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/19/06		
Logged By:	Nathan Parker	Total Depth:	95 ft		
Location Code:	RIMW-19	Abandonment:	well installed		
Location:	Rock Hill, South Carolina	Latitude			
Driller:	Miller Drilling Co.	Longitude:			
Method:	Hollow Stem Auger with split spoon & corer, reamed and completed with Air Drill				

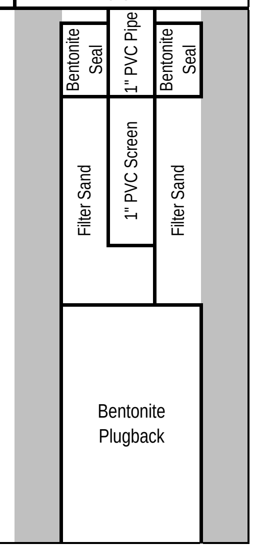
Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time	RIMW- 19 Well as built
82						
83						
84						
85						
86						
87						
88						Bentonite Plugback
89						
90						
91						
92						
93						
94						
95						

Boring Log

Project:	Former PSC Site	Start Date:	12/20/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/20/06	
Logged By:	Nathan Parker	Total Depth:	18 ft	
Location Code:	RIPZ-1	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon			

RIPZ- 1 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1					
2					
3					
4					
5					
6					
7					
8					
9			N/A		
10					
11					
12					
13					
14					
15					
16					
17					
18					



CDM

Boring Log

Project:	Former PSC Site	Start Date:		
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/19/06	
Logged By:	Mark Walters	Total Depth:	78 ft	
Location Code:	RIPZ-2	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Air Drill			

RIPZ- 2 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15			Soil Lithology not collected		
16			Top of Bedrock - 34' bls		
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					

4" PVC Casing	Grout	1" PVC Riser	Grout	4" PVC Casing

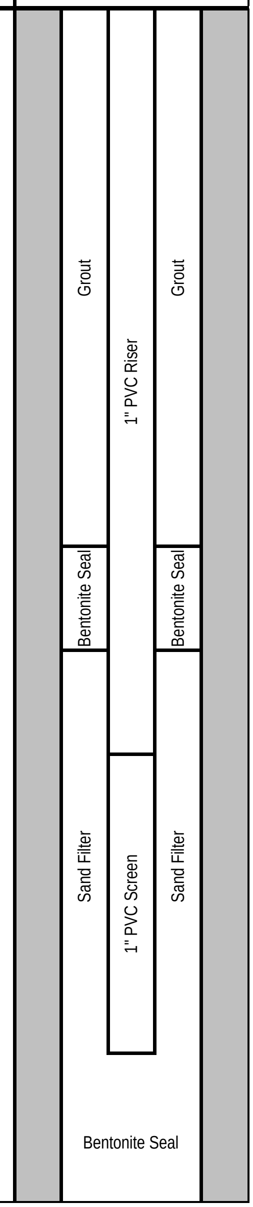
CDM

Boring Log

Project:	Former PSC Site	Start Date:		
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/19/06	
Logged By:	Mark Walters	Total Depth:	78 ft	
Location Code:	RIPZ-2	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Air Drill			

RIPZ- 2 Well as built

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58			Soil Lithology not collected		
59			Top of Bedrock - 34' bls		
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					



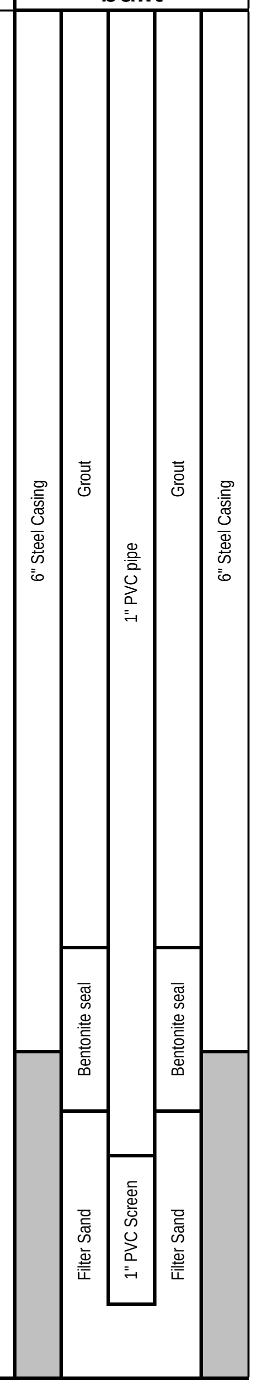
CDM

Boring Log

Project:	Former PSC Site	Start Date:	12/11/06	
Project No.:	20958-50105-TSK6.PHASE2	End Date:	12/20/06	
Logged By:	Nathan Parker	Total Depth:	102 ft	
Location Code:	RIPZ-3 (formerly RIMW-17)	Abandonment:	well installed	
Location:	Rock Hill, South Carolina	Latitude		
Driller:	Miller Drilling Co.	Longitude:		
Method:	Hollow Stem Auger with split spoon to 32' then Air Drilled to completion			

Depth (ft)	Recovery	Blow Count	Sample Description	OVM Reading	Lab Sample Collect Time
1 2	21"	7-5-5-7	CLAY, sandy, reddish orange, poorly sorted, plastic, mottled with black	0	N/A
3 4	24"	5-10-17-?	CLAY, silty, reddish orange, some large clasts, plastic mottled with brown	0	
5 6	18"	17-27-24-2	CLAY, with sand, greenish brown, plastic, small clasts 0.5' layer of grey gravel	0	
7 8	24"	10-22-25-31	CLAY, sandy, greenish (olive) brown, plastic, organic material 7.5-8'	0	
9 10	24"	20-25-27-34	CLAY, silty, brown with orangish brown, mottling, odor, moist	1	
11 12	12"	26-28-32-27	Same as Above	88	
13 14	6"	22-30-23-24	CLAY, silty, brown, mosit to wet	26	
15 16	24"	1-1-5-?	SAND, grey, med-coarse, wet	1	
17 18	18"	18-24-25-34	SAPROLITE, green (80%) with black (20%), breaks to sandy silt, moist	0	
19 20	18"	2-2-15-20	Same as Above	0	
21 22		7-31-47-R	SAPROLITE, green (80%) with pink (5%), black (15%), breaks to silty sand. Split spoon refusal.	0	
23 24 25 26 27 28 29 30	Cuttings from Auger		Mud, greenish gray, w/ sandy clay. From cuttings (no split spoon)		
31 32			MUD, grey with bluish green hue, sandy silt HAS Refusal at 32' bls		
33 34 35 36 37 38 39 40 41 42 43 44 45 46			N/A, due to Air Drilling		

RIPZ-3 Well as built



Phase III Well Construction

Soil Classification System

Major Divisions			Descriptions	
Coarse Grained Soils (More than 50% of material is LARGER than 200 sieve size)	**Gravels** (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	**Clean Gravels** (Little or no fines)	**GW**	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		Gravels with fines	**GM**	Silty gravels, gravel-sand- silt mixtures
			GC	Clayey gravels, gravel-sand- clay mixtures
	Sands (More than 50% of coarse fraction is SMALLER than the No.4 sieve size)	**Clean Sands** (Little or no fines)	**SW**	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines	**SM**	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
Fine Grained Soils (More than 50% of material is SMALLER than 200 sieve size)	**SILTS and CLAYS** (liquid limit LESS than 50)		**ML**	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS and CLAYS (liquid limit GREATER than 50)		**MH**	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plaasticity, organic silts
HIGHLY ORGANIC SOILS			**Pt**	Peat and other highly organic soils

Rock Classifications

Weathering		Abbreviation	Description
Fresh		**VBR**	Core pieces 1 - 3 inches
Slightly Weathered		**BR**	Core pieces 3 inches to 1 ft
Weathered		**BL**	Core 1 - 3 ft
Severely Weathered		**M**	Core sections more than 3 ft long

Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-20	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-20 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
1	SAND with silt, brown loose, fine- very fine-	SM				
2	SILT with fine sand, brown-yellow, brown, stiff, dry					
3						
4				1	7/7	
5		ML				
6						
7						
8	SAND, fine-medium with silt, medium density, grey green and yellow brown, moist SAPROLITE (biotite, quartz, feldspar, hornblende) (starts @ 7.5')					
9						
10						
11						
12						
13	becomes dry	SM		2	10/10	
14						
15						
16						
17						
18	becoming coarse dense					
19		SP				
20						
21	SAPROLITE, sand, medium-coarse, white, black, green, slightly moist, (biotite, hornblende, feldspar)					
22						
23				3	10/10	
24						
25						
26						
27		SP				
28						
29						
30			0			
31						
32						
33				4	10/10	
34	Grading to severely weathered rock (DIORITE), gravel with sand and silt					
35						
36						
37		GP				
38						
39						
40						coring

Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-20	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-20 Well as built

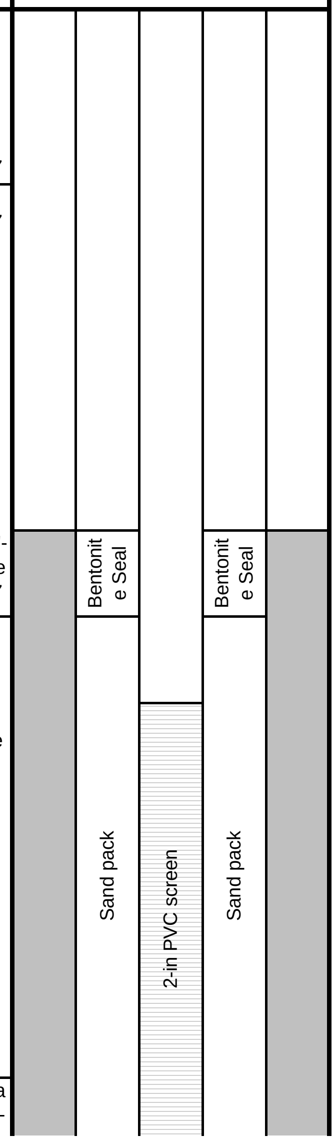
Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks					
41	Weathered GRANODIORITE Gravel with sand					with water, fines washed out					
42				5	2/10						
43											
44											
45											
46											
47											
48											
49											
50		GP					6-in threaded steel casing	Grout	2-in PVC casing	Grout	6-in threaded steel casing
51						hard coring					
52											
53				6	1.5/10						
54											
55											
56						softer drilling					
57											
58											
59											
60											
61	Weathered DIORITE/GRANODIORITE, quartz, hornblende, feldspar, biotite, poss. garnet, (GRAVEL with sand)										
62											
63		GP/SP		7	1.5/10						
64											
65											
66	No recovery, (sand?)										
67											
68											
69											
70						cored with water fines washed out					
71											
72											
73				8	0/10						
74		SP									
75											
76											
77											
78											
79											
80											
81											

Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-20	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
82	Weathered (Moderate-Severe) DIORITE/GRANODIORITE, appears to becoming more competent rock, (GRAVEL with sand)			9	2/10	
83						
84						
85						
86						Stop 8/20/07
87						
88		GP/SP				Start 8/21/07
89						
90						
91						
92				10	2.8/10	
93						
94						
95						hard coring
96	GRANODIORITE, fresh-slightly weathered, hard quartz, feldspar, hornblende, trace biotite, trace possible garnet, broken (starts at 95.5')					
97			NA			
98		BR				
99						
100				11	5/5	TD-102'-10" hole 8/21/07
101	GRANODIORITE, moderate weathering, Iron staining, llaumonite filled fracs					
102						
103		VBR				
104						
105				12	5/5	
106	becomes slighty weathered (at 104.75')					vertical fracture 105.5-107.1
107		BR				
108						
109		VBR				
110						
111		BR				
112	Apparent increase in Chlorite content			13	10/10	
113		VBR				
114						
115						
116		BR				
117						
118	Weathered zone with chlorite, feldspar and laumonite on fractured faces	VBR				
119						high>frac 120.2-
120						

RIMW-20 Well as built



Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-20	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-20 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks	Well
121	GABBRO, fresh, few laumonite filled fractures, lower chlorite, increased pyroxine/hornblende, chlorite zoning along fractured traces					120.8	Backfilled w/ sand
122				14	10/10		
123		BR					
124						high>frac 124.7-125.3	
125							
126							
127							
128	Fractured zone with chlorite and Iron staining on fractured faces (at 27.2')	VBR					
129		BL					
130		BR		15	6/6		
131							
132		M					
133						TD-133'	

Boring Log - RIMW-21

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-21	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW- 21 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
1	SILT with sand, brown, dry, stiff (first 0.6')	ML				
2	SAND with gravel, fractured, light brown, dry(0.6-	SW/GW				
3	SAPROLITE, SILT with sand, brown, dry, very stiff-hard, quartz, mica (1.6-6.4')					
4		ML		1	4/7	
5						
6						
7	SAPROLITE, SAND fine-very fine with silt, some clay, moist, medium density, pale brown, dark green and pale yellow (starts @6.4')					
8						
9		SM				
10						
11						
12	SAND fine-medium, with silt, dense, dry, green-gray			2	10/10	
13		SM				
14						
15	SAND, fine, with clay, gray-green, moist, medium	SC				
16	SAPROLITE, SAND grading to severly weathered rock, dark green (starts @ 15.4')					
17		SW/GW				
18			0			
19	SAND, medium, green-dark green, dense, some silt (saprolite-severely weathered rock)					Begin coring with water sample washed out @ 22'
20				3	5/5	
21						
22	Becomes brown-green (ends @ 24.6')	SP				
23						
24						
25	SAPROLITE/SEVERELY WEATHERED ROCK, Sand, medium-fine, very dense, some silt, dry, brown-green to green-gray (starts @ 24.6')			4	0/5	
26						
27						
28						No water used
29						
30						
31						
32				5	12/10	
33						
34		SP				
35						
36						
37						
38						Coring with water
39						
40						
41						
42				6	4/10	

Well as built: 6-in treaded steel casing | Grout | 2-in PVC casing | Grout | 6-in treaded steel casing

Appendix B-2
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, SC

Boring Log - RIMW-21

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-21	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW- 21 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
43	SEVERELY WEATHERED ROCK, DIORITE, friable, coarse, Iron and Maganese staining, dry, hard		0			
44						
45						
46						
47						
48		GW				No water used
49						
50				7	8/5	
51						
52						
53						
54	DIORITE moderate-severely weathered, abundant Iron staining (ends @55.5')	VBR				
55				8	3.8/5	
56	SAPROLITE, silt with sand, green-grayish green, some rock fragments, medium stiffness (from 55.5-59.2')					
57			NA			
58		ML/SM				
59	weathered rock fragments and fine-coarse gravel (from 58.1-59.2')					
60						
61	CLAY with fine-medium sand, green, dry, very stiff, low plasticity (starts @ 59.2')					
62		CL		9	8.4/10	
63						
64						
65	SAND and GRAVEL, saprolite to severely weathered, DIORITE, green-grayish green		0			
66		SP/GP				high < fracture 70.6-71.4
67						
68						
69	CLAY with gravel, gray-greenish gray, moist, stiff (ends @ 69.6)	CL				
70				10	4.5/5	TD 10" hole -71' 8/21/07
71	DIORITE, white, black and green, fresh, plagioclase, hornblende, biotite, little quartz, chlorite and laumonite in fractured traces (69.6-76.4')	BL/BR				
72						
73		VBR				
74		BL/BR				high < fracture 73.8-74.8
75				11	5/5	
76						
77	DIORITE with GABBRO (diabase) intrusions,	BL				
78	DIORITE as above, GABBRO, dark gray-black, fine xstalline, pyroxine, hornblende, trace pyrite (starts @ 76.4')					
79						laumonit e/feldsp
80						

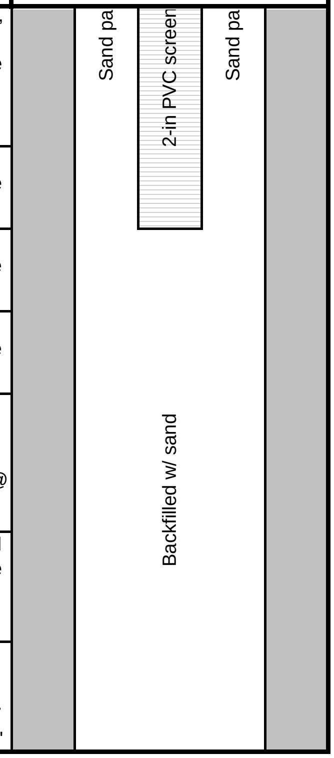
5-1/2-in sonic casing
Bentonit e Seal
ck
Bentonit e Seal
ck
5-1/2-in sonic casing

Boring Log - RIMW-21

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-21	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
81	DIORITE and GABBRO as above, feldspar alteration banding along diorite/gabbro contacts (ends @87.6)	BR				ar filled, high < fracture 78.2-78.8
82						
83				12	10/10	
84		VBR				
85						
86						high < fracture 81.5-
87			NA			
88						
89	DIORITE, coarse xstalline, mineral composition same as above (starts @ 87.6)					vertical fracture 82.8-
90		BR				
91						
92						vertical fracture 85.9-
93				13	10/10	
94						
95		BL				Zone broken by coring @ 87'
96						
97		BR				
98						
99						
100						Vertical fracture 91.6-92.6
101						
102						
103		VBR		14	10/10	
104						
105			NA			
106						Cored 8/23/07 TD-107'
107						

RIMW- 21
Well as built



Boring Log

Project:	Former PSC Site	Start Date:	8/15/07
Project No.:	20958-50105	End Date:	8/21/07
Logged By:	J. Hofer	Total Depth:	152'
Location Code:	RIMW-22	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-22 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
1	Gravel fill (until 1.4')					
2	CLAY, some silt, dark brown, moist, medium stiff (1.4-3')	CL	731			
3						
4	CLAY, some silt, red brown, slightly moist, medium stiff			1	7/7	
5			141			
6						
7	CLAY with silt, yellow- red and light gray, mottled, slightly moist, medium stiff (ends @ 9.5)	CL				
8			78			
9						
10	SILT with fine sand, light gray very stiff-hard, dry (9.5-11.5')	ML	16.8			
11						
12	SAND, fine, some silt, pale yellow, moist, medium desity (11.5-12.8')	SM		2	10/10	
13			10.9			
14	SAND, medium, brown-red, medium density, angular, moist (12.8-15')	SW				
15						
16	SAPROLITE, SILT and very fine grained sand, stiff, slightly moist					
17						
18		ML/SM	46			
19						
20						
21	SAPROLITE as above, dry, hard					
22				3	10/10	hard drilling/ coring
23		ML/SM	156			
24						
25						
26						
27	Weathered Rock, DIORITE, with saprolitic zones gray-greenish gray, dry					
28			401			
29						
30		VBR	559			
31				4	7/7	
32						
33			104			
34						
35	Iron staining on rock fracture faces (34-34.6')					Begin coring w/ water
36	SAND, coarse, feldspar, hornblende, quartz, dark green, white (34.6-38.2')		50.2	5	3/3	
37						
38		SW				
39	SAND, gravel and weathered rock (38.2-40')					
40			0			
41	SAND and Weathered Rock, quartz filled vein (broken piece)					most of core washed out
42				6	1/10	
43						
44		SP/GP	0			
45						
46						

Boring Log

Project:	Former PSC Site	Start Date:	8/15/07
Project No.:	20958-50105	End Date:	8/21/07
Logged By:	J. Hofer	Total Depth:	152'
Location Code:	RIMW-22	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-22 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
47						
48	SAND and silt with weathered rock, dry, gray-green	SM	0	7	5/5	dry cored
49–52						
53	Same as above, higher weathered rock content	SP/GP	0	8	2.5/5	coring with water
54–57						
58	SAND medium-coarse with silt, gray, dense, saturated (ends @ 58.8')	SP/SM	0	9	10/10	dry coring
59						
60	ROCK (58.8-60')	SP				very hard @58.8'
61	SAND with weathered rock fragments, saturated, dark gray					slightly faster coring @ 62'
62–70						
68				10	8/10	
71	SAND, fine-coarse with silt and rock fragments, dry, light-dark gray					
72–77						

Well construction (47–77 ft): 6-in Threaded steel casing | Grout | 2-in PVC casing | Grout | 6-in Threaded steel casing

Boring Log

Project:	Former PSC Site	Start Date:	8/15/07
Project No.:	20958-50105	End Date:	8/21/07
Logged By:	J. Hofer	Total Depth:	152'
Location Code:	RIMW-22	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-22 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
78	SAND and Weathered Rock					
79						coring with water
80						
81	SAND and Weathered Rock (DIORITE), light brownish gray to brown					
82						fines washed out @ 80'
83		SP/GP		11	4/10	
84						
85						
86	SAND, pink, with gravel, plagioclase, quartz, hornblende, (GRANITE?), 2-in diameter Biotite, quartz Schist? Rock fragment (ends @92.6')					
87						
88						
89		SP				Fines washed out
90						
91						
92				12	2/10	
93	DIORITE, Fragments with weathered quartz (92.6-102.6')					
94						
95						
96						
97						
98		GP				
99						
100						
101						
102				13	3.5/10	
103						Borehole reamed to 10" 0-119' 6" steel threaded casing installed to 117'
104	SAND with Gravel, some Clay, grayish green-dark red brown (saprolitic) (starts @ 102.6')					
105		SP				
106						
107	GRAVEL, (Weathered DIORITE), abundant Iron staining					
108						
109						
110			NA			
111		GP				
112				14	5/10	
113						
114						
115	feldspar/Quartz vein (114-115.2')					

Boring Log

Project:	Former PSC Site	Start Date:	8/15/07
Project No.:	20958-50105	End Date:	8/21/07
Logged By:	J. Hofer	Total Depth:	152'
Location Code:	RIMW-22	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-22 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks	Well as built
116	GABBRO, dark green- greenish black,					very	
117	plagioclase, hornblende, quartz, biotite, fresh, fine					hard	
118	grained (diabase) (starts @ 115.2')					coring @	
119		BR				118'	Bentonite Seal
120				15	5/5	TD-122'	
121						8/15/07	
122	DIORITE, fresh, fine-medium xstalline, white,					Resume	
123	green and black, plagioclase, hornblende, biotite,					coring	
124	pyroxine	BR				8/21/07	
125				16	5/5	Open	
126						vert. frac	
127		VBR				123.5-	
128						124.1'	
129	becoming coarse xstalline @ 127.6'					closed	
130						124.1-	
131						124.8'	
132				17	7/10	frac	Sand pack; 2-in PVC Screen; Sand pack
133		BL				zone	
134		(126.8-				126.0-	
135		140.4')				133.0-	
136						133.7'	
137						quartz&	
138						felds	
139						vein @	
140						137.8'	
141	GRANODIORITE, fresh, broken-blocky,	VBR		18	8.4/6	frac	
142	hornblende, orthoclase, quartz, biotite					zone	
143		BL				140.4-	
144						washout	
145		VBR				frac	
146				19	2/4	zone	Backfilled with bentonite pellets
147		BR				flush out	
148		VBR				to 147'	
149						frac	
150		BR/BL		20	2.8/5	zone	
151		(147.5-				147-	
152		152')				TD- 152	

Boring Log

Project:	Former PSC Site	Start Date:	8/22/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	42'
Location Code:	RIMW-23	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

No Well

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks	Well
1	Gravel fill (0-0.8')	FILL	0	1	5/7		
2	CLAY with silt and fine sand, yellow-red (FILL) (starts0.8')						
3							
4	CLAY with brown-yellow brown, slightly moist, medium stiffness	CL	0				
5							
6							
7	SILT with very fine grained sand brown-red brown, moist, soft	ML	3.8				
8				2	10/10		
9							
10	SILT with very fine grained sand, some clay, saturated, very soft, olive brown	ML	7.4				
11							
12			4.6				
13							
14							
15	SAND fine-very fine, olive brown, medium desity (15-17.6')	SM	10				
16							
17							
18	SILT with gravel and sand, yellow brown, gravel up to 3.5" in diameter, sub angular-sub rounded (17.6-20')	ML		3	10/10		
19			8.8				
20							
21	GRAVEL with sand and clay, dark olive brown, saturated, fine-coarse, medium density	GP/GC	4.8				Borehole grouted
22							
23							
24	SAND medium-coarse, some silt and clay, slightly moist-dry, medium density (ends @ 27.8')	SP/SC	15.6				
25							
26			56.2				
27							
28							

Boring Log

Project:	Former PSC Site	Start Date:	8/22/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	42'
Location Code:	RIMW-23	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

No Well

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
29	GRAVEL with sand and clay, sub-well rounded, up to 3.5" in diameter, grayish brown (starts @ 27.8')	GP/GC	27.6	4	6/6	Start water coring @ 33'
30						
31						
32	GRAVEL with sand, sub-well rounded, dry-slightly moist, redish brown	GP	42.8			
33						
34				5	2/4	vert. frac 34.5-
35	GABBRO (diabase), fine xstalline, fresh-slightly weathered, chlorite on fractured faces	BR	NA			
36						vert. frac 39-40
37						
38				6	5/5	bore hole abandoned @ 42'
39						
40						
41	GABBRO (diabase) as above, hard-very hard, broken, fine xstalline					
42						

Boring Log

Project:	Former PSC Site	Start Date:	8/22/07
Project No.:	20958-50105	End Date:	8/24/07
Logged By:	J. Hofer	Total Depth:	72'
Location Code:	RIMW-23A	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-23 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
1	See boring log RIMW-24 for 0-37					
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						Sonic casing installed to 37.5' 8/22/07 Resumed coring 8/24/07
31						
32						
33						
34						
35						
36						
37						

Well as built (columns, left to right):

5 1/2-in sonic casing installed to 37.5 ft	Grout	2-in PVC casing	Grout	5 1/2-in sonic casing installed to 37.5 ft

Boring Log

Project:	Former PSC Site	Start Date:	8/22/07
Project No.:	20958-50105	End Date:	8/24/07
Logged By:	J. Hofer	Total Depth:	72'
Location Code:	RIMW-23A	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-23 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
38	GRANODIORITE, slightly weathered, coarse, xstalline, orthoclase, hornblende, biotite, pyroxine, chlorite					
39						
40		VBR				high < frac. 43.0-43.5' & 43.4-44.0'
41						
42				1	8.9/10	
43						
44	few laumonite/feldspar filled fractures	BR (42.8-46')				
45						
46						
47						
48						vert. frac 47.0-48.7 vug @ 48.8'
49						
50		VBR				
51						
52	highly fractured 51.4-52.0' with feldspar/laumonite on fractured faces			2	10/10	
53						
54						
55		BR	NA			
56						near vertical fract 55.4-56.3
57						
58		VBR				
59		BR (58-59.6')				
60						
61		VBR				
62				3	10/10	
63						
64						
65						
66						
67		BR				
68						
69						
70				4	5/5	8/24/07 TD- 72'
71						
72						

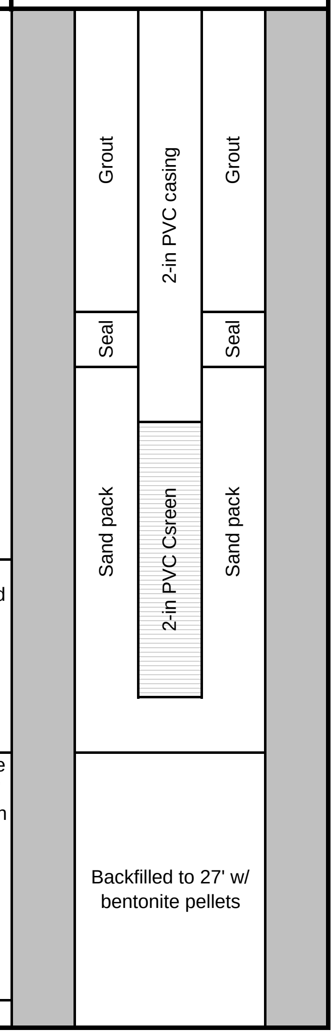
Bentonite Seal
Sand pack
2-in PVC Screen
Backfilled with sand
Bentonite Seal
Sand pack

Boring Log

Project:	Former PSC Site	Start Date:	8/14/07
Project No.:	20958-50105	End Date:	8/14/07
Logged By:	J. Hofer	Total Depth:	37'
Location Code:	RIMW-24	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
1	Gravel (0-0.5')	CL	2.2	1	6.5/7	
2–3	CLAY with silt, some fine sand, red-dark red, dry, very stiff (0.5-3')					
4–6	SILT, trace very fine grained sand, brown-olive brown, dry, hard (3-5.5')	ML	0			
7–8	SILT with fine to medium sand, olive gray, hard (5.5-7.4')	ML/SM	0			
9–10	SAND, veryfine-fine, rounded, little medium, moist, loose, with silt olive brown (starts @ 7.4')	SM	7	2	10/10	
11–12	becomes medium-coarse, with silt, red brown (@ 10')	SM/SW	10.7			
13–14			16.4			
15–17	becomes coarse, some silt, olive gray (@ 13.6')	SW	18			
18–20	saturated		21.2	3	10/10	
21–24	SAND, medium-coarse, rounded, loose		40.6			Installed MW @25' with screen 15-25'
25			104			
26–27	Weathered rock	GP	NA			
28–30				4	10/10	Backfilled to 27' logs with 3/8" bent. Pellets
31–37	Bedrock, DIORITE, medium grained, feldspar, hornblende, little quartz, fractured	BR				TD-37'

RIMW-24 Well as built



Boring Log

Project:	Former PSC Site	Start Date:	8/17/07
Project No.:	20958-50105	End Date:	8/27/07
Logged By:	J. Hofer	Total Depth:	72'
Location Code:	RIMW-25	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-25 Well as built

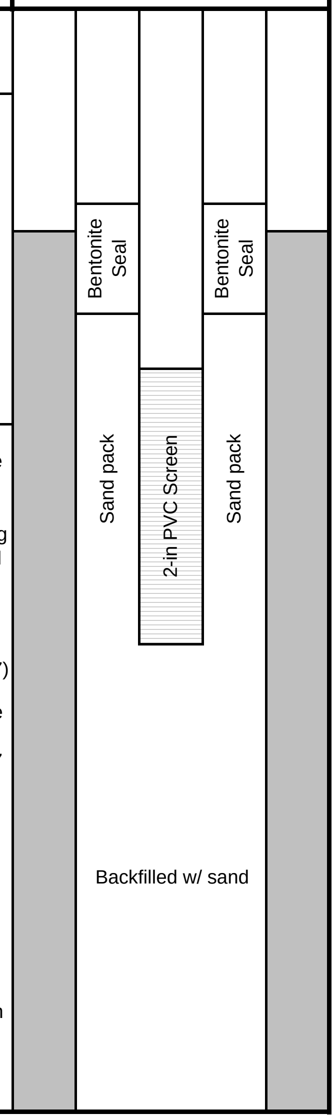
Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks	Well as built
1	CLAY with silt, some fine-medium sand, dark red brown, dry, stiff (0-3.8')	C L	0	1	7/7		6-in Threaded steel casing; Grout; 2-in PVC Casing; Grout; 6-in Threaded steel casing
2							
3							
4							
5	CLAY, some silt, grayish-yellowish brown, Manganese/Iron concretions, very stiff, dry, (3.8-	CL	0				
6							
7	SILT, some fine sand, brown-yellow to gray brown, stiff (5.7-7')	ML	0				
8				2	10/10		
9	SAND, some silt, medium, grayish green, loose, dry (7-9.5')	SM				strong petroleum odor	
10			356				
11	SILT with fine sand, grayish green, soft, dry (9.5-13)	ML					
12			420				
13			292				
14	SAPROLITE, Sand with silt, fine-medium, greenish gray and white, dry (13-23.5')	SM	50.5				
15							
16							
17							
18	becoming fine to coarse with some fine gravel		50.1	3	7/7		
19							
20							
21		SW	32.9				
22							
23	Increase in gravel content		11.1				
24	SAND, medium-coarse, little silt, dark green (23.5-32')	SP	568				
25				4	3/3	coring w/ water @ 24' strong odor @25.5'	
26							
27							
28				5	6/10		
29							
30							
31							
32						hard	

Boring Log

Project:	Former PSC Site	Start Date:	8/17/07
Project No.:	20958-50105	End Date:	8/27/07
Logged By:	J. Hofer	Total Depth:	72'
Location Code:	RIMW-25	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-25 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
33	DIORITE, slightly weathered, fractured,	BR (33-35')		5	8/10	coring (@32')
34	hornblende, plagioclase, biotite, pyroxine					
35		VBR (35-36.2')				
36						faster coring (@35')
37	very broken weathered zone 35-36.5'					
38		BR (36.2-40')				
39						
40	weathered zone (gravel)			6	4/5	
41	weathered zone with sand and silt (@41.5')	GP				
42						
43		BR (42-43.5')				
44	weathered zone (44-46')					
45		VBR		7	5/5	
46	DIORITE, fresh-slightly weathered, medium	BR				
47	xstalline, plagioclase, hornblende, pyroxene, biotite					
48		VBR				rock may be broken due to breaking the drill rod
49				8	4/4	
50		BR				
51						
52			NA			
53						
54	orthoclase filled vert frac: 54-56'	VBR		9	6/6	
55						
56						TD-51' (8/17/07)
57		BR				
58						resume coring 8/27/07
59						
60						
61						
62				10	10/10	
63		BR-BL				
64						
65						
66						
67		BR(66-68.2')				
68						bottom 4' left in bore hole
69		BL (68.2-72)				
70				11	1/5	
71						
72						TD- 72'



Appendix B-2
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, SC

Boring Log

Project:	Former PSC Site	Start Date:	8/18/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	107'
Location Code:	RIMW-26	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-26 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks	RIMW-26 Well as built
1	CLAY with silt and sand, brown-yellow and light brown gray mottled, dry-slightly moist, very stiff						
2			0				
3							
4		CL		1	7/7		
5			0				
6							
7	SILT with fine sand, brownish yellow- yellowish brown, dry stiff		0				
8							
9		ML					
10	SILT with very fine sand, grayish green, medium stiff-soft (SAPROLITE), moist		0				
11							
12			0				
13	SAND, fine, some silt, grayish green to yellow brown, slightly moist, medium density (12-15.5')			2	10/10		
14							
15		SM	0				
16							
17	SAND, medium, some fine, little silt, grayish green to brownish yelloow, dense, angular, quartz and horseblende, SATURATED						
18			0				
19							
20							
21							
22		SP		3	10/10		
23			0				
24							
25							
26							
27			0				
28							
29	CLAY with silt some sand, olive gray, moist, medium stiffness (29-30')	CL	0			begin coring with water @ 33'	
30				4	6/6		
31	SILT with very fine sand, green-gray, dry, very stiff-hard						
32		ML	0				
33							asing asing

Boring Log

Project:	Former PSC Site	Start Date:	8/18/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	107'
Location Code:	RIMW-26	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-26 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
34–41	SAND, medium-coarse, (severely weathered rock?), dark green and black (33-41.4')	SP	0	5 (34–37); 6 (38–46)	2/4; 2.5/10	fines and sand above rock @ 41.5' washed out
42–44	DIORITE, weathered (41.4-44')	VBR	0 (42–46)	6	2.5/10	hard drilling @41'
45–46	SAND with silt, some DIORITE Gravel (44-46.6')	SM		6		vry easy drilling @ 44'
47–48	CLAY with some rock fragments dark green-gray, moist (46.6-48')	CL	0 (47–51)	7 (48–54)	7/7	dry coring @47'
49–50	SAND, some rock fragments, medium-coarse, green and brown, moist (48-49.2')	SW				
51–54	SAND and CLAY, greenish gray-gray, little gravel (49.2-54')	SC	0 (52–56)			driller reports rock sample fell out barrell down hole @ 55' & washed out @ 57'
55–56	ROCK (Diorite?)			8	0/3	
57–60	Unknown		0	9 (58–67)	5/10	
61–63	Weathered DIORITE	GP				
64–69	Coarse SAND, angular, quartz, feldspa, with rock fragments (63-69.4')	SP				very easy drilling/coring @67'

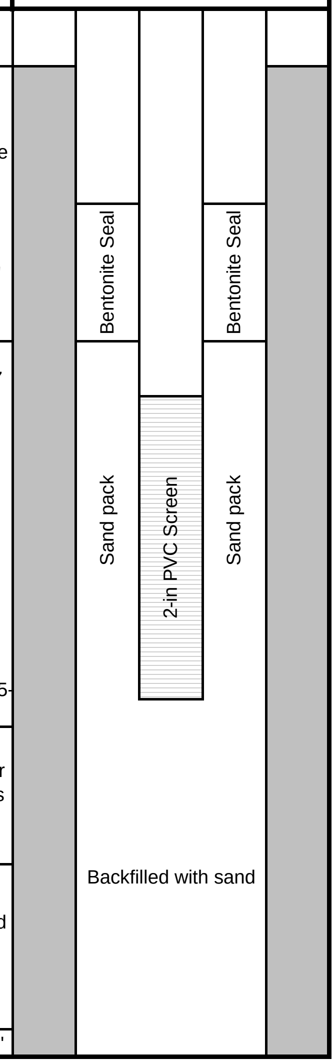
Well as built columns: 6-in Treaded steel ca | Grout | 2-in PVC Casing | Grout | 6-in Treaded steel ca

Boring Log

Project:	Former PSC Site	Start Date:	8/18/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	107'
Location Code:	RIMW-26	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-26 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
70	DIORITE, fresh, (GRANODORITE), plagioclase,					@67
71	hornblende, biotite, pyroxine (69.4-107')					
72						very hard , TD-10" borehole install 6"ID steel casing @70.8' bgs
73				10	8/10	
74						
75		BR				
76						
77						
78						
79	becomes broken-very broken @ 79'					
80						
81						
82		BR-VBR		11	10/10	TD 6" 8/18/07
83						
84	becomes broken-blocky @ 84.6'		NA			
85						
86						
87						
88		BR-BL				
89						
90						
91	broken zone (91.5-92.1')					
92		BR		12	10/10	
93						high < frac 98.5-99.3'
94						
95		BR-BL				
96						low< weathered fracs 99.8 - 100.1'
97	becomes very broken, slightly weathered, staining, pitted @ 97.4'					
98						
99						
100		VBR				
101	fresh @ 101.3'					
102				13	10/10	Driller reported water loss @ 100'
103		BR				
104						
105		VBR				
106		BR				
107						TD-107'



Boring Log

Project:	Former PSC Site	Start Date:	8/19/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	87'
Location Code:	RIMW-27	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-27 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
1	CLAY with some gravel, red-brown, moist, stiff (FILL)	FILL		1	7/7	
2			0			
3						
4						
5			0			
6						
7	SAND & GRAVEL, gray, coarse (6-6.6')					
8	CLAY, brown, saturated, soft (6.6-14.5')	CL	0	2	10/10	(hand auger 7-10')
9	medium sand lens (8-8.5')					
10						
11			43.6			
12						
13			7.8			
14						
15	CLAY with very fine grained sand, dark greenish gray, moist, medium stiffness (14.5-16.6')	CL	1.6			
16						
17	SILT some clay, dark gray, very stiff, low plasticity (16.6-18')	ML				
18			0	3	10/10	
19	SAND with silt & GRAVEL (SAPROLITE), gray-green, dense	SW				
20						relatively hard coring
21	SAND with silt, gray with little yellow-brown, saprolite, dense, dry (weathered rock?)	SM				
22			0			
23						
24						
25			0			
26						

Boring Log

Project:	Former PSC Site	Start Date:	8/19/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	87'
Location Code:	RIMW-27	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-27 Well as built

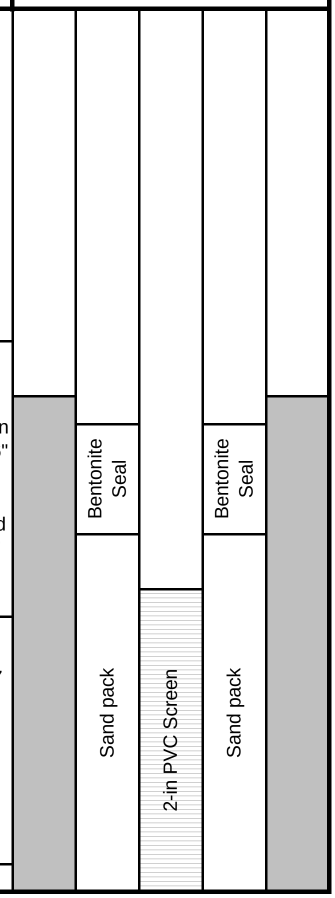
Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks	6-in Threaded steel casing	Grout	2-inch PVC Casing	Grout	6-in Threaded steel casing
27	Severely Weathered Rock (DIORITE)	GP									
28				4	2/10	Fines washed out, coring with water					
29											
30											
31											
32											
33											
34											
35											
36											
37											
38				5	3/10						
39											
40											
41											
42											
43						6" of rock core in sample @ 42'					
44											
45											
46											
47											
48	Partially Weathered DIORITE	VBR/ GP		6	5/10						
49											
50											
51											
52											
53											
54											
55											

Boring Log

Project:	Former PSC Site	Start Date:	8/19/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	87'
Location Code:	RIMW-27	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-27 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
56	Quartz/Feldspa veins (weathered out) @ 55.6'					
57			NA			
58						
59						
60						
61	DIORITE, weathered, very broken (60-65.4')					
62						
63		VBR		7	3.5/10	
64						
65						
66	DIORITE, fresh-slightly weathered, orthoclase, hornblende, biotite, pyroxine (65.4-78.6')					
67						
68						very hard drilling, no return water, 6" steel casing installed @69.1'
69						
70						
71						
72		BR/ VBR		8	9/10	
73						
74						
75						
76						
77						
78						6" TD 77' 8/19/07
79						
80	SAND, medium-coarse, with gravel, gray-olive green, saturated (78.6-80.6')	SP				
81						
82	GABBRO?, black-dark green, fresh- slightly weathered, pyroxine, hornblende (80.6-83.8')					
83		BR		9	10/10	
84						
85	SAND, medium-coarse, with gravel, some silt, saturated (83.8-86.5')	SP				
86						
87	CLAY, black with sand, dry, hard (86.5-87')	CL				TD-87'



Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	82'
Location Code:	RIMW-28	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-28 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
1	CONCRETE (0-0..6')					
2	CLAY, yellow-red, slightly moist, stiff (0.6-2.8')	CL	20.4			
3						
4	SAND with silt, yellow-green, fine-medium, loose, dry (2.8-7')		24.6	1	6/7	
5						
6	becomes gray-green @ 5.4'		98.7			
7	SAND with silt, fine-medium, (SAPROLITE), slightly moist, loose-medium density, green-grayish green					
8			190			Strong solvent odor
9						
10			69.7			
11						
12		SM	54.9	2	10/10	
13						
14						
15			10.1			
16						
17						
18			26.3			
19						
20						
21			11.1			
22			23.7	3	10/10	
23						
24		SM/SP				
25			37			
26						
27	SAPROLITE/SAND, dense-very dense, saturated					
28			0			
29						
30			0			
31						
32				4	10/10	

Well as built columns: 6-in Treaded steel casing | Grout | 2-inch PVC Casing | Grout | 6-in Treaded steel casing

Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	82'
Location Code:	RIMW-28	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-28 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks	Well as built
33	becoming dry @ 32'		0	4	10/10		
34							
35		SP					
36			0				
37							
38			0				
39							
40				5	4/5		
41			0			TD-10" borehole, install 6" casing @ 46'	
42							
43	DIORITE, slighlty weathered-fresh, medium-coarse xstalline, plagioclase, hornblende, biotite, white, black and dark green (42-51.8')						
44							
45				6	5/5		
46							
47	becomes fresh, broken @ 46'					vert fracs 46.0-	
48							
49							
50		BR		7	5/5	TD-6" Resumed coring 8//23/07 @ 52'	
51							Bentonite Seal
52							
53	GRANODIORITE, fresh-slighlty weathered, orthoclase, hornblende, biotite, pyroxine, medium-coarse, xstalline, pink, black & dark green						
54							
55				8	3.8/5		
56						veritcal frac 57.3-58.1'	
57							
58		VBR (57.8-59.4')					
59						veritcal frac 58.9-59.8'	Sand pack
60							-inch PVC Screen
61		BR					
62			NA	9	10/10	veritcal frac 60.6-61.8'	
63		BR-VBR					
64							

Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	82'
Location Code:	RIMW-28	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-28 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks	Well as built
65	feldspar/laumonite precipitate on fractured faces	BR				multiple high < fracs 64.5-67.5'	2
66							
67							
68				10	10/10		
69		BL					
70							
71						Probably mech break @ 73'	
72							
73							
74		VBR					
75	No apparent weathering on fractured face @ 73.2'	BR				mech break @ 77'	Backfilled with sand
76							
77							
78		VBR		11	5/5	vert frac 78.0-82.0'	
79							
80		BL					
81							
82						TD-82'	

Boring Log - RIMW-29

Project:	Former PSC Site	Start Date:	8/19/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	82'
Location Code:	RIMW-29	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-29 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
1	GRAVEL (0-0.5')					
2	CLAY, with medium sand, some gravel, brown-red, dry, very stiff, low pasticity (0.5-4.6')	CL	0	1	5/7	
3						
4						
5						
6	SILT with fine sand, yellow-brown, medium stiffness, low plasticity (4.6-7')	ML	0			
7						
8	SILT with clay, brown, organic, very moist, high plasticity (7-11.4')		0	2	9.5/10	
9						
10						
11						
12	SAND, fine-medium, little silt, grayish green, loose saturated (11.4-15')	SP	0			
13						
14						
15						
16	SAND, medium-coarse, trace silt, saturated, loose (15-17.5')	SP	0			
17						
18	SAND, dark graying green, moist, medium-coarse, some silt, dense (17.5-20')	SM	0	3	7/6	
19						
20						
21	SAPROLITE, sand with silt, dry, hard (20-21.5')					
22	DIORITE, severely weathered, dry (21.5-23')	GP	0			
23						
24	SAND, fine-coarse, greenish gray, dry, loose (23-31.5')	SP		4	4/4	
25						
26						
27						
28				5	5.5/10	Top 4' washed out during coring run 5
29						
30						
31						
32						

Well as built (columns): 6-inch Threaded Casing | Grout | 2-inch PVC Casing | Grout | 6-inch Threaded Casing

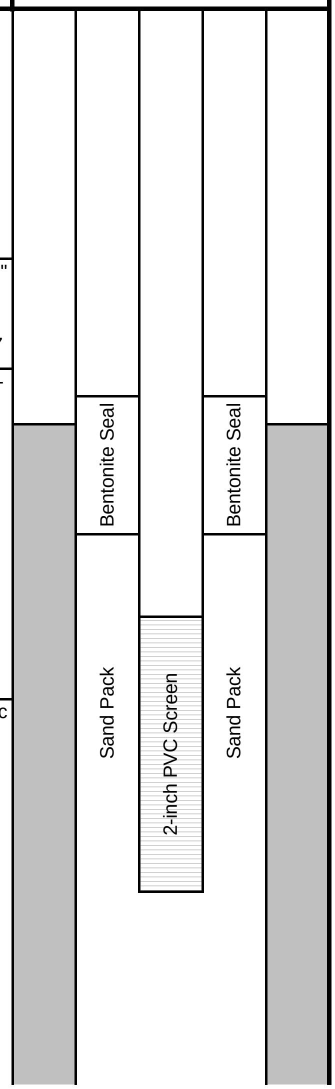
Appendix B-2
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, SC

Boring Log - RIMW-29

Project:	Former PSC Site	Start Date:	8/19/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	82'
Location Code:	RIMW-29	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
33	Severely Weathered DIORITE and saprolite sand,					
34	grayish green and brownish yellow (31.5-42')					
35						
36						
37		GP/SP				
38						
39						
40						
41		SP				
42						Install 6" casing @ 46" 8/20/07
43	DIORITE, fresh with Iron staining on fractured			6	4.5/10	
44	faces, medium grained, orthoclase, hornblende,					
45	pyroxine, biotite					
46						TD-10"-46'
47						
48	beocomes coarse xstalline @ 48'					
49						
50						
51		BR				
52				7	10/10	
53						
54			NA			
55						
56						
57						
58						vert. frac 57.7-58.3
59						
60						
61	DIORITE, green and black, coarse xstalline, fresh-					
62	slightly weathered	VBR				
63				8	10/10	
64	weathered zone	VBR/GP				
65	DIORITE, fresh, coarse (64-70.8')	BR				
66						
67		BL (67-69.4')				
68						
69		VBR (69.4-70.8')				
70						
71						

RIMW-29 Well as built



Boring Log - RIMW-29

Project:	Former PSC Site	Start Date:	8/19/07
Project No.:	20958-50105	End Date:	8/22/07
Logged By:	J. Hofer	Total Depth:	82'
Location Code:	RIMW-29	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks	RIMW-29 Well as built
72	Highly fractured zone (70.8-72.4')	VBR		9	10/10		
73	DIORITE, fresh, coarse, very little fracturing (72.4-82')	BL (72.4-76')					Backfilled with sand
74							
75							
76							
77		BR				vert. frac 77.3-78.3	
78				10	5/5		
79							
80							
81							
82						TD-82'	

Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-20	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-30 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
1	SAND with silt, brown loose, fine- very fine-	SM				
2	SILT with fine sand, brown-yellow, brown, stiff, dry					
3						
4				1	7/7	
5		ML				
6						
7						
8	SAND, fine-medium with silt, medium density, grey green and yellow brown, moist SAPROLITE (biotite, quartz, feldspar, hornblende) (starts @ 7.5')					
9						
10						
11						
12						
13	becomes dry	SM		2	10/10	
14						
15						
16						
17						
18	becoming coarse dense					
19		SP				
20						
21	SAPROLITE, sand, medium-coarse, white, black, green, slightly moist, (biotite, hornblende, feldspar)					
22						
23				3	10/10	
24						
25						
26						
27		SP				
28						
29						
30			0			
31						
32				4	10/10	
33						

Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-20	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-30 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
34	Grading to severely weathered rock (DIORITE), gravel with sand and silt					
35						
36						
37		GP				
38						
39						
40						
41	Weathered GRANODIORITE Gravel with sand					coring with water, fines washed out
42				5	2/10	
43						
44						
45						
46						
47						
48						
49						
50		GP				hard coring
51						
52				6	1.5/10	
53						
54						
55						softer drilling
56						
57						
58						
59						
60						
61	Weathered DIORITE/GRANODIORITE, quartz, hornblende, feldspar, biotite, poss. garnet, (GRAVEL with sand)					
62				7	1.5/10	
63		GP/SP				
64						
65						

Well as built: Grout | 2-in PVC casing | Grout

Boring Log

Project:	Former PSC Site	Start Date:	8/20/07
Project No.:	20958-50105	End Date:	8/23/07
Logged By:	J. Hofer	Total Depth:	133'
Location Code:	RIMW-20	Abandonment:	
Location:	Rock Hill, South Carolina	Latitude	
Driller:	Jimmy Hall: Boart-Longyear	Longitude:	
Method:	Sonic		

RIMW-30 Well as built

Depth (ft)	Description of Materials	USCS/ Litho	Screening Results (ppm)	Core Run	Recovery (ft)	Remarks
66–81	No recovery, (sand?)	SP	NA			
68–77				8	0/10	cored with water fines washed out
78–87				9	2/10	Stop 8/20/07
82–95	Weathered (Moderate-Severe) DIORITE/GRANODIORITE, appears to becoming more competent rock, (GRAVEL with sand)	GP/SP				
88–97				10	2.8/10	Start 8/21/07; hard coring
96–97	GRANODIORITE, fresh-slightly weathered, hard quartz, feldspar, hornblende, trace biotite, trace	BR				

Well as built: Bentonite Seal (78–80); Sand Pack (81–97); 2-inch PVC Screen (83–97)

Appendix C
Geophysical Survey Reports

Borehole Geophysical Survey Report
PSC Site
Rock Hill, South Carolina

Date of Survey: December 13-18, 2006

James Ursic
Superfund Division – Innovative Systems and Technology Branch
Field Services Section
United States Environmental Protection Agency
Region 5
Chicago, Illinois

Introduction

Requests for a borehole geophysical survey were presented to Kevin Beswick of U.S. Environmental Protection Agency (USEPA) Region 4 Office of Regional Counsel by Judy Canova from the South Carolina Department of Health and Environmental Control. The request sought assistance from Region 5 to provide borehole geophysical surveys to aid positioning of well screens during a well construction phase, in addition to gathering geophysical information from existing on-site wells. The survey commenced on December 13 and continued consecutively through the18, 2006 at the PSC - Thermalkem site in Rock Hill, South Carolina. Funding for the borehole geophysical survey was provided by Region 4 of USEPA.

Geophysical Methods

Data were collected using a borehole logging platform mounted in a modified four wheel drive Suburban vehicle owned and operated by Region 5 USEPA. The vehicle has two on-board geophysical logging collection systems which run independently through a single Century winch system. The two data collection systems are a Century Geophysical unit and a Mount Sopris Instruments unit.

A combination of five logging tools were used at the site which included Century probes: 9041, 9060, 9065 and Mount Sopris probes 2EMA and 2IDA. Table 1 provides information describing each of the tools, while Appendix A presents a chronology of tool applications for each well investigated. Table 2 is a summary of which logging tools were used at each well.

Table 1
Geophysical Tool Descriptions

Probe →	**9041** Multi-Parameter Formation & Resistivity	**9060** Slim-hole Natural Gamma (without SP option)	**9065** 3-Arm Caliper	**2EMA** Formation Conductivity (Electromagnetic Induction or EM)	**2IDA** Multi-Parameter Fluid Chemistry
General Purpose	Geologic & limited fluid data	Clay characterization	Hole & casing diameter	Geologic conductive-resistive intervals	General fluid chemistry parameters
Operating System	Century	Century	Century	Mount Sopris	Mount Sopris
Diameter	2.5”	1.4”	1.7”	1.5”	2”
Length	84”	80”	61.6”	62.2”	24.1”
Parameters Measured	Natural gamma Temperature Fluid resistivity Spontaneous Potential Single Point Resistance Normal resistivity: 16 inch 64 inch Lateral resistivity: 48 inch	Natural gamma	Diameter	Collective geologic/fluid conductivity	Pressure (depth) Temperature Fluid Conductivity Oxygen Redox Chloride Ammonia Nitrate (note NO_3 & NH_4 sensors are interchangeable – cannot be operated simultaneously)

Table 2
Geophysical Tools Applied in Various Wells at PSC Site

WELL ID ↓	**9065** (Century Inc.) 3-Arm Caliper Tool	**9041** (Century Inc.) Multi Parameter Formation & Resistivity Tool	**9060** (Century Inc.) Slim-Hole Natural Gamma Tool	**2EMA** (Mount Sopris Inc.) Formation Conductivity (EM) Tool	**2IDA** (Mount Sopris Inc.) Multi Parameter Fluid Analysis Tool
RIMW14	X	X		X	X^{1}
PW3	X	X		X	X^{1}
RIMW13	X	X		X	$X^{1,2}$
RIMW18	X	X		X	$X^{1,2}$
P3				X	$X^{1,2}$
OB109B			X	X	X^{1}
W1				X	X^{1}
BP1B			X	X	$X^{1,2}$
MW113B			X	X	$X^{1,2}$
MW100			X		$X^{1,2}$
RIPZ2	X	X		X	$X^{1,2}$
RIMW19	X	X		X	$X^{1,2}$
MW122B			X	X	$X^{1,2}$
EW4			X		$X^{1,2}$
MW123B			X		$X^{1,2}$

$X^{1} = NO_3$ $X^{2} = NH_4$

Note that not all tools could be used in each well due to varying well diameters and well construction conditions (refer to tool diameters; Table 1). For example, certain parameters of the 9041 tool (i.e. spontaneous potential, single point resistance, normal and lateral resistivity) require open hole (no casing) and fluid conditions to operate properly. Although fluid parameters can be obtained in wells with or without casing, those data obtained without casing or inside screen intervals will be most representative of formation conditions. Generally, fluid measurements obtained within casing are measuring stagnant conditions, unless recently purged. It is also important to note that all fluid measurements can be effected by multiple tool traverses which agitates and disrupts the fluid column each time a tool traverse is initiated.

Natural gamma and caliper measurements can be obtained through all commonly used well casings and open hole conditions. Formation or electromagnetic (EM) conductivity measurements can be obtained through commonly used plastic casing material and within open hole conditions, it cannot be used within metal casing. Any metal near the EM induction tool will interfere with the data; this includes any metal external to PVC casing such as metal well casing stabilizers within the annulus between the casing and borehole wall.

Field Procedures

Standardization checks for various tools were conducted as follows: caliper tool (9065) was evaluated against eight and four inch diameter rings; data were 2910 and 1720 counts per second respectively. Natural gamma readings for the 9060 and 9041 were evaluated using a check source; data were 260 and 210 counts per second respectively. Background for each natural gamma tool was 4 and 10 counts per second respectively. The 2IDA tool sensors were evaluated against water collected from a local hotel in Rock Hill. Conductivity ranged between 103.86 and 118.367 uS/cm; Conductivity at 20 degrees Centigrade ranged between 100.161 and 112.760 uS/cm; redox ranged between 240-310mV and 219-230 mV; oxygen values remained constant at zero ppm. Chloride ranged between 141.2 and 148.60 mg/L; nitrate ranged near 191 mg/L; and ammonia ranged near 85 mg/L. Formation conductivity (EM) data were not collected until the readings stabilized after being lowered into the well and electronic components had time acclimate to borehole temperatures. Time periods required to acclimate with down hole conditions were noted on log headers.

The primary goal of the survey was to log wells RIMW13, RIMW14, RIMW18, RIMW19 and RIPZ2 as initial drilling activities were completed at each location. However, as time permitted between drilling operations, other previously existing wells at the site were also logged. These included wells BP1B, EW4, MW100, OB109B, MW113B, MW122B, MW123B, PW3, P3 and W1. Attempts were made to log MW120B and MW121B but overgrown vegetation and debris within the gravel roadway prohibited vehicle access to the wells (see photographic log).

Sequencing the order of tool applications were established by the logging operator based on well conditions reported by the driller, time constraints, drilling schedules, casing conditions and water levels. Wells with stability concerns were usually logged with a caliper tool for the initial traverse. When possible, tools measuring water parameters were logged moving down hole to fully expose sensors without backwash issues and also to avoid additional mixing of the fluid column. Draft well logs were provided to on-site officials as the logging process was completed at each well.

Data Processing

Well log data for on-site draft logs and this report were created using WellCAD version 4.1. In some cases a smoothing algorithm (moving average) built into WellCAD program was applied for easier comprehension of certain logs, most often natural gamma logs. When such an algorithm was used, a note was made on the log header as well as the range of the moving average calculation.

For those tools having multiple sensors, note that not all data terminates at the same elevation, this is due to varied sensor locations throughout the length of the tool. The most varied sensor separations can be seen from data obtained by the 9041 tool.

Table 3 summarizes how various data sets of well log information were combined to display data for each well. Note that tool 2IDA can be configured using two optional modes, either with an ammonia sensor or nitrate sensor. Both of these sensors use the same sensor base and thus cannot be used at the same time, therefore it requires two separate traverses if both sets of data are desired. When both sets of options are obtained, the acquisition process results in the duplication of the remaining multiple sensor data as the second traverse is completed. Minor differences will exist when comparing the duplicate data from each traverse due to the agitation of well fluids from the previous traverses.

Table 3
Presentation Combinations for Geophysical Log Data

WELL ID ↓	Log Combinations **9041 & 9065**	Log Combinations **Partial 9041; 9065 & 2EMA**	Log Combinations **9060 & 2EMA**	Log Presentation **2EMA**	Log Presentation **9060**	Log Presentation **2IDA** ^{1}	Log Presentation **2IDA** ^{2}	Total Log Presentation Sets Per Well
RIMW14	X	X				X^1		3
PW3	X	X				X^1		3
RIMW13	X	X				X^1	X^2	4
RIMW18	X	X				X^1	X^2	4
P3				X		X^1	X^2	3
OB109B			X			X^1		2
W1				X		X^1		2
BP1B			X			X^1	X^2	3
MW113B			X			X^1	X^2	3
MW100					X	X^1	X^2	3
RIPZ2	X	X				X^1	X^2	4
RIMW19	X	X				X^1	X^2	4
MW122B			X			X^1	X^2	3
EW4					X	X^1	X^2	3
MW123B					X	X^1	X^2	3

$X^1 = NO_3$ $X^2 = NH_4$

PSC Site Rock Hill, SC
Well Log Location Map

Aerial Photograph: Google Earth

N

Figure 1

Results

Combinations of forty seven log sets are attached to this report presenting all data collected at the site. Each combination was grouped in a manner which complemented similar parameters, some of which may have been duplicated and incorporated into other data sets such as caliper and natural gamma logs added to an EM log. When possible, photographs were taken of logging sites in addition to GPS coordinates if acceptable satellite reception conditions existed. A Trimble Pathfinder Pro and Recon data recorder were used to acquire GPS data.

Most all measurements were referenced from the top of the inner casing, when present, or the outer casing during logging operations. The height of the various above/below ground risers/casings were also measured and noted on log headers so that references to ground level could be established. However, all final logs were referenced to ground surface to avoid confusion with any prior temporary casings. Locations of wells logged are noted on Figure 1.

Generally all of the new wells drilled had water levels which stabilized within a day. However, well RIMW14 required over a day to stabilize and the following rates were recorded:

Date	Time	DTW* (feet)
12/13	10:45	81.81
12/13	13:45	69.42
12/13	13:56	68.28
12/14	08:15	20.25

* = Depth to Water

Some wells, such as MW122B, have PVC riser casing and stainless steel well screens, which would limit acquiring EM and other electric logs. When such circumstances occurred, they were noted on the log header. When possible, EM logs were recorded the entire length of the hole but data were omitted after the metal screen was encountered due to interference.

Locations of well screens, or proposed placement locations, were noted on well logs to better assist the reader in log interpretation.

Conclusions

Please refer to the attached well logs.

Newly drilled wells (RIMW13, RIMW14, RIMW18, RIMW19 and RIPZ2) which were surveyed with borehole geophysical tools also had fluids sampled at specific intervals using a packer assembly. The packer assembly, operated by the drilling contractor, used a sampling interval of ten feet between inflatable packers which isolated fluids beyond the ten foot sampling area (see photo log). Well RIMW19 was tested with packer sampling intervals set at 63'-75' and 76'-88'. Analytical data from sampled fluids and geophysical anomalies observed with borehole geophysical instruments provided information needed to locate well screen intervals. Note that screen locations were referenced and measured from the top of the outer casing at the time drilling was completed, not from the final well head completion configuration (see photo log for clarifications). The proposed screen intervals are as follows:

RIMW13	72' to 82' feet from ground surface (GS)
RIMW14	85' to 75' feet from ground surface (GS)
RIMW18	45.5' to 55.5' feet from ground surface (GS)
RIMW19	70' to 80' feet from ground surface (GS)
RIPZ2	63 to 73 feet from ground surface (GS)

(GS) = Ground Surface

Some of the existing wells logged (P3, BP1B and MW100) extended beyond the documented screen interval and it is unclear from previous well completion records if sumps exist below the screen interval. If sumps do not exist, there are minor discrepancies with screen locations.

Two of the flush mount wells (OB109B and 113B) terminated at a depth before the end of the documented screen interval. If well construction documents are correct, these wells probably have accumulated sediment within the screen interval.

A final observation concerning well MW123B was made in reference to log responses from the 2IDA tool. It appears that conductivity, temperature, ammonia, chloride, redox and nitrate all seem to have some changes at ten foot intervals (18.63', 28.63' and 38.63' from ground surface). If well construction logs indicate that ten foot sections of casing were used to construct the well and jointed together at these locations, the possibility exists that the casing joints may be leaking. If this observation can be refuted, the log responses may only be a coincidence. If additional evidence is needed, a video log of the well casing would provide data as to the location of casing joints.

Any questions regarding this report can be directed to:

James Ursic
77 West Jackson Boulevard
Mail Stop SRT-4J
Chicago, IL 60604
312.353.2536
Ursic.James@EPA.GOV

Attachments: Appendix A, B and C
Well Logs (47 logs)

APPENDIX A

Chronology of Geophysical Logging Events
PSC Site Rock Hill, South Carolina

Date	Tool*	Time	Well	Traverse Direction	Scale Options	Parameter Option	Well Photo
12/13							
	9065	10:12	test				
	9065	N/A	RIMW14	Down			Yes
	9065	10:53	RIMW14	Up**			
	9041	11:34	RIMW14	Down			
	9041	N/R	RIMW14	Up			
	9041	N/R	RIMW14	Down			
	9041	12:22	RIMW14	Up			
	2EMA	13:43	RIMW14	Down	1000mS/m		
	2EMA	13:50	RIMW14	Up	1000mS/m		
	9065	N/A	PW3	Down			
	9065	14:39	PW3	Up			Yes[x]
	9041	15:19	PW3	Down			
	9041	N/R	PW3	Up			
	2EMA	16:00	PW3	Down	1000mS/m		
	2EMA	16:05	PW3	Up	1000mS/m		
	2IDA	16:30	PW3	Down	0-64 mg/l***	NO_3	
	2IDA	N/R	PW3	Up			
12/14							
	9041	08:31	RIMW14	Down			Yes
	9041	08:42	RIMW14	Up			
	2IDA	10:04	RIMW14	Down	0-64 mg/l***	NO_3	
	2IDA	10:08	RIMW14	Up	0-6400 ug/l***	NO_3	
	2EMA	12:12	RIMW13	Down	1000mS/m		Yes
	2EMA	12:19	RIMW13	Up	1000mS/m		
	2EMA	12:25	RIMW13	Down	1000mS/m		
	2EMA	12:32	RIMW13	Up	1000mS/m		
	2IDA	12:48	RIMW13	Down	0-6400 ug/l***	NO_3	
	2IDA	12:52	RIMW13	Up	0-6400 ug/l***	NO_3	
	2IDA	13:03	RIMW13	Down	0-6400 ug/l***	NH_4	
	2IDA	13:09	RIMW13	Up	0-6400 ug/l***	NH_4	
	9065	N/A	RIMW13	Down			
	9065	13:24	RIMW13	Up			
	9041	13:40	RIMW13	Down			
	9041	14:05	RIMW13	Up			
12/15							
	9065	N/A	RIMW18	Down			Yes
	9065	09:00	RIMW18	Up			
	9041	09:25	RIMW18	Down			
	9041	09:33	RIMW18	Up			
	2EMA	10:38	RIMW18	Down	1000mS/m		
	2EMA	10:43	RIMW18	Up	1000mS/m		
	2IDA	10:56	RIMW18	Down	0-6400 ug/l***	NH_4	
	2IDA	11:00	RIMW18	Up	0-6400 ug/l***	NH_4	
	2IDA	11:19	RIMW18	Down	0-6400 ug/l***	NO_3	
	2IDA	N/R	RIMW18	Up			

[x] photographs taken 8/2007

APPENDIX A (continued)

Date	Tool*	Time	Well	Traverse Direction	Scale Options	Parameter Option	Well Photo
12/15							
	2IDA	15:15	P3	Down	0-6400 ug/l***	NO_3	Yes[x]
	2IDA	15:18	P3	Up	0-6400 ug/l***	NO_3	
	2IDA	15:25	P3	Down	0-6400 ug/l***	NH_4	
	2IDA	15:28	P3	Up	0-6400 ug/l***	NH_4	
	2EMA	15:53	P3	Down	1000mS/m		
	2EMA	15:57	P3	Up	1000mS/m		
12/16							
	2IDA	09:10	OB109B	Down	0-6400 ug/l***	NO_3	Yes[x]
	2IDA	09:14	OB109B	Up	0-6400 ug/l***	NO_3	
	2EMA	09:48	OB109B	Down	1000mS/m		
	2EMA	09:53	OB109B	Up	1000mS/m		
	9060	10:07	OB109B	Down			
	9060	10:15	OB109B	Up			
	2IDA	11:07	W1	Down	0-6400 ug/l***	NO_3	Yes
	2IDA	11:09	W1	Up	0-6400 ug/l***	NO_3	
	2EMA	11:38	W1	Down	1000mS/m		
	2EMA	11:41	W1	Up	1000mS/m		
	2IDA	13:33	BP1B	Down	0-6400 ug/l***	NO_3	Yes
	2IDA	13:36	BP1B	Up	0-6400 ug/l***	NO_3	
	2IDA	13:53	BP1B	Down	0-6400 ug/l***	NH_4	
	2IDA	13:58	BP1B	Up	0-6400 ug/l***	NH_4	
	2EMA	14:22	BP1B	Down	1000mS/m		
	2EMA	14:29	BP1B	Up	1000mS/m		
	9060	14:42	BP1B	Down			
	9060	14:46	BP1B	Up			
	2IDA	16:07	MW113B	Down	0-6400 ug/l***	NH_4	Yes
	2IDA	16:10	MW113B	Up	0-6400 ug/l***	NH_4	
	2IDA	16:20	MW113B	Down	0-6400 ug/l***	NO_3	
	2IDA	16:23	MW113B	Up	0-6400 ug/l***	NO_3	
	2EMA	16:46	MW113B	Down	1000mS/m		
	2EMA	16:49	MW113B	Up	1000mS/m		
	9060	16:54	MW113B	Down			
	9060	16:58	MW113B	Up			
12/17							
	2IDA	08:11	MW100	Down	0-6400 ug/l***	NO_3	Yes
	2IDA	08:14	MW100	Up	0-6400 ug/l***	NO_3	
	2IDA	08:25	MW100	Down	0-6400 ug/l***	NH_4	
	2IDA	08:27	MW100	Up	0-6400 ug/l***	NH_4	
	9060	08:50	MW100				
	9060	08:54	MW100				
	9065	N/A	RIPZ2	Down			Yes
	9065	12:00	RIPZ2	Up			
	9041	12:36	RIPZ2				
	9041	12:42	RIPZ2				
	2EMA	13:14	RIPZ2	Down	1000mS/m		
	2EMA	13:21	RIPZ2	Up	1000mS/m		
	2IDA	13:33	RIPZ2	Down	0-6400 ug/l***	NH_4	

[x] photographs taken 8/2007

APPENDIX A (continued)

Date	Tool*	Time	Well	Traverse Direction	Scale Options	Parameter Option	Well Photo
12/17							
	2IDA	13:40	RIPZ2	Up	0-6400 ug/l***	NH_4	
	2IDA	13:52	RIPZ2	Down	0-6400 ug/l***	NO_3	
	2IDA	13:58	RIPZ2	Up	0-6400 ug/l***	NO_3	
	9065	N/A	RIMW19	Down			Yes
	9065	15:48	RIMW19	Up			
	9041	16:11	RIMW19	Down			
	9041	16:22	RIMW19	Up			
	2EMA	17:03	RIMW19	Down	1000mS/m		
	2EMA	17:08	RIMW19	Up	1000mS/m		Yes
	2IDA	17:20	RIMW19	Down	0-6400 ug/l***	NO_3	
	2IDA	17:27	RIMW19	Up	0-6400 ug/l***	NO_3	
	2IDA	17:38	RIMW19	Down	0-6400 ug/l***	NH_4	
	2IDA	17:44	RIMW19	Up	0-6400 ug/l***	NH_4	
12/18							
	2IDA	10:03	MW122B	Down	0-6400 ug/l***	NH_4	Yes
	2IDA	10:07	MW122B	Up	0-6400 ug/l***	NH_4	
	2IDA	10:15	MW122B	Down	0-6400 ug/l***	NO_3	
	2IDA	10:18	MW122B	Up	0-6400 ug/l***	NO_3	
	2EMA	10:43	MW122B	Down	1000mS/m		
	2EMA	10:46	MW122B	Up	1000mS/m		
	9060	10:52	MW122B	Down			
	9060	10:55	MW122B	Up			
	2IDA	12:26	EW4	Down	0-6400 ug/l***	NO_3	Yes
	2IDA	12:31	EW4	Up	0-6400 ug/l***	NO_3	
	2IDA	12:55	EW4	Down	0-6400 ug/l***	NH_4	
	2IDA	13:01	EW4	Up	0-6400 ug/l***	NH_4	
	9060	13:07	EW4	Down			
	9060	13:12	EW4	Up			
	2IDA	15:32	MW123B	Down	0-64 mg/l***	NH_4	Yes
	2IDA	15:36	MW123B	Up	0-64 mg/l***	NH_4	
	2IDA	15:53	MW123B	Down	0-6400 ug/l***	NO_3	
	2IDA	15:56	MW123B	Up	0-6400 ug/l***	NO_3	
	9060	16:08	MW123B	Down			
	9060	16:11	MW123B	Up			

* Tool designators

- 9041 Century Geophysical multi-parameter formation & resistivity tool
- 9060 Century Geophysical slim hole natural gamma tool (without SP option)
- 9065 Century Geophysical 3-arm caliper tool
- 2EMA Mount Sopris formation conductivity tool (electromagnetic induction)
- 2IDA Mount Sopris multi-parameter water chemistry tool

** Traverse selected for print-out

*** Applies only to Idronaut fluid conductivity value

N/R Not recorded
N/A Not applicable

APPENDIX B
Well Information; Rock Hill, South Carolina

Well	New or Old Well	Old Well Style	Outer Casing Dia.	Inner Casing Dia. & Type	End Of Casing From GS	Outer Casing Stickup From GS	Inner Casing Distance From Top Open Outer Casing	DTW From TIC or TOC; Time; Date	Well Depth From TIC or TOC	Screen Interval From GS or (proposed)	TOC Elevation	Latitude Longitude
RIMW14	New	N/A	6”	None	46.4’	0.20’	N/A	20.25’ TOC ~08:15 12/14	86.23’ TOC	(65’-75’)	N/A	34.88725°N -81.07275°W
PW3	Old	Stickup	6”	None	20.5’	2.90’	N/A	12.53’ TOC ~14:30 12/13	58.24’ TOC	N/A	523.98’	34.88748138°N -81.07422663°W
RIMW13	New	N/A	6”	None	37’	0.56’	N/A	44.71’ TOC ~12:00 12/14	101.55’ TOC	(72’-82’)	N/A	34.88914°N -81.07303°W
RIMW18	New	N/A	6”	None	39’	1.60’	N/A	12.90’ TOC ~08:45 12/15	79.26’ TOC	(45.5’-55.5’)	N/A	34.88844°N -81.07347°W
P3	Old	Stickup	N/A	2” PVC	30’	0’	-0.2	14.25’ TIC ~15:00 12/15	34.49’ TIC	30’ to 35’	526.12’	34.88858218°N -81.07199365°W
OB109B	Old	Flush	N/A	2” pvc to 51’	51’	0’	-0.4’	18.55’ TIC ~09:00 12/16	60.51’ TIC	SS Screen 51’ to 52’	530.38’	34.88801120°N -81.07295565°W
W1	Old	Stickup	N/A	4” PVC	24’	2.77’	-2.4	25.10’ TOC ~11:00 12/16	31.85’ TOC	24’ to 29’	537.66’	34.88917554°N -81.07304471°W

Well	New or Old Well	Old Well Type	Outer Casing Dia.	Inner Casing Dia. & Type	End Of Casing From GS	Outer Casing Stickup From GS	Inner Casing Distance From Top Open Outer Casing	DTW From TIC or TOC; Time; Date	Well Depth From TIC or TOC	Screen Interval From GS or (proposed)	TOC Elevation	Latitude Longitude
BP1B	Old	Stickup	N/A	2" PVC	28'	2.66'	+0.15	13.59' TIC ~13:00 12/16	39.49' TIC	28' to 38'	523.74'	34.88892596°N -81.07072095°W
MW113B	Old	Flush	N/A	2" PVC	34'	0'	-0.32'	12.28' TIC ~15:45 12/16	40.67' TIC	34' to 44'	521.20'	34.88800182°N -81.07116168°W
MW100	Old	Stickup	N/A	4" PVC & galv. steel	32'	3.4'	-0.73'	17.19' TIC ~08:00 12/17	40.45' TIC	32' to 37'	530.04'	34.88979593°N -81.07125209°W
RIPZ2	New	N/A	4" PVC	N/A	40'	1.88'	N/A	8.67' TOC ~11:50 12/17	76.85' TOC	(63' – 73')	N/A	34.887718°N -81.070799°W
RIMW19	New	N/A	6" steel	N/A	55'	0.67'	N/A	18.60' TOC ~15:00 12/17	96.26' TOC	(70' - 80')	N/A	34.88887421°N -81.07201329°W
MW122B	Old	Stickup	N/A	2" PVC	25.5'	3.7'	-0.02'	10.04' TOC ~09:50 12/18	38.89' TOC	SS Screen 25.5' to 35.5'	520.32'	34.887378°N -81.070457°W
EW4	Old	Flush	N/A	6" steel	N/A	0'	-0.36'	15.16' TIC ~12:10 12/18	77.40' TIC	N/A	528.18'	34.888632°N -81.072096°W
MW123B	Old	Stickup	N/A	2" SS	39'	2.86'	+0.01	17.48' TIC ~15:15 12/18	51.41' TIC	39' to 49'	529.06'	34.888253°N -81.072554°W

APPENDIX C **Photographic Log; December 13-18, 2006**

RIMW14

RIMW13

RIMW18

W1 (center yellow pipe left of rig)

BP1B

MW113B (view 1)

Photographic Log

MW113B (view 2)

MW100

RIPZ2

RIMW19

MW122B

EW4

Photographic Log

MW123B (left-most well)

MW OB109B (photo taken 8/2007)

MW PW3 (photo taken 8/2007)

MW P3 (photo taken 8/2007)

Photographs continued on next page

Photographic Log

Continued from previous page

Path off main dirt road to MW121B

Continuation of path to MW121B

End of path to MW121B

Path off main dirt road to MW120B

Continuation of path to MW120B

Photographic Log

End of path to MW120B

Extracting core from RIMW19

Continued core extraction: RIMW19

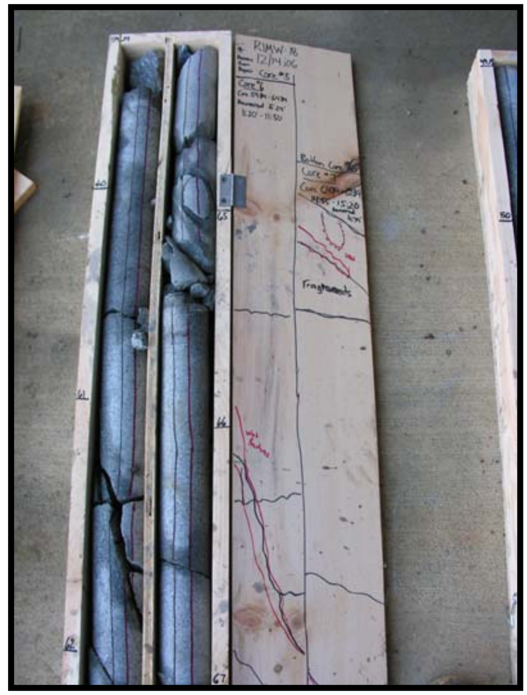
Drill rig

Borehole logging 1 of 2

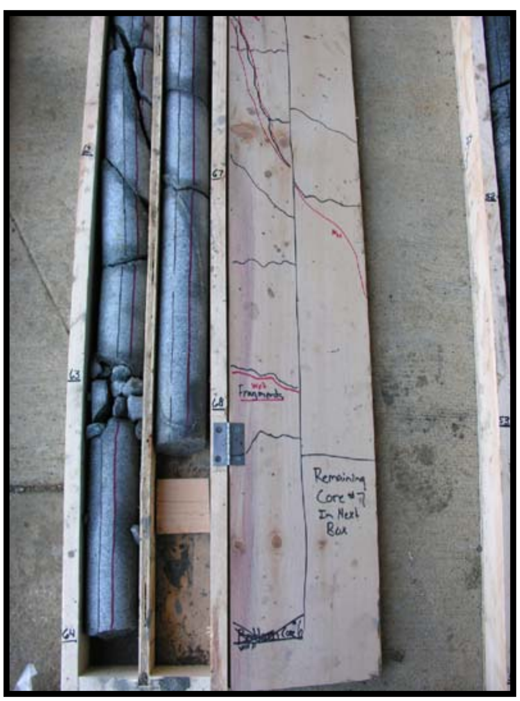
Borehole logging 2 of 2

Photographic Log

Core box for RIMW18 1 of 5



Core box for RIMW18 2 of 5



Core box for RIMW18 3 of 5

Core box for RIMW18 4 of 5

Photographic Log

Core box for RIMW18 5 of 5

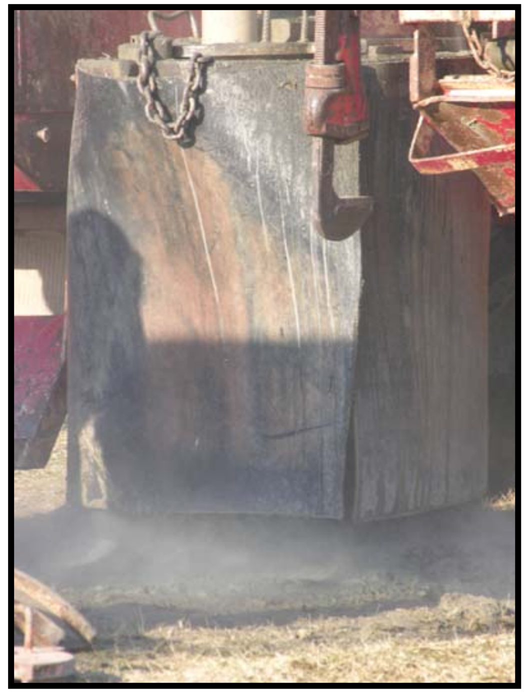
Drilling RIMW13 1 of 15

Drilling RIMW13 2 of 15

Drilling RIMW13 3 of 15

Photographic Log

Drilling RIMW13 4 of 15



Drilling RIMW13 5 of 15

Drilling RIMW13 6 of 15

Drilling RIMW13 7 of 15

Photographic Log

Drilling RIMW13 8 of 15

Drilling RIMW13 9 of 15

Drilling RIMW13 10 of 15

Drilling RIMW13 11 of 15

Drilling RIMW13 12 of 15

Drilling RIMW13 13 of 15

Photographic Log

Drilling RIMW13 14 of 15

Drilling RIMW13 15 of 15

Drill rig at RIMW19 1 of 4

Drilling RIMW19 2 of 4

Photographic Log

Drilling rig at RIMW19 3 of 4

Drill rig at RIMW19 4 of 4

Drill rig operations 1 of 2

Drill rig operations 2 of 2

Photographic Log

Ground Water Sampling 1 of 3

Ground Water Sampling 2 of 3

Ground Water Sampling 1 of 3

Water intakes on 10’ packer assembly

Inflatable bladder (left) water intakes (right)

Lower inflatable bladder of packer assy.

Photographic Log

Ten foot packer assembly

Sampling from packer assy. [1 of 2]

Sampling from packer assy. [2 of 2]

End of Photographs

Borehole Geophysical Survey Report
PSC Site
Rock Hill, South Carolina

Date of Survey: August 22-28, 2007

James Ursic
Superfund Division – Innovative Systems and Technology Branch
Field Services Section
United States Environmental Protection Agency
Region 5
Chicago, Illinois

Introduction

Requests for a borehole geophysical survey were presented to Kevin Beswick of U.S. Environmental Protection Agency (USEPA) Region 4 Office of Regional Counsel by Judy Canova from the South Carolina Department of Health and Environmental Control. This request is the second call for assistance from Region 5 to provide borehole geophysical surveys to aid positioning of well screens during a well construction phase. The first survey was conducted in December, 2006. The survey commenced on August 22 and continued consecutively through the 28, 2006 at the PSC - Thermalkem site in Rock Hill, South Carolina. Funding for the borehole geophysical survey was provided by Region 4 of USEPA.

Geophysical Methods

Data were collected using a borehole logging platform mounted in a modified four wheel drive Suburban vehicle owned and operated by Region 5 USEPA. The vehicle has two on-board geophysical logging collection systems which run independently through a single Century winch system. The two data collection systems are a Century Geophysical unit and a Mount Sopris Instruments unit.

A combination of five logging tools were used at the site which included Century probes: 9041, 9065 and Mount Sopris probes Obi40-2, 2EMA and 2IDA. Table 1 provides information describing each of the tools, while Appendix A presents a chronology of tool applications for each well investigated. Table 2 is a summary of which logging tools were used at each well.

Table 1
Geophysical Tool Descriptions

Probe →	**9041** Multi-Parameter Formation & Resistivity	**Obi40-2** Optical Televiewer	**9065** 3-Arm Caliper	**2EMA** Formation Conductivity (Electromagnetic Induction or EM)	**2IDA** Multi-Parameter Fluid Chemistry
General Purpose	Geologic & limited fluid data	Continuous digital borehole images	Hole & casing diameter	Geologic conductive-resistive intervals	General fluid chemistry parameters
Operating System	Century	Mount Sopris	Century	Mount Sopris	Mount Sopris
Diameter	2.5”	1.6”	1.7”	1.5”	2”
Length	84”	86.16”	61.6”	62.2”	24.1”
Parameters Measured	Natural gamma Temperature Fluid resistivity Spontaneous Potential Single Point Resistance Normal resistivity: 16 inch 64 inch Lateral resistivity: 48 inch	Records color borehole images. requires centralizers	Diameter	Collective geologic/fluid conductivity	Pressure (depth) Temperature Fluid Conductivity Oxygen Redox Chloride Ammonia Nitrate (note NO_3 & NH_4 sensors are interchangeable – cannot be operated simultaneously)

Table 2
Geophysical Tools Applied in Various Wells at PSC Site

WELL ID ↓	**9065** (Century Inc.) 3-Arm Caliper Tool	**9041** (Century Inc.) Multi Parameter Formation & Resistivity Tool	**Obi40-2** (Mount Sopris Inc.) Color Optical Televiewer	**2EMA** (Mount Sopris Inc.) Formation Conductivity (EM) Tool	**2IDA** (Mount Sopris Inc.) Multi Parameter Fluid Analysis Tool
RIMW-20	X	X	X	X	X [1, 2]
RIMW-21	X	X	X	X	X [1, 2]
RIMW-22	X	X	X	X	X [1, 2]
RIMW-23	X	X	X	X	X [1, 2]
RIMW-25	X	X	X	X	X [1, 2]
RIMW-26	X	X	X	X	X [1, 2]
RIMW-28	X	X	X	X	X [1, 2]
RIMW-29	X	X	X	X	X [1, 2]

$X^1 = NO_3$ $X^2 = NH_4$

It is important to note that certain tool parameters can only obtain measurements in specific borehole environments. For example, the 9041 tool (i.e. spontaneous potential, single point resistance, normal and lateral resistivity) requires an open hole (no casing) and fluid conditions to operate properly. Although fluid parameters can be obtained in wells with or without casing, those data obtained without casing or inside screen intervals will be most representative of formation conditions. Generally, fluid measurements obtained within casing are measuring stagnant conditions, unless recently purged. It is also important to note that all fluid measurements can be affected by multiple tool traverses which agitates and disrupts the fluid column each time a tool traverse is initiated.

Natural gamma and caliper measurements can be obtained through all commonly used well casings and open hole conditions. Formation or electromagnetic (EM) conductivity measurements can be obtained through commonly used plastic casing material and within open hole conditions, it cannot be used within metal casing. Any metal near the EM induction tool will interfere with the data; this includes any metal external to PVC casing such as metal well casing stabilizers within the annulus between the casing and borehole wall. The optical televiewer functions best in dry wells or wells with clear fluids. Visibility will be limited in deeper side-wall cavities or vugs where light from the tool's lamps will dissipate with distance.

Field Procedures

Standardization checks for logging tools were conducted in Chicago prior to arrival at Rock Hill. A quick field check was conducted on-site for the optical televiewer when it was received after being shipped from Texas. All tools were operating properly.

The primary goal of the survey was to log wells RIMW-20, RIMW-21, RIMW-22, RIMW-23, RIMW-25, RIMW-26, RIMW-28 and RIMW-29 as initial drilling activities were completed at each location.

Sequencing the order of tool applications were established by the logging operator based on well conditions reported by the driller, time constraints, drilling schedules, casing conditions and water levels. Wells with rock wall stability concerns were usually logged with a caliper tool for the initial traverse to evaluate down hole conditions. When possible, tools measuring water parameters were logged moving down hole to fully expose sensors without backwash issues and also to avoid additional mixing of the fluid column. Draft well logs were provided to on-site officials as the logging process was completed at each well.

Data Processing

Well log data for on-site draft logs and this report were created using WellCAD version 4.1. In some cases a smoothing algorithm (moving average) built into WellCAD program was applied for easier comprehension of certain logs, most often natural gamma logs. When such an algorithm was used, a note was made on the log header as well as the range of the moving average calculation.

For those tools having multiple sensors, note that not all data terminates at the same elevation, this is due to varied sensor locations throughout the length of the tool. The most varied sensor separations can be seen from data obtained by the 9041 tool.

Table 3 summaries how various data sets of well log information were combined to display data for each well. Note that tool 2IDA can be configured using two optional modes, either with an ammonia sensor or nitrate sensor. Both of these sensors use the same sensor base and thus cannot be used at the same time, therefore it requires two separate traverses if both sets of data are desired. When both sets of options are obtained, the acquisition process results in the duplication of the remaining multiple sensor data as the second traverse is completed. Minor differences will exist when comparing the duplicate data from each traverse due to the agitation of well fluids from the previous traverses.

Table 3
Presentation Combinations for Geophysical Log Data

WELL ID ↓	Log Combinations **9041 & 9065**	Log Combinations **9065; 2EMA; Obi40 & Partial 9041**	Log Presentation **2IDA** [1]	Log Presentation **2IDA** [2]	Total Log Presentation Sets Per Well
RIMW-20	**X**	**X**	**X** [1]	**X** [2]	4
RIMW-21	**X**	**X**	**X** [1]	**X** [2]	4
RIMW-22	**X**	**X**	**X** [1]	**X** [2]	4
RIMW-23	**X**	**X**	**X** [1]	**X** [2]	4
RIMW-25	**X**	**X**	**X** [1]	**X** [2]	4
RIMW-26	**X**	**X**	**X** [1]	**X** [2]	4
RIMW-28	**X**	**X**	**X** [1]	**X** [2]	4
RIMW-29	**X**	**X**	**X** [1]	**X** [2]	4

$X^1 = NO_3$ $X^2 = NH_4$

Results

Combinations of thirty two log sets are attached to this report presenting all data collected at the site. Each combination was grouped in a manner which complemented similar parameters, some of which may have been duplicated and incorporated into other data sets such as caliper and natural gamma logs added to an EM log. When possible, photographs were taken of logging sites in addition to GPS coordinates if acceptable satellite reception conditions existed. A Trimble Pathfinder Pro and Recon data recorder were used to acquire GPS data.

Most all field measurements were referenced from the top of the inner casing, when present, or the outer casing. The height of the various above/below ground risers/casings were also measured and noted on log headers so that references to ground level could be established, if needed. Final log plots had all well elevations referenced to ground surface at the well head. Locations of wells logged are illustrated on Figure 1; following page.

Generally all of the new wells drilled had water levels which stabilized within a day.

Locations of proposed well screen placement locations were noted on well logs to better assist the reader in log interpretation.

Aerial Photograph: Google Earth

PSC Site Rock Hill, SC
Well Log Location Map

N

Figure 1

Conclusions

Please refer to the attached well logs.

The proposed screen intervals are as follows:

RIMW-20	104.6' – 119.6' from ground surface (GS)
RIMW-21	77' – 87' from ground surface (GS)
RIMW-22	124.9' – 134.9' from ground surface (GS)
RIMW-23	45.8' – 57.8' from ground surface (GS)
RIMW-25	45' – 55' from ground surface (GS)
RIMW-26	83.2' – 93.2' from ground surface (GS)
RIMW-28	56.4' – 66.4' from ground surface (GS)
RIMW-29	54' – 64' from ground surface (GS)

(GS) = Ground Surface

Any questions regarding this report can be directed to:

James Ursic
77 West Jackson Boulevard
Mail Stop SRT-4J
Chicago, IL 60604
312.353.2536
Ursic.James@EPA.GOV

Attachments: Appendix A, B, C
Well logs (total of 32 logs)

APPENDIX A

Chronology of Geophysical Logging Events
PSC Site Rock Hill, South Carolina

Date	Tool*	Time	Well	Traverse Direction	Scale Options	Parameter Option	Well Photo
08/22							
	2IDA	07:30	RIMW-22	Down	0-6400 ug/l	NH_4	Yes
	2IDA	08:04	RIMW-22	Down	0-6400 ug/l	NO_3	
	2EMA	08:25	RIMW-22	Down	1000 mS/m		
	9065	08:55	RIMW-22	Up			
	9041	09:20	RIMW-22	Down			
	2IDA	N/R	RIMW-26 VOIDED	Down			Yes
	2IDA	N/R	RIMW-26 VOIDED	Down			
	2IDA	N/R	RIMW-26	Down			
	2IDA	12:10	RIMW-26	Down	0-64 mg/l**	NO_3	
	2IDA	12:18	RIMW-26	Down	0-64 mg/l**	NH_4	
	2EMA	13:26	RIMW-26	Up	1000 mS/m		
	9065	14:12	RIMW-26	Up			
	9041	15:47	RIMW-26	Down			
08/23							
	2IDA	08:13	RIMW-29	Down	0-64 mg/l**	NH_4	Yes
	2IDA	08:40	RIMW-29	Down	0-64 mg/l**	NO_3	
	2EMA	09:40	RIMW-29	Up	1000 mS/m		
	9065	10:05	RIMW-22	Up			
	9041	10:37	RIMW-22	Down			
	2IDA	14:25	RIMW-28	Down	0-64 mg/l**	NO_3	Yes
	2IDA	14:50	RIMW-28	Down	0-64 mg/l**	NH_4	
	2EMA	N/R	RIMW-28 VOIDED	Up	1000 mS/m		
	2EMA	15:25	RIMW-28	Up	1000 mS/m		
	9065	15:33	RIMW-28	Up			
	9041	16:00	RIMW-28	Down			
08/24							
	2IDA	N/R	RIMW-20 VOIDED	Down	0-64 mg/l**	NH_4	Yes
	2IDA	07:50	RIMW-20	Down	0-64 mg/l**	NH_4	
	2IDA	08:20	RIMW-20	Down	0-64 mg/l**	NO_3	
	2EMA	08:45	RIMW-20	Up	1000 mS/m		
	2IDA	09:30	RIMW-20	Down	0-64 mg/l**	NH_4	
	9065	09:45	RIMW-20	Up			
	9041	10:20	RIMW-20	Down			
	9041	10:45	RIMW-20	Down			
	2IDA	13:45	RIMW-23	Down	0-64 mg/l**	NH_4	Yes
	2IDA	14:05	RIMW-23	Down	0-64 mg/l**	NO_3	
	2EMA	14:30	RIMW-23	Up	1000 mS/m		
	9065	15:00	RIMW-23	Up			
	9041	15:15	RIMW-23	Down			

APPENDIX A (continued)

Date	Tool*	Time	Well	Traverse Direction	Scale Options	Parameter Option	Well Photo
08/25							
	2IDA	09:05	RIMW-21	Down	0-64 mg/l**	NO_3	Yes
	2IDA	09:40	RIMW-21	Down	0-64 mg/l**	NH_4	
	2EMA	10:07	RIMW-21	Up	1000 mS/m		
	9065	10:30	RIMW-21	Up			
	9041	11:30	RIMW-21	Down			
08/27							
	Obi40	12:30	RIMW-22	Up			
	Obi40	14:35	RIMW-21	Down			
	Obi40	15:37	RIMW-28 VOIDED	Up			
	Obi40	16:12	RIMW-26	Down			
	Obi40	17:40	RIMW-28	Down			
08/28							
	Obi40	07:40	RIMW-23	Down			
	Obi40	08:25	RIMW-29	Down			
	2IDA	09:30	RIMW-25	Down	0-64 mg/l**	NH_4	Yes
	2IDA	09:55	RIMW-25	Down	0-64 mg/l**	NO_3	
	2EMA	10:15	RIMW-25	Up	1000 mS/m		
	9065	10:47	RIMW-25	Up			
	9041	11:00	RIMW-25	Down			
	Obi40	11:30	RIMW-25	Up			
	Obi40	08:29	RIMW-20	Down			

* Tool designators

9041	Century Geophysical multi-parameter formation & resistivity tool
Obi40	Mount Sopris color optical televiewer
9065	Century Geophysical 3-arm caliper tool
2EMA	Mount Sopris formation conductivity tool (electromagnetic induction)
2IDA	Mount Sopris multi-parameter water chemistry tool

** Later converted from mg/l to ug/l as shown and noted on well logs

N/R Not recorded

APPENDIX B
Well Information at Time of Logging; Rock Hill, South Carolina

Well	New or Old Well	Outer Casing Dia.	Inner Casing Dia. & Type	End Of Casing From GS	Outer Casing Stickup From GS	Inner Casing Distance From Top Open Outer Casing	DTW From TIC or TOC; Time; Date	Well Depth From TIC or TOC	Screen Interval From GS or (proposed)	TOC Elevation (before final casing was set)	Latitude Longitude
RIMW-20	New	6”	N/A	100’	0.20’	N/A	20.25’ TOC ~08:15 12/14	86.23’ TOC	(104.6’-119.6’)	N/A	34.88959760°N -81.07119817°W
RIMW-21	New	6”	N/A	70’	2.90’	N/A	12.53’ TOC ~14:30 12/13	58.24’ TOC	(77.3’-87.3’)	N/A	34.88930735°N -81.07101464°W
RIMW-22	New	6”	N/A	117’	0.56’	N/A	44.71’ TOC ~12:00 12/14	101.55’ TOC	(124.9’-134.9’)	N/A	34.88911822°N -81.07154162°W
RIMW-23	New	6”	N/A	37’	1.60’	N/A	12.90’ TOC ~08:45 12/15	79.26’ TOC	(45.8’-57.8’)	N/A	34.88862735°N -81.07101140°W
RIMW-25	New	6”	N/A	40’	0.7’	N/A	14.25’ TIC ~15:00 12/15	34.49’ TIC	(44.7’-54.7’)	N/A	34.888535°N -81.072158°W
RIMW-26	New	6”	N/A	71’	-0.4’	N/A	18.55’ TIC ~09:00 12/16	60.51’ TIC	(83.2’-93.2’)	N/A	34.88837161°N -81.07170296°W
RIMW-28	New	6”	N/A	46’	-2.4’	N/A	25.10’ TOC ~11:00 12/16	31.85’ TOC	(56.4’-68.4’)	N/A	34.88824904°N -81.07256796°W

Well	New or Old Well	Outer Casing Dia.	Inner Casing Dia. & Type	End Of Casing From GS	Outer Casing Stickup From GS	Inner Casing Distance From Top Open Outer Casing	DTW From TIC or TOC; Time; Date	Well Depth From TIC or TOC	Screen Interval From GS or (proposed)	TOC Elevation	Latitude Longitude
RIMW-29	New	6”	N/A	47’	-2.66’	N/A	13.59’ TIC ~13:00 12/16	39.49’ TIC	(54’-64’)	N/A	34.88756758°N -81.075156490°W

N/A = Not Available

APPENDIX C **Photographic Log of Well Sites; August 22-28, 2007**

RIMW-20

RIMW-21

RIMW-22

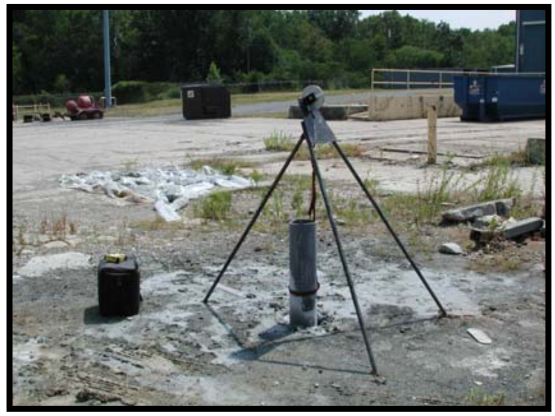
RIMW-23

RIMW-25

RIMW-26 1 of 2

Photographic Log

RIMW-26 2 of 2



RIMW-28

RIMW-29

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for BP1B

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log BP1B – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log BP1B – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 18 - C

Natural gamma – cps (9060 Tool)
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)
Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity – Ohm/M
Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)
Natural gamma – cps

Century 9065 tool
Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
Formation conductivity – mS/m

Well:	BP1B	Log: BP1B-A

Site:	PSC

City/State: Rock Hill, South Carolina

Date: 12/16/06	Time: 13:53

System Configuration: Mount Sopris 2IDA with ammonia option

Water Level: 10.63'	Measured From: GS @ ~ 13:00

Outer Casing Height AGL (with cap open/removed): 2.81' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: +0.15'	Casing Type: PVC

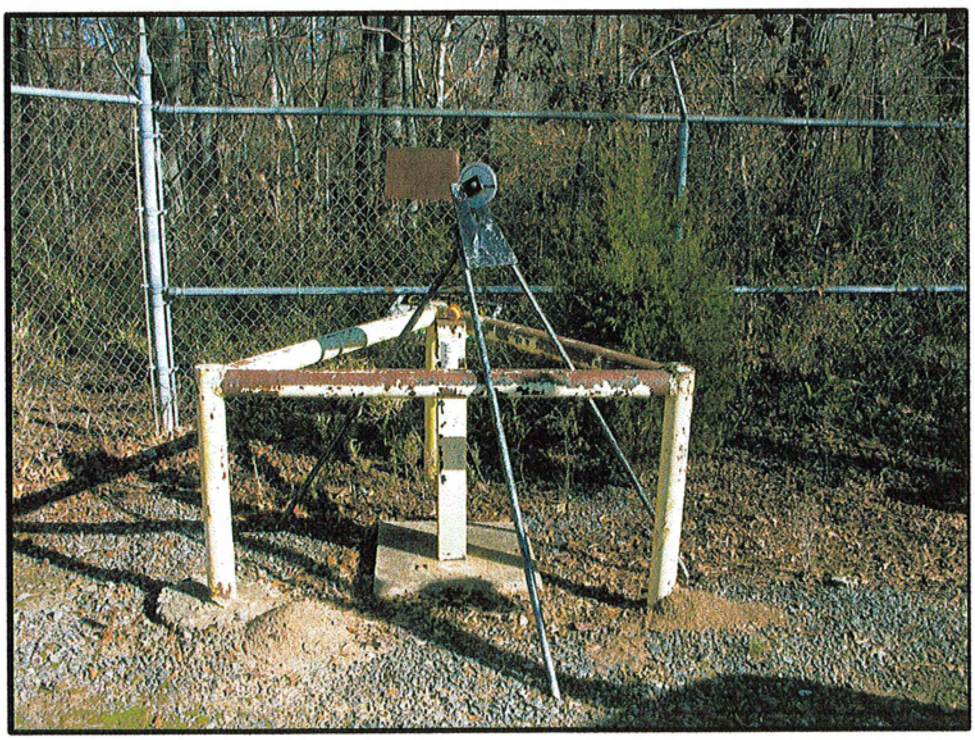
Log Direction: Down	Measured from: GS	Log Speed: 15 fpm
Log Top: 10.64'	Log Bottom: 34.24'	Reference Point: GS

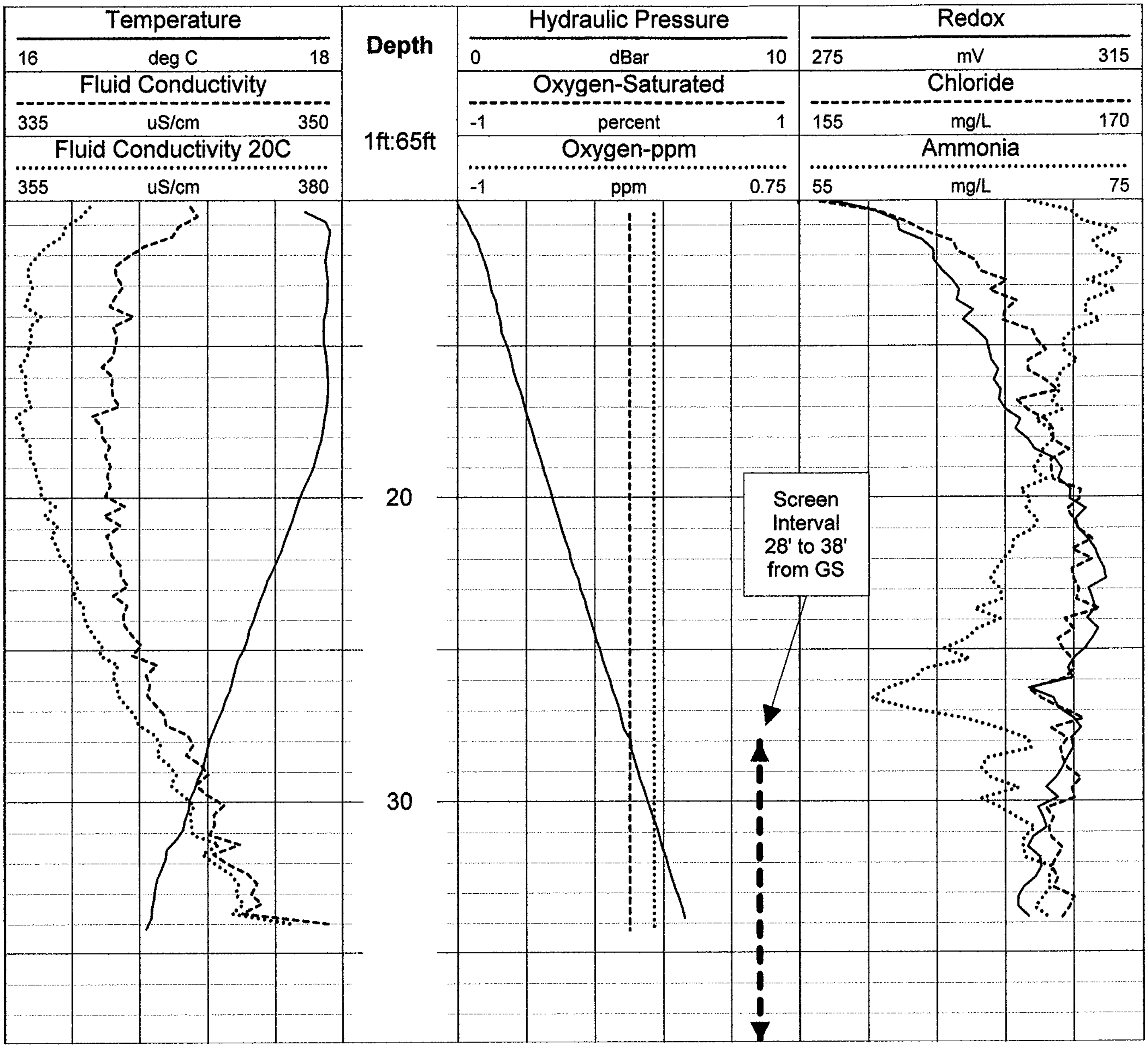
Analysis Software: WellCAD	Smoothing Points: Redox = 1

Operator: JRU	Witness: None	Other Tools Used: 9060, 2EMA
Well Diameter: 2"	Well Depth: 38'	Referenced From: GS

Casing Material: PVC	Non-Cased Interval: all cased
Screen Interval: 28' to 38'; GS	Screen Type: unknown
Latitude: 34.88892596°N	Longitude: -81.07072095°W

Notes: Two logging traverses preceeded this log.
Screen interval data obtained from previous well construction documents.
GS references converted from a TIC height of 2.96' (org. ref. pt.)
GPS values; NAD83





Temperature
16 deg C 18
Fluid Conductivity
335 uS/cm 350
Fluid Conductivity 20C
355 uS/cm 380
Depth
1ft:65ft
20
30
Hydraulic Pressure
0 dBar 10
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
275 mV 315
Chloride
155 mg/L 170
Ammonia
55 mg/L 75
Screen Interval 28' to 38' from GS

Well: BP1B   Log: BP1B-B

Site: PSC

City/State: Rock Hill, South Carolina

Date: 12/16/06	Time: 13:33

System Configuration: Mount Sopris 2IDA with nitrate option

Water Level: 10.63'	Measured From: GS @ ~ 13:00

Outer Casing Height AGL (with cap open/removed): 2.81' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: +0.15'	Casing Type: PVC

Log Direction: Down	Measured from: GS	Log Speed: 18 fpm
Log Top: 10.64'	Log Bottom: 34.24'	Reference Point: GS

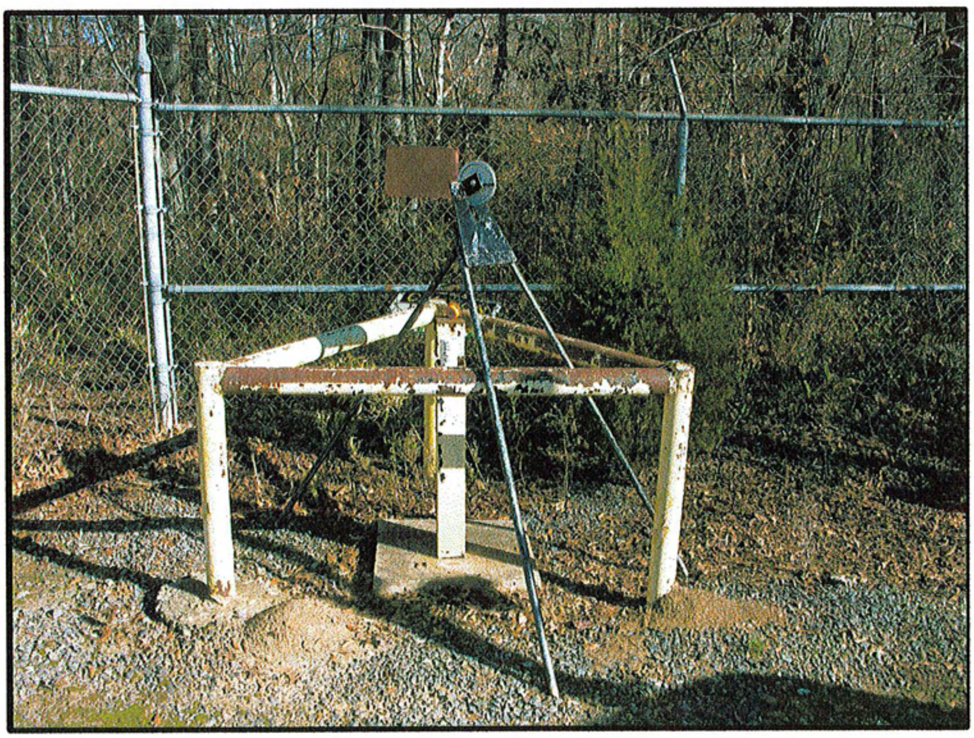
Analysis Software: WellCAD	Smoothing Points: see notes

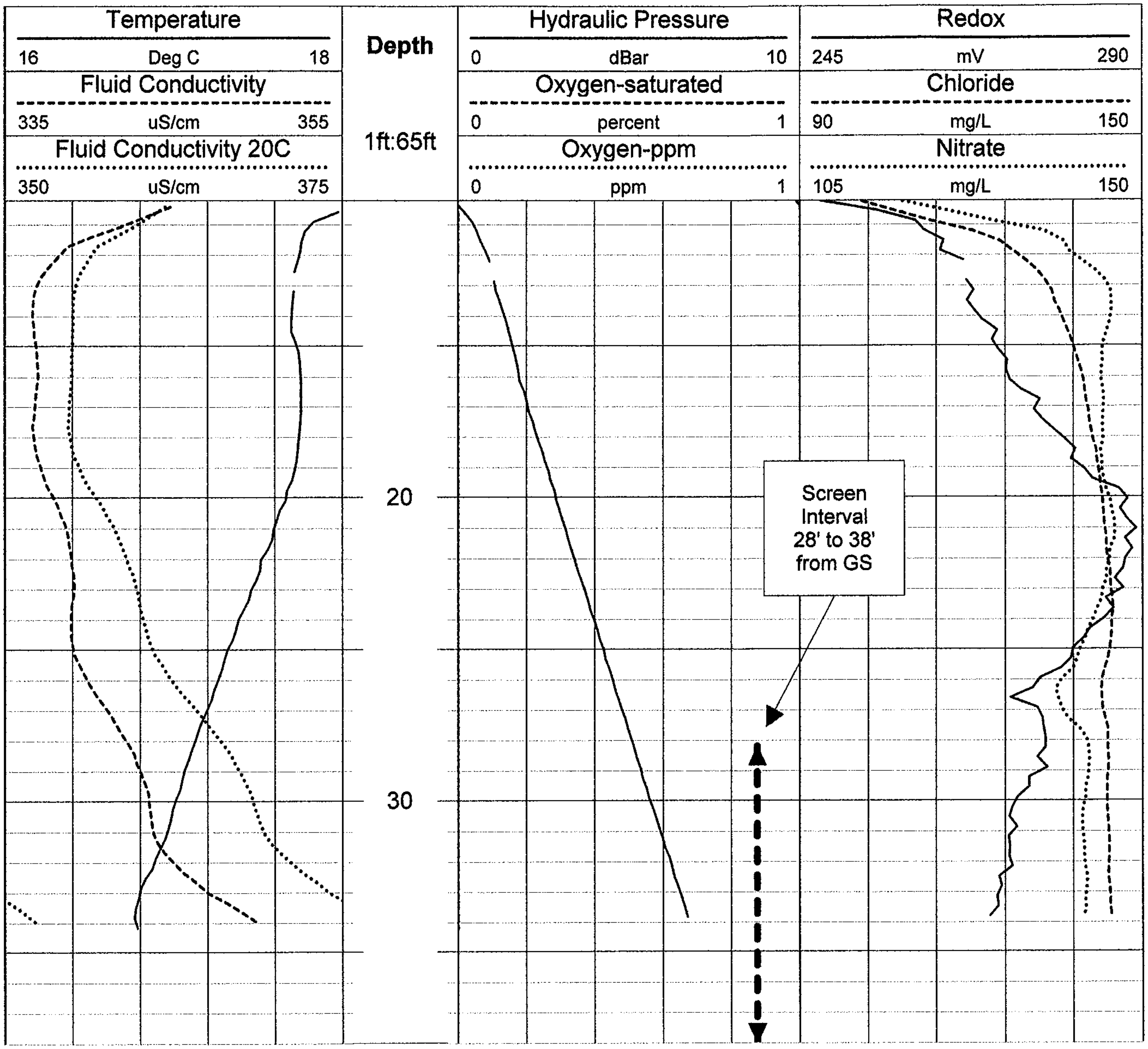
Operator: JRU	Witness: None	Other Tools Used: 9060, 2EMA
Well Diameter: 2"	Well Depth: 38'	Referenced From: GS

Casing Material: PVC	Non-Cased Interval: all cased
Screen Interval: 28' to 38'; GS	Screen Type: unknown
Latitude: 34.88892596°N	Longitude: -81.07072095°W

Notes: This was the first logging traverse.
Screen interval data obtained from previous well construction documents.
Smoothing; redox = 1; conductivities, NO3 & Cl = 5.
GS references converted from a TIC height of 2.96' (org. ref. pt.)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





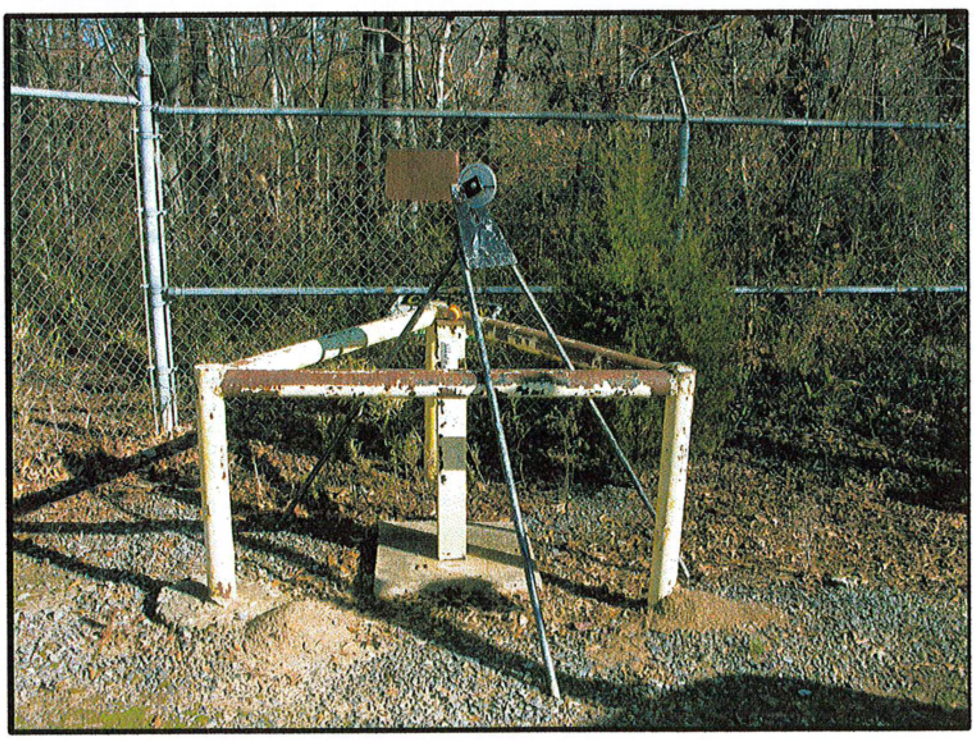
Temperature
16 Deg C 18
Fluid Conductivity
335 uS/cm 355
Fluid Conductivity 20C
350 uS/cm 375
Depth
1ft:65ft
20
30
Hydraulic Pressure
0 dBar 10
Oxygen-saturated
0 percent 1
Oxygen-ppm
0 ppm 1
Redox
245 mV 290
Chloride
90 mg/L 150
Nitrate
105 mg/L 150
Screen Interval 28' to 38' from GS

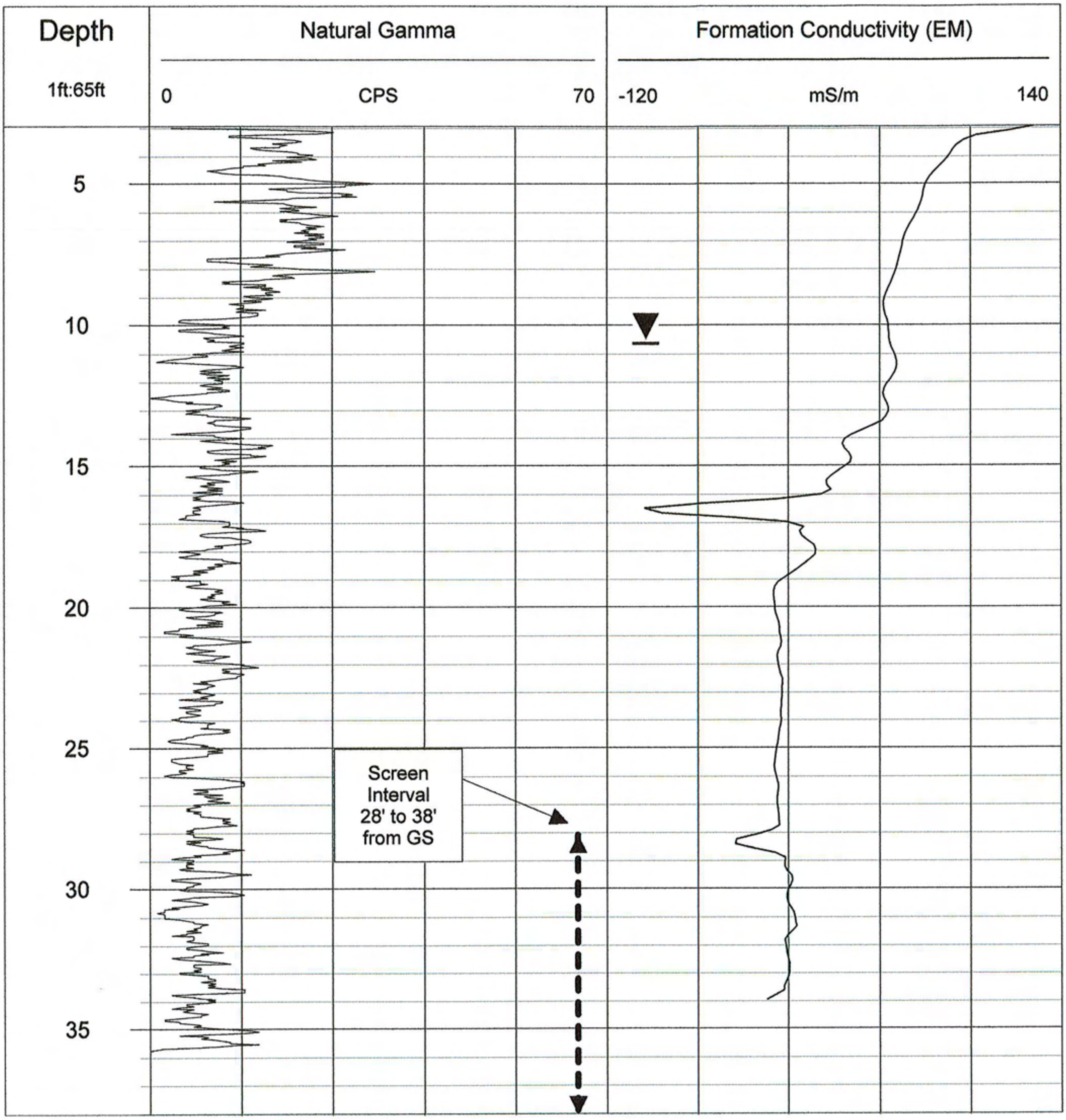
Well:	**BP1B**	**Log: BP1B-C**
Site:	**PSC**	

City/State: Rock Hill, South Carolina		
Date: 12/16/06	Time: See notes	
System Configuration: Century 9060; Mount Sopris 2EMA		
Water Level: 10.63'	Measured From: GS @ ~ 13:00	
Outer Casing Height AGL (with cap open/removed): 2.81'	Type: Steel riser	
Inner Casing Ht. ± Outer Casing Ht.: +0.15	Casing Type: PVC	
Log Direction: Up	Measured from: GS	Log Speed: see notes
Log Top: 3.04'	Log Bottom: 36.54'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: natural gamma = 9	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 2"	Well Depth: 38'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: all cased	
Screen Interval: 28' to 38'; GS	Screen Type: unknown	
Latitude: 34.88892596°N	Longitude: -81.07072095°W	

Notes: Natural gamma logged @ 14:49; speed 16 fpm
Formation conductivity logged @ 13:58; speed 11 fpm.
Screen interval data obtained from previous well construction documents. GPS values; NAD83
2EMA stabilized within 14 minutes.
GS references converted from a TIC height of 2.96' (org. ref. pt.)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY




Depth
1ft:65ft
Natural Gamma
0
CPS
70
Formation Conductivity (EM)
-120
mS/m
140
5
10
15
20
25
30
35
Screen
Interval
28' to 38'
from GS

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for EW4

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log EW4 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log EW4 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log EW4 - C

Natural gamma – cps (9060 Tool)

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

Well:	EW4	Log: EW4-A

Site:	PSC

City/State: Rock Hill, South Carolina

Date: 12/18/06	Time: 13:01

System Configuration: Mount Sopris 2IDA with ammonia option

Water Level: 15.81'	Measured From: GS @ ~ 12:10

Outer Casing Height AGL (with cap open/removed): 0' Type: Flush mount

Inner Casing Ht. ± Outer Casing Ht.: -0.65'	Casing Type: 6" steel

Log Direction: Up	Measured from: GS	Log Speed: 13.5 fpm
Log Top: 15.9'	Log Bottom: 75.6'	Reference Point: GS

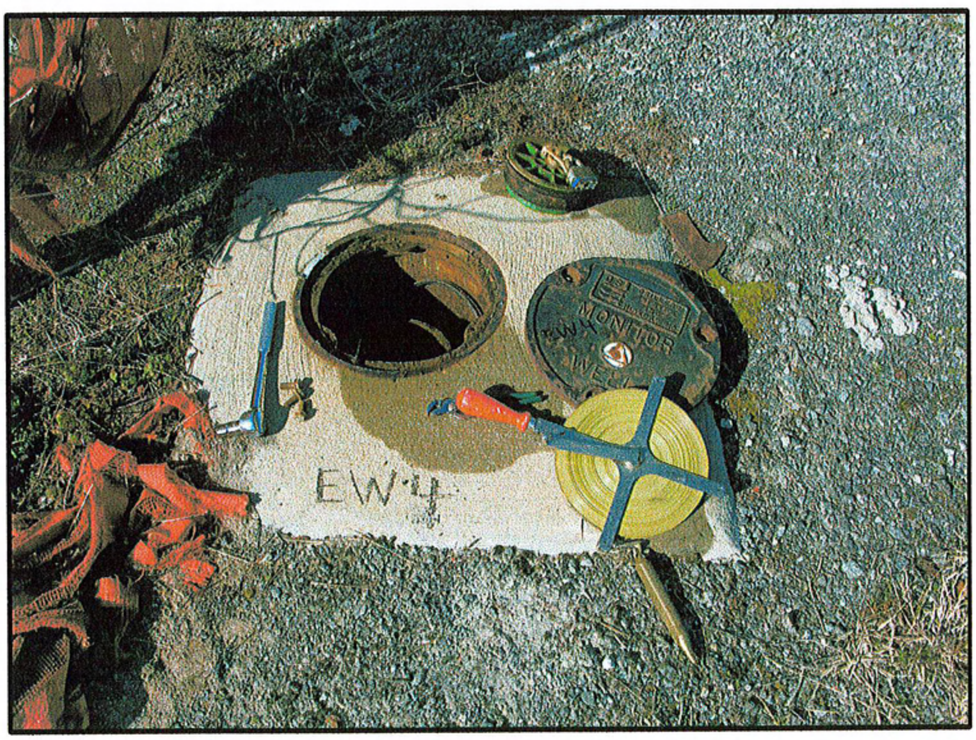
Analysis Software: WellCAD	Smoothing Points: redox = 1

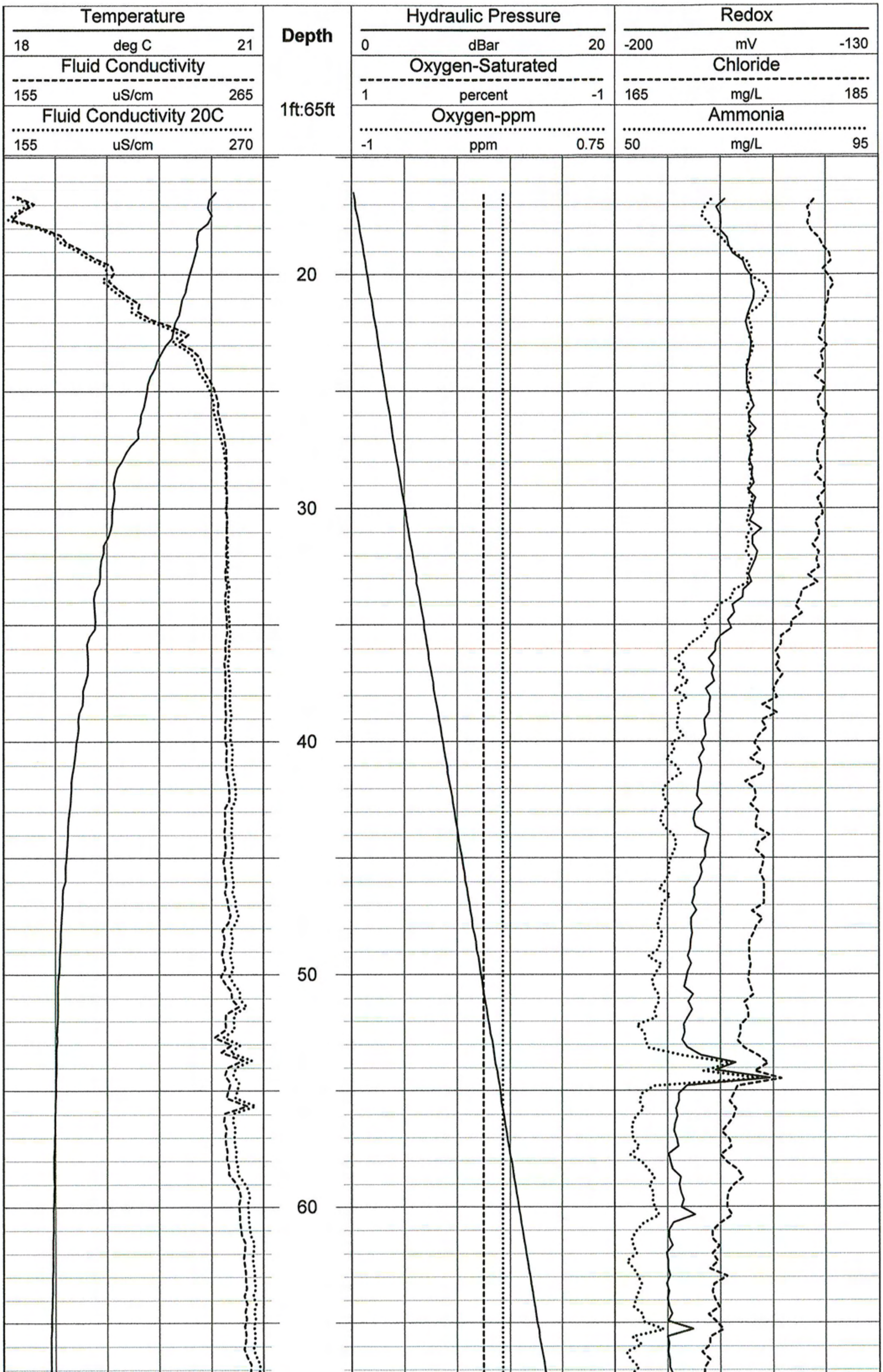
Operator: JRU	Witness: None	Other Tools Used: 9060
Well Diameter: 6"	Well Depth: 78.8'	Referenced From: GS

Casing Material: steel	Non-Cased Interval: N/A
Screen Interval: Unknown	Screen Type: N/A
Latitude: 34.888632°N	Longitude: -81.072096°W

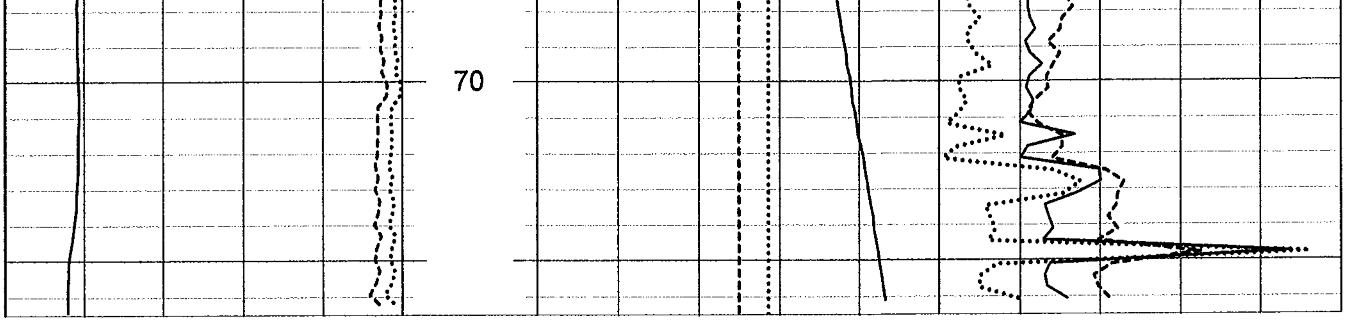
Notes: Down traverse for ammonia was voided, thus this log recorded on a traverse up hole.
GS references converted from a TIC height -0.65' (org. ref. pt.)
GPS values; NAD83
Probe hung at 25' going down hole; voided traverse. Logged up.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Temperature
18 deg C 21
Fluid Conductivity
155 uS/cm 265
Fluid Conductivity 20C
155 uS/cm 270
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-Saturated
1 percent -1
Oxygen-ppm
-1 ppm 0.75
Redox
-200 mV -130
Chloride
165 mg/L 185
Ammonia
50 mg/L 95
20
30
40
50
60


70

Well:	EW4	Log: EW4-B

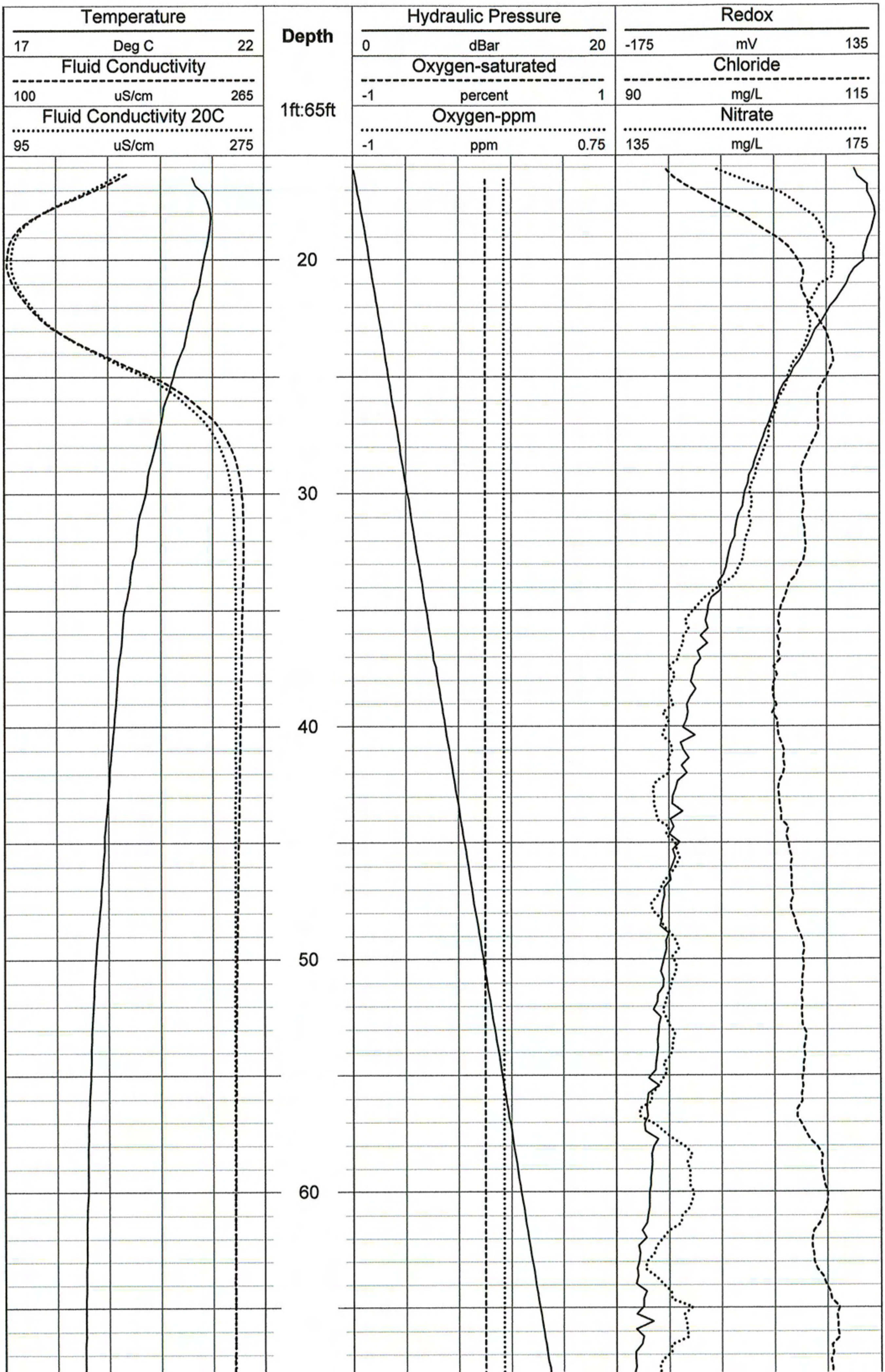
Site:	PSC

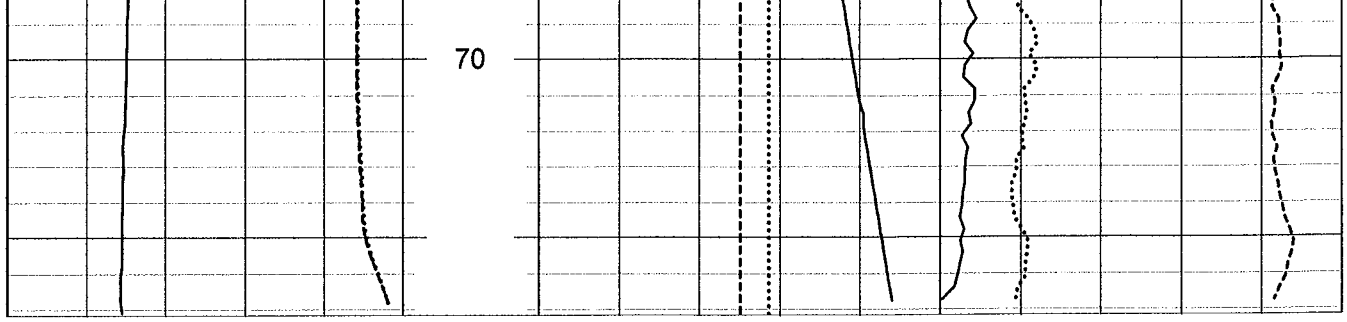
City/State: Rock Hill, South Carolina

Date: 12/18/06	Time: 12:26	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 15.81'	Measured From: GS @ ~ 12:10	
Outer Casing Height AGL (with cap open/removed): 0'	Type: Flush mount	
Inner Casing Ht. ± Outer Casing Ht.: -0.65'	Casing Type: 6" steel	
Log Direction: Down	Measured from: GS	Log Speed: 13 fpm
Log Top: 16.55'	Log Bottom: 77.2'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9060
Well Diameter: 6"	Well Depth: 78.8'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: N/A	
Screen Interval: Unknown	Screen Type: N/A	
Latitude: 34.888632°N	Longitude: -81.072096°W	

Notes: Smoothing; redox = 1; Cl & NO3 = 5; conductivities = 7.
GS references converted from a TIC height -0.65' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Temperature
17 Deg C 22
Fluid Conductivity
100 uS/cm 265
Fluid Conductivity 20C
95 uS/cm 275
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-175 mV 135
Chloride
90 mg/L 115
Nitrate
135 mg/L 175
20
30
40
50
60


70

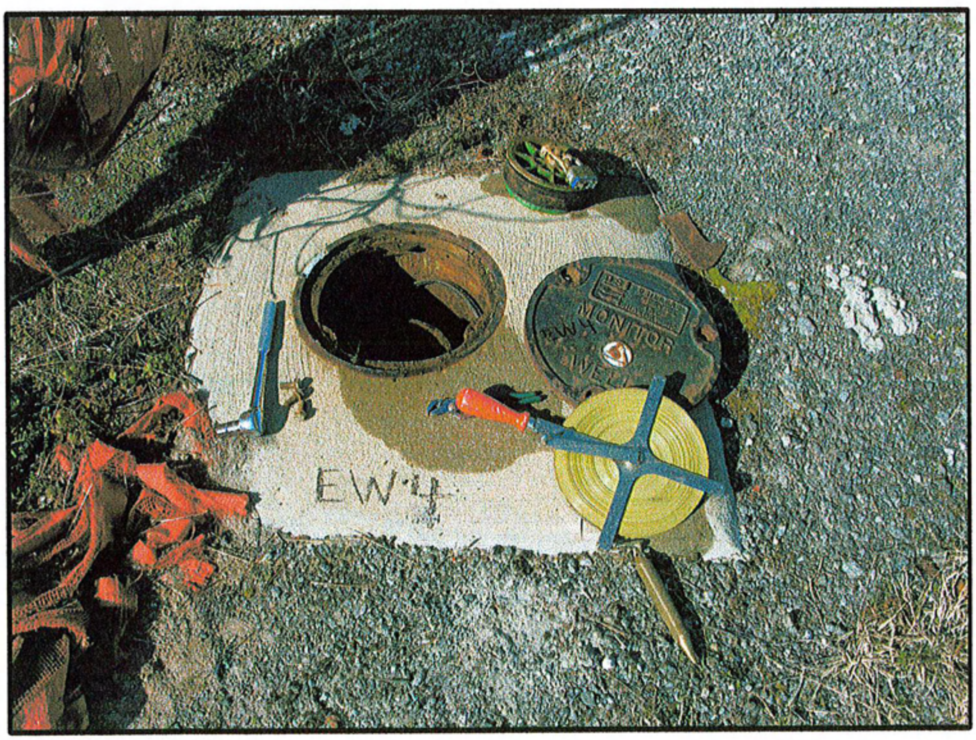
Well:	EW4	Log: EW4-C

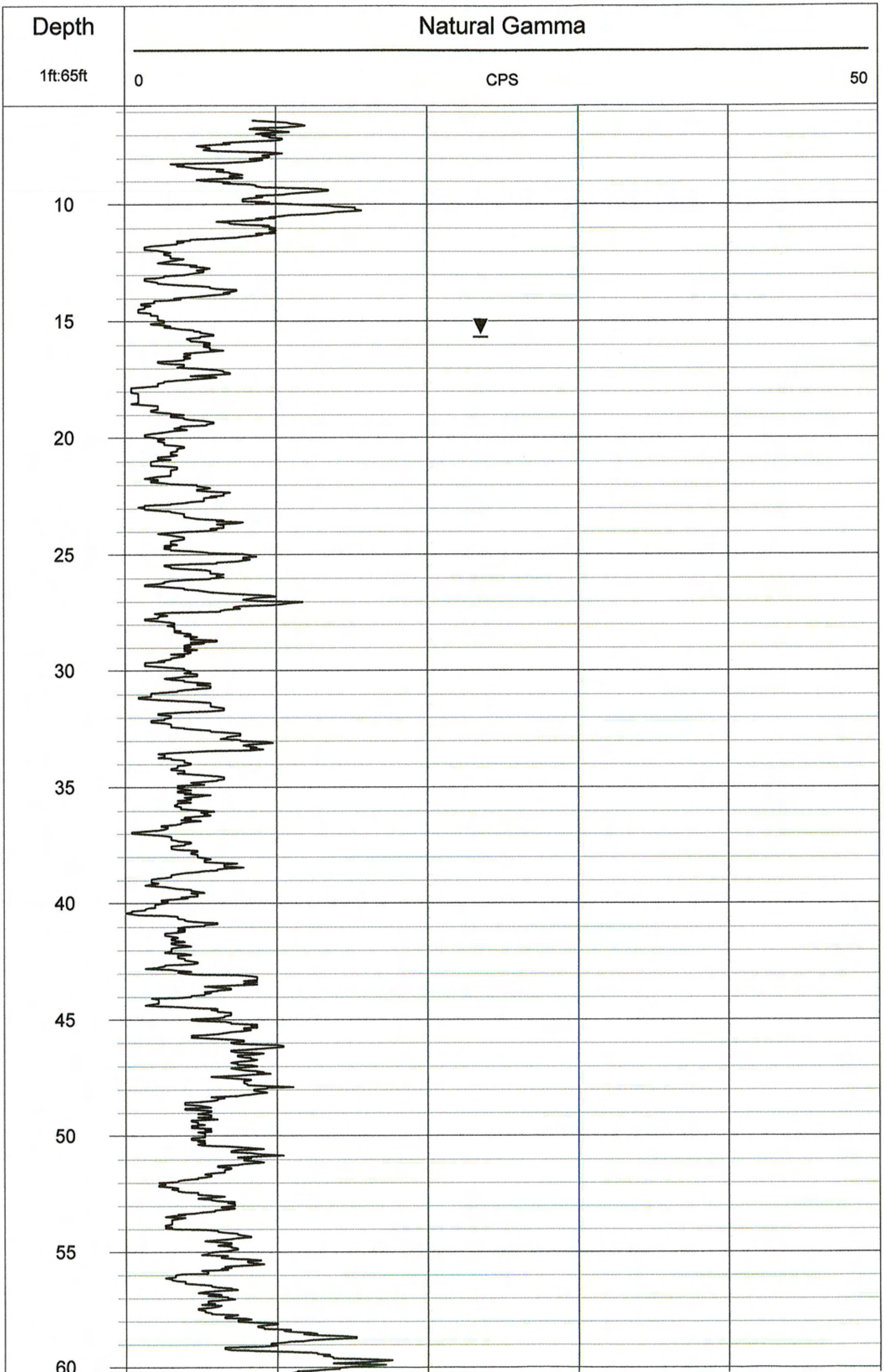
Site:	PSC

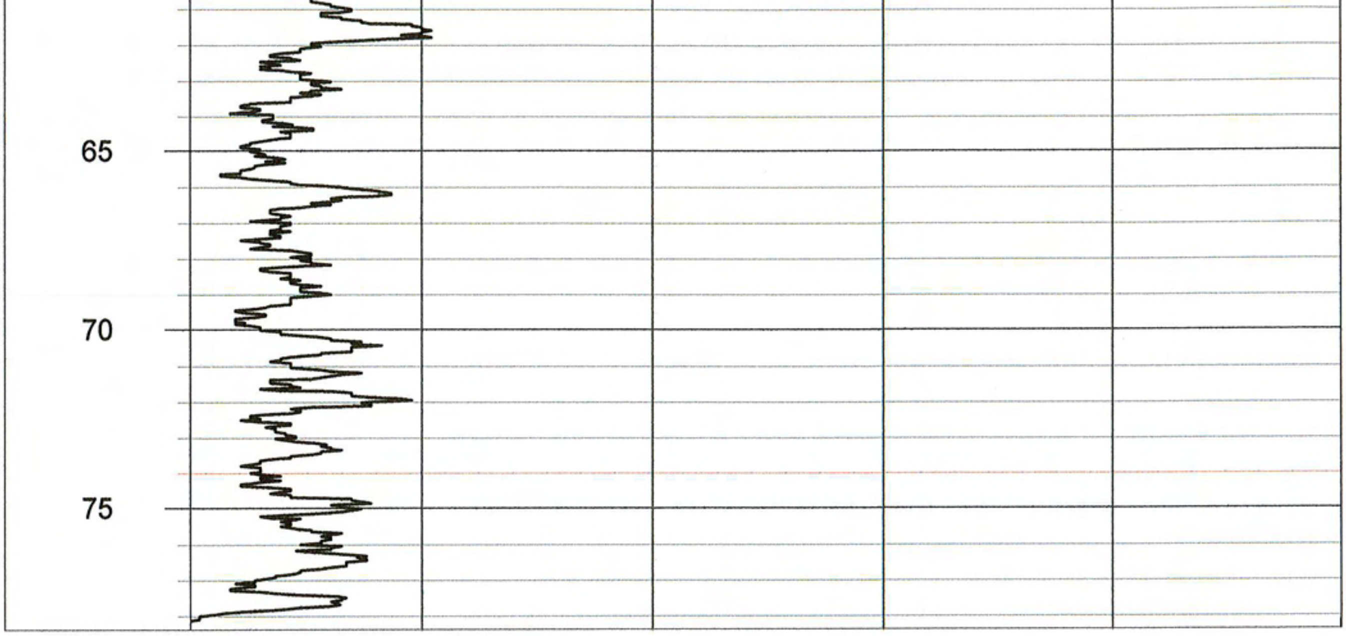
City/State: Rock Hill, South Carolina		
Date: 12/18/06	Time: 13:12	
System Configuration: Century 9060		
Water Level: 15.81'	Measured From: GS @ ~ 12:10	
Outer Casing Height AGL (with cap open/removed): 0'	Type: Flush mount	
Inner Casing Ht. ± Outer Casing Ht.: -0.65'	Casing Type: 6" steel	
Log Direction: Up	Measured from: GS	Log Speed: 18 fpm
Log Top: 6.4'	Log Bottom: 78.4'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: natural gamma = 23	
Operator: JRU	Witness: None	Other Tools Used:
Well Diameter: 6"	Well Depth: 78.8'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: N/A	
Screen Interval: Unknown	Screen Type: N/A	
Latitude: 34.888632°N	Longitude: -81.072096°W	

Notes: GS references converted from a TIC height -0.65' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY




Depth
1ft:65ft
Natural Gamma
0
CPS
50
10
15
20
25
30
35
40
45
50
55
60


65
70
75

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for MW100

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 100 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 100 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 100 - C

Natural gamma – cps (9060 Tool)

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – μS/cm
- Fluid conductivity at 20˚ C – μS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – μS/cm
- Fluid conductivity at 20˚ C – μS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

Well: MW100 Log: 100-A

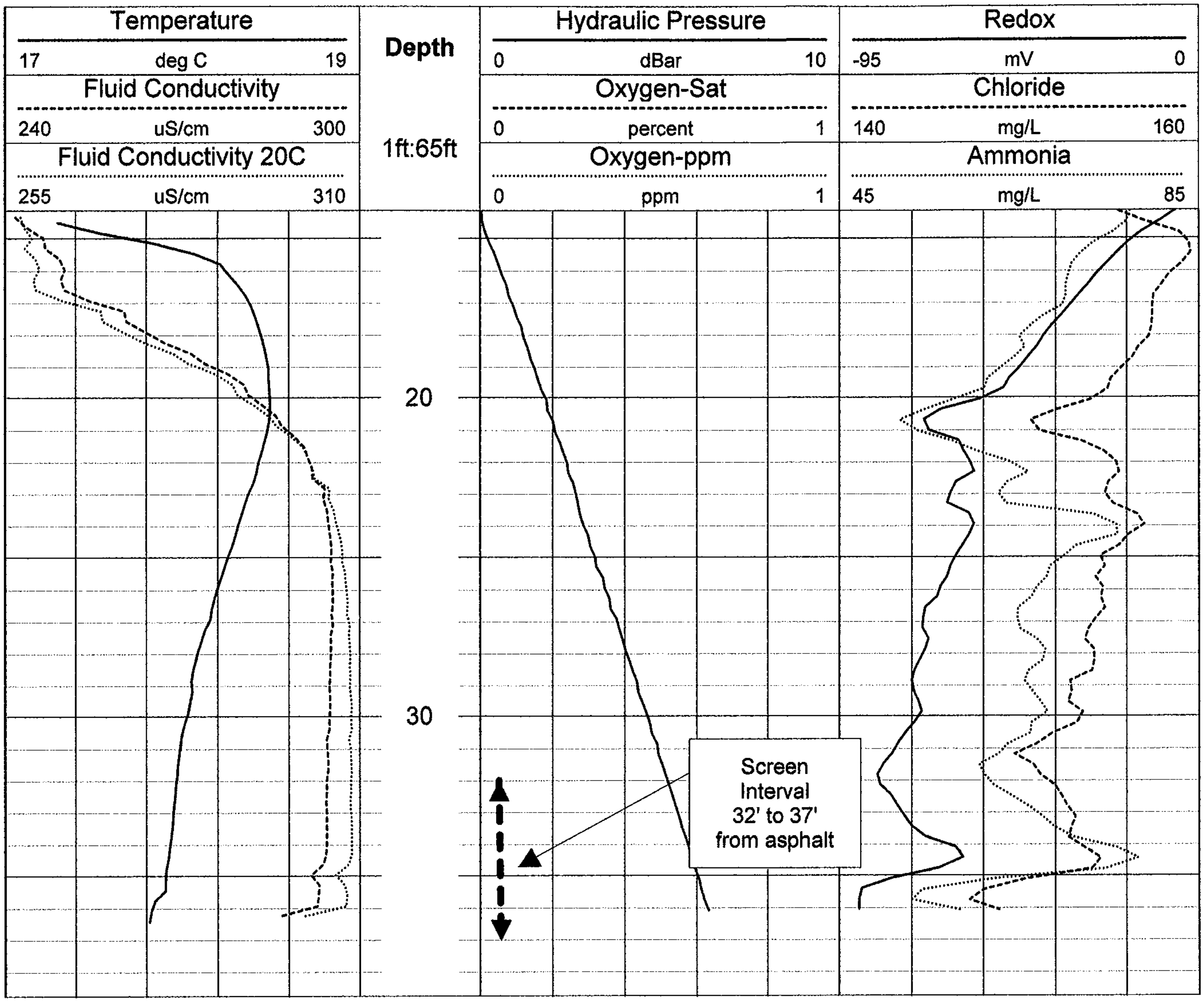
Site: PSC

City/State: Rock Hill, South Carolina	
Date: 12/17/06	Time: 08:25
System Configuration: Mount Sopris 2IDA with ammonia option	
Water Level: 14.52'	Measured From: Asphalt @ ~ 08:00
Outer Casing Height AGL (with cap open/removed): 3.4'	Type: Steel
Inner Casing Ht. ± Outer Casing Ht.: -0.73'	Casing Type: See notes

Log Direction: Down	Measured from: Asphalt	Log Speed: 13 fpm
Log Top: 14.53'	Log Bottom: 36.43'	Reference Point: Asphalt
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9060
Well Diameter: 4"	Well Depth: 38'	Referenced From: Asphalt

Casing Material: See notes	Non-Cased Interval: N/A
Screen Interval: 32' to 37'; asphalt	Screen Type: Unknown
Latitude: 34.88979593°N	Longitude: -81.07125209°W

Notes: Upper part of well (distance unknown) has inner casing of PVC, remainder of well is cased in steel. GPS values; NAD83
Tools were hanging on an obstruction near 30' from asphalt.
This log was obtained after two previous traverses.
Screen interval obtained from previous construction documents.
GS references converted from a TIC height of 2.67' (org. ref. pt.)



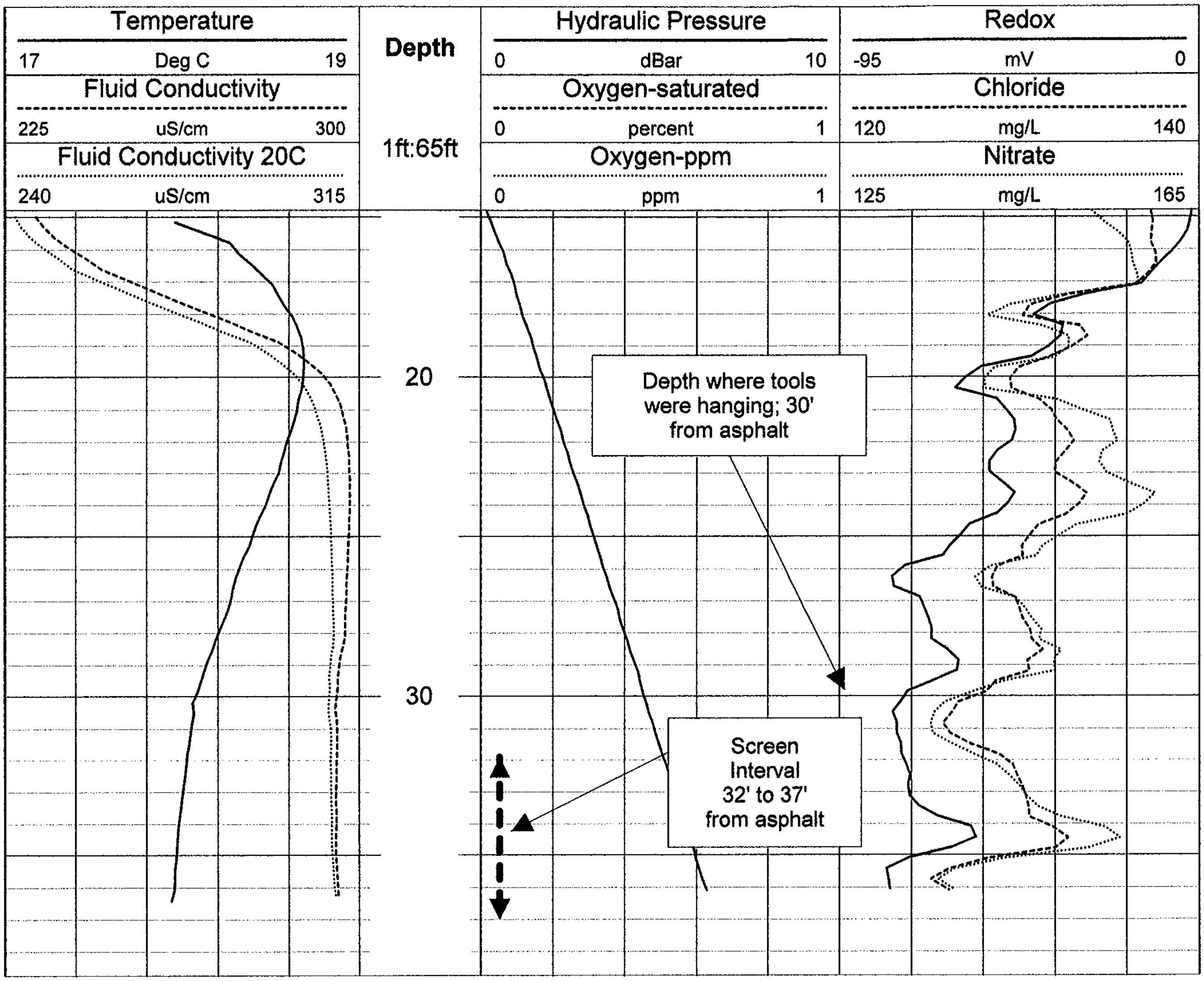
Temperature
17 deg C 19
Fluid Conductivity
240 uS/cm 300
Fluid Conductivity 20C
255 uS/cm 310
Depth
1ft:65ft
20
30
Hydraulic Pressure
0 dBar 10
Oxygen-Sat
0 percent 1
Oxygen-ppm
0 ppm 1
Redox
-95 mV 0
Chloride
140 mg/L 160
Ammonia
45 mg/L 85
Screen Interval 32' to 37' from asphalt

Well: MW100	Log: 100-B

Site:	PSC
City/State: Rock Hill, South Carolina	
Date:	Time: 08:11
System Configuration: Mount Sopris 2IDA with nitrate option	
Water Level: 14.52'	Measured From: Asphalt @ ~ 08:00
Outer Casing Height AGL (with cap open/removed): 3.4'	Type: Steel
Inner Casing Ht. ± Outer Casing Ht.: -0.73'	Casing Type: See notes
Log Direction: Down	Measured from: Asphalt	Log Speed: 13.8 fpm
Log Top: 15.13'	Log Bottom: 36.43'	Reference Point: Asphalt
Analysis Software: Down	Smoothing Points: see notes
Operator: JRU	Witness: None	Other Tools Used: 9060
Well Diameter: 4"	Well Depth: 38'	Referenced From: Asphalt
Casing Material: See notes	Non-Cased Interval: N/A
Screen Interval: 32' to 37'; asphalt	Screen Type: Unknown
Latitude: 34.88979593°N	Longitude: -81.07125209°W

Notes:

Upper part of well (distance unknown) has inner casing of PVC, remainder of well is cased in steel. GPS values; NAD83
Tools were hanging on an obstruction near 30' from asphalt.
This log is the frist traverse downhole.
GS references converted from a TIC height of 2.67' (org. ref. pt.)
Smoothing; redox, Cl, NO3 = 3; conductivities = 7

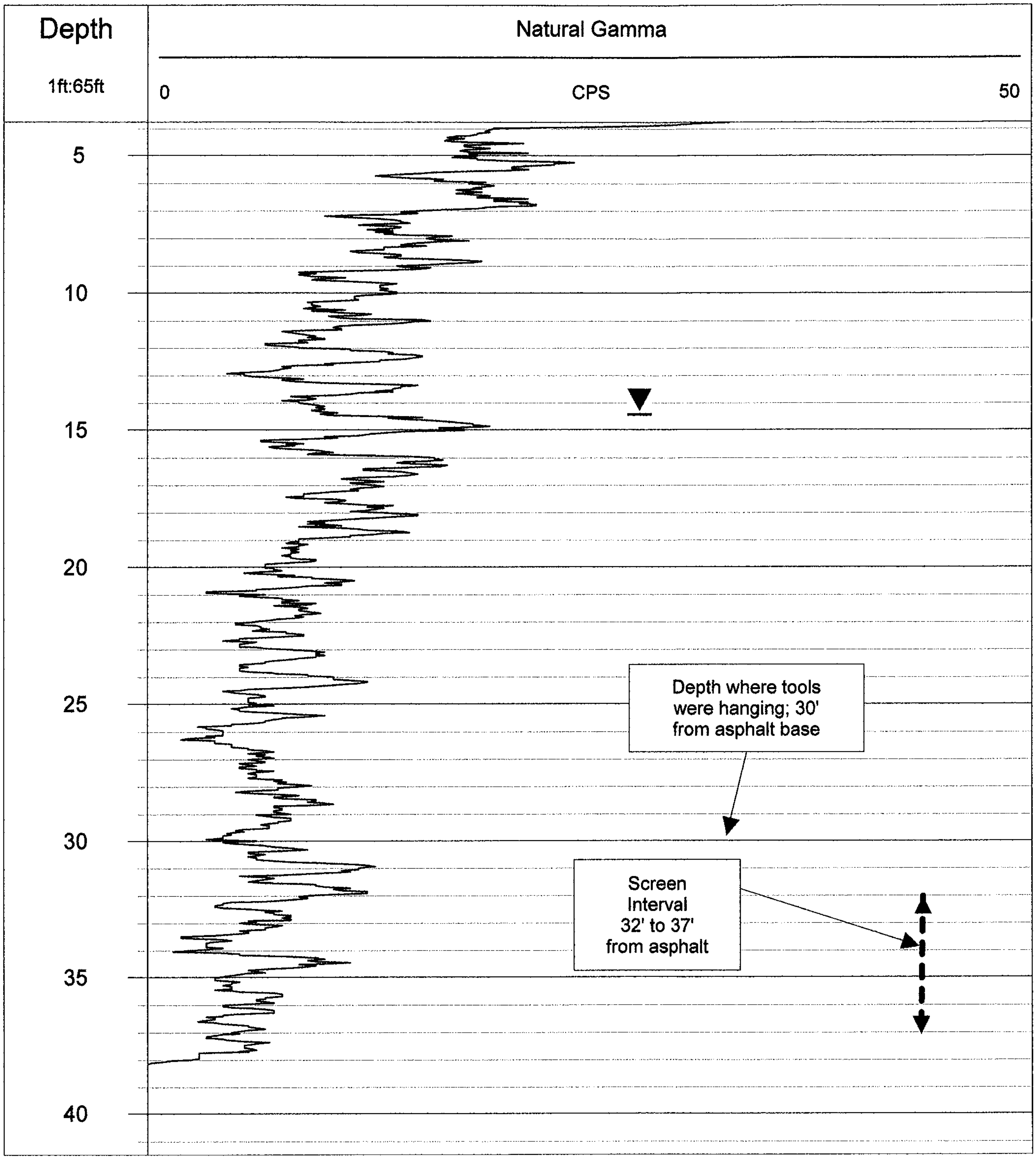

Temperature
17 Deg C 19
Fluid Conductivity
225 uS/cm 300
Fluid Conductivity 20C
240 uS/cm 315
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 10
Oxygen-saturated
0 percent 1
Oxygen-ppm
0 ppm 1
Redox
-95 mV 0
Chloride
120 mg/L 140
Nitrate
125 mg/L 165
20
30
Depth where tools were hanging; 30' from asphalt
Screen Interval 32' to 37' from asphalt

Well:	MW100	Log: 100-C
Site:	PSC	

City/State: Rock Hill, South Carolina		
Date: 12/17/06	Time: 08:25	
System Configuration: Century 9060		
Water Level: 14.52'	Measured From: ashphalt @ ~ 08:00	
Outer Casing Height AGL (with cap open/removed): 3.4'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: -0.73'	Casing Type: See notes	
Log Direction: Up	Measured from: asphalt	Log Speed: 18 fpm
Log Top: 3.73'	Log Bottom: 38.83'	Reference Point: asphalt
Analysis Software: WellCAD	Smoothing Points: 21	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 4"	Well Depth: 38'	Referenced From: asphalt
Casing Material: See notes	Non-Cased Interval: N/A	
Screen Interval: 32' to 37'; asphalt	Screen Type: Unknown	
Latitude: 34.88979593°N	Longitude: -81.07125209°W	

Notes: Upper part of well (distance unknown) has inner casing of PVC, remainder of well is cased in steel.
Screen interval data obtained from previous well construction documents. GPS values; NAD83
GS references converted from a TIC height of 2.67' (org. ref. pt.)
Tools were hanging on an obstruction near 30' from asphalt.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Depth
1ft:65ft
Natural Gamma
0
CPS
50
5
10
15
20
25
30
35
40
Depth where tools were hanging; 30' from asphalt base
Screen Interval 32' to 37' from asphalt

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for 113B

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 113B – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 113B – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 113B - C

Natural gamma – cps (9060 Tool)
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5” diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4” diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

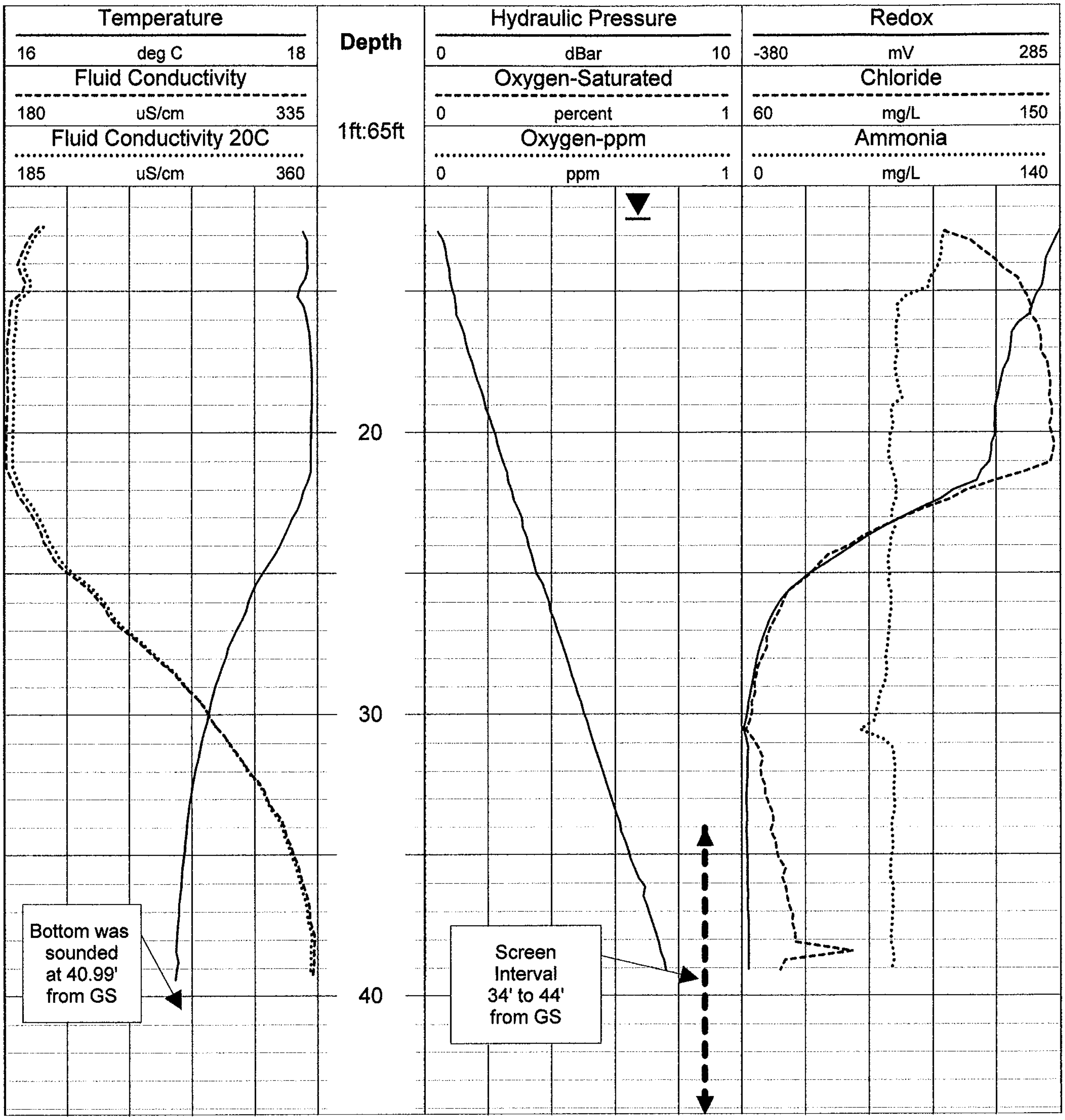
Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

Well:	MW113B	Log: 113B-A

Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/16/06	Time: 16:07	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 12.6'	Measured From: GS @ ~ 15:45	
Outer Casing Height AGL (with cap open/removed): 0'	Type: Flush Mount	
Inner Casing Ht. ± Outer Casing Ht.: -0.32'	Casing Type: PVC	
Log Direction: Down	Measured from: GS	Log Speed: 18 fpm
Log Top: 12.92'	Log Bottom: 39.42'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 9060; 2EMA
Well Diameter: 2"	Well Depth: 40.62'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: N/A	
Screen Interval: 34' to 44.'; GS	Screen Type: Unknown	
Latitude: 34.88800182°N	Longitude: -81.07116168°W	

Notes: This was the first traverse to be logged in the well.
Screen interval data obtained from previous well construction documents showing 10' interval. Bottom was sounded @ 40.99'.
GS references converted from a TIC height of -0.32' (org. ref. pt.)
GPS values; NAD83



Temperature
16 deg C 18
Fluid Conductivity
180 uS/cm 335
Fluid Conductivity 20C
185 uS/cm 360
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 10
Oxygen-Saturated
0 percent 1
Oxygen-ppm
0 ppm 1
Redox
-380 mV 285
Chloride
60 mg/L 150
Ammonia
0 mg/L 140
20
30
40
Bottom was sounded at 40.99' from GS
Screen Interval 34' to 44' from GS

Well: MW113B Log: 113B-B

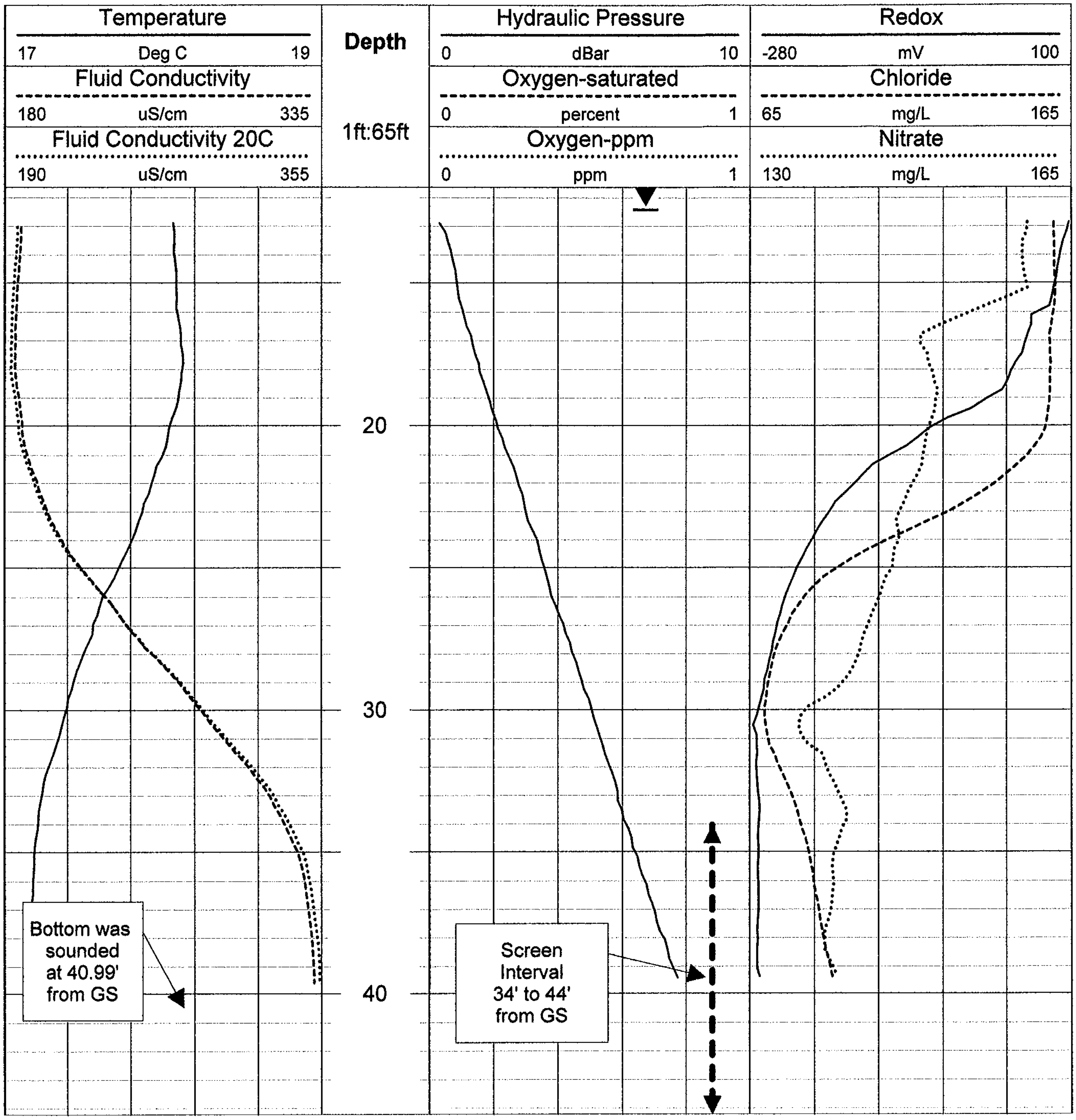
Site: PSC

City/State: Rock Hill, South Carolina

Date: 12/16/06	Time: 16:20	
System Configuration: Mount Sopris 2EMA with nitrate option		
Water Level: 12.6'	Measured From: GS @ ~ 15:45	
Outer Casing Height AGL (with cap open/removed): 0'	Type: Flush Mount	
Inner Casing Ht. ± Outer Casing Ht.: -0.32'	Casing Type: PVC	
Log Direction: Down	Measured from: GS	Log Speed: 12.5 fpm
Log Top: 12.92'	Log Bottom: 39.72'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9060; 2EMA
Well Diameter: 2"	Well Depth: 40.62'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: N/A	
Screen Interval: 34' to 44'; GS	Screen Type: Unknown	
Latitude: 34.88800182°N	Longitude: -81.07116168°W	

Notes: Screen interval data obtained from previous well construction documents showing 10' interval. Bottom was sounded @ 40.99'.
Smoothing; redox =1; conductivities, NO3 & Cl = 5.
Two well traverses occured prior to this log.
GS references converted from a TIC height of -0.32' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



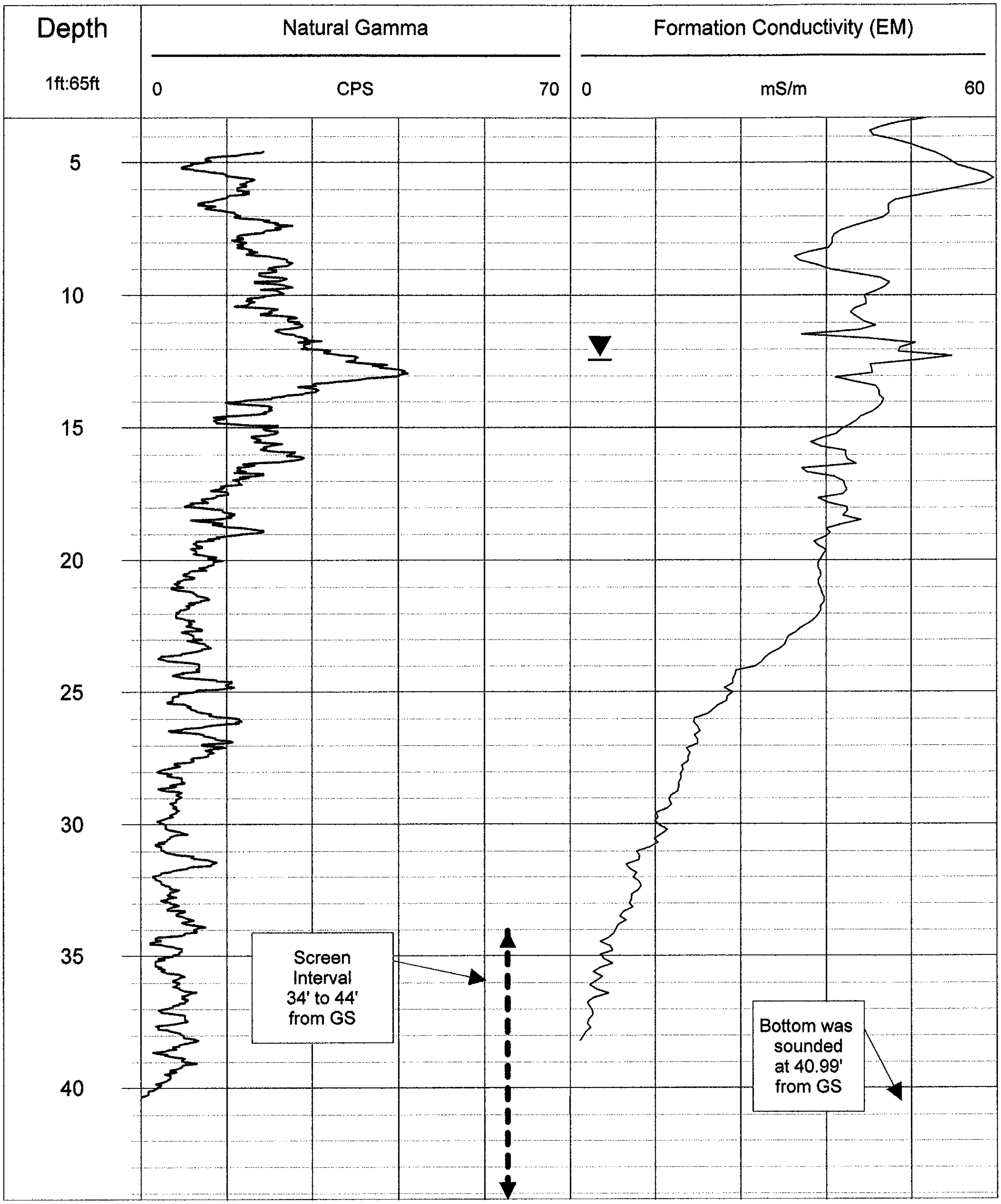
Temperature
17 Deg C 19
Fluid Conductivity
180 uS/cm 335
Fluid Conductivity 20C
190 uS/cm 355
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 10
Oxygen-saturated
0 percent 1
Oxygen-ppm
0 ppm 1
Redox
-280 mV 100
Chloride
65 mg/L 165
Nitrate
130 mg/L 165
20
30
40
Bottom was sounded at 40.99' from GS
Screen Interval 34' to 44' from GS

Well:	MW113B	Log: 113B-C

Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/16/06	Time: See notes	
System Configuration: Century 9060; Mount Sopris 2EMA		
Water Level: 12.6'	Measured From: GS @ ~ 15:45	
Outer Casing Height AGL (with cap open/removed): 0'	Type: Flush Mount	
Inner Casing Ht. ± Outer Casing Ht.: -0.32'	Casing Type: PVC	
Log Direction: Up	Measured from: GS	Log Speed: see notes
Log Top: 3.32'	Log Bottom: 40.12'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: natural gamma = 21	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 2"	Well Depth: 40.99'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: N/A	
Screen Interval: 34' to 44'; GS	Screen Type: Unknown	
Latitude: 34.88800182°N	Longitude: -81.07116168°W	

Notes: 9060 logged at 17:00; speed 16 fpm. GPS values; NAD83
2EMA logged at 16:49; speed 16 fpm.
Screen interval data obtained from previous well construction documents showing 10' interval. Bottom was sounded @ 40.99'.
2EMA stabilized after 14 minutes.
GS references converted from a TIC height of -0.32' (org. ref. pt.)



Depth
1ft:65ft
Natural Gamma
0
CPS
70
Formation Conductivity (EM)
0
mS/m
60
5
10
15
20
25
30
35
40
Screen Interval 34' to 44' from GS
Bottom was sounded at 40.99' from GS

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for MW122B

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 122B – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 122B – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 122B - C

Natural gamma – cps (9060 Tool)
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity – Ohm/M
Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)

Natural gamma – cps

Century 9065 tool

Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool

Formation conductivity – mS/m

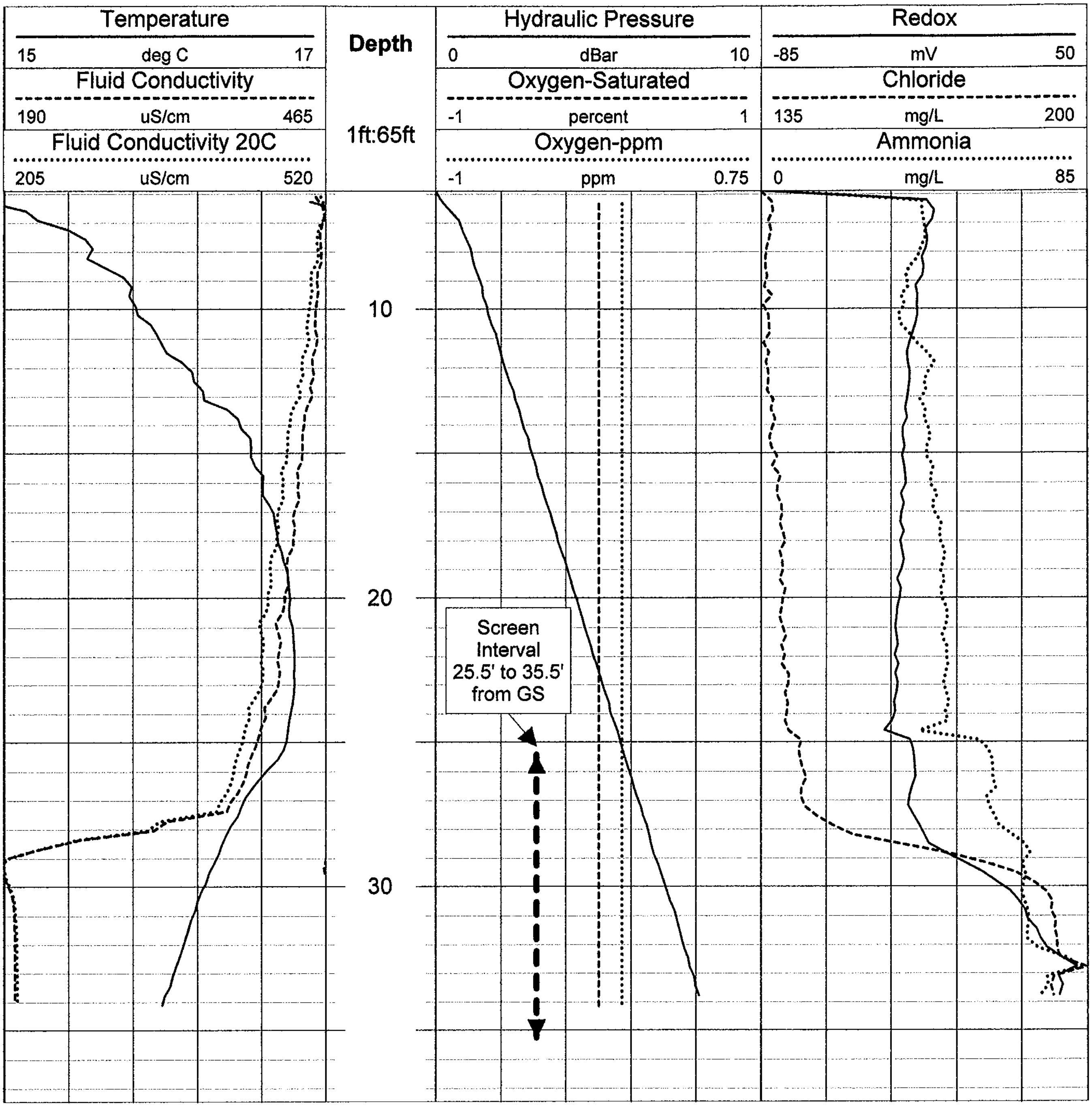
Well: MW122B Log: 122B-A

Site: PSC

City/State: Rock Hill, South Carolina		
Date: 12/18/06	Time: 10:03	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 6.36'	Measured From: GS @ ~ 09:50	
Outer Casing Height AGL (with cap open/removed): 3.7'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: -0.02	Casing Type: PVC	
Log Direction: Down	Measured from: GS	Log Speed: 16.4 fpm
Log Top: 6.3'	Log Bottom: 34.2'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9060, 2EMA
Well Diameter: 2"	Well Depth: 35.21'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: N/A	
Screen Interval: 25.5' to 35.5'; GS	Screen Type: steel	
Latitude: 34.887378°N	Longitude: -81.070457°W	

Notes: Screen interval data obtained from previous well construction documents.
Smooting points: redox = 1; NO3, Cl = 5; conductivities = 7.
GS references converted from a TIC height of 3.68' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Temperature
15 deg C 17
Fluid Conductivity
190 uS/cm 465
Fluid Conductivity 20C
205 uS/cm 520
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 10
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-85 mV 50
Chloride
135 mg/L 200
Ammonia
0 mg/L 85
10
20
30
Screen Interval 25.5' to 35.5' from GS

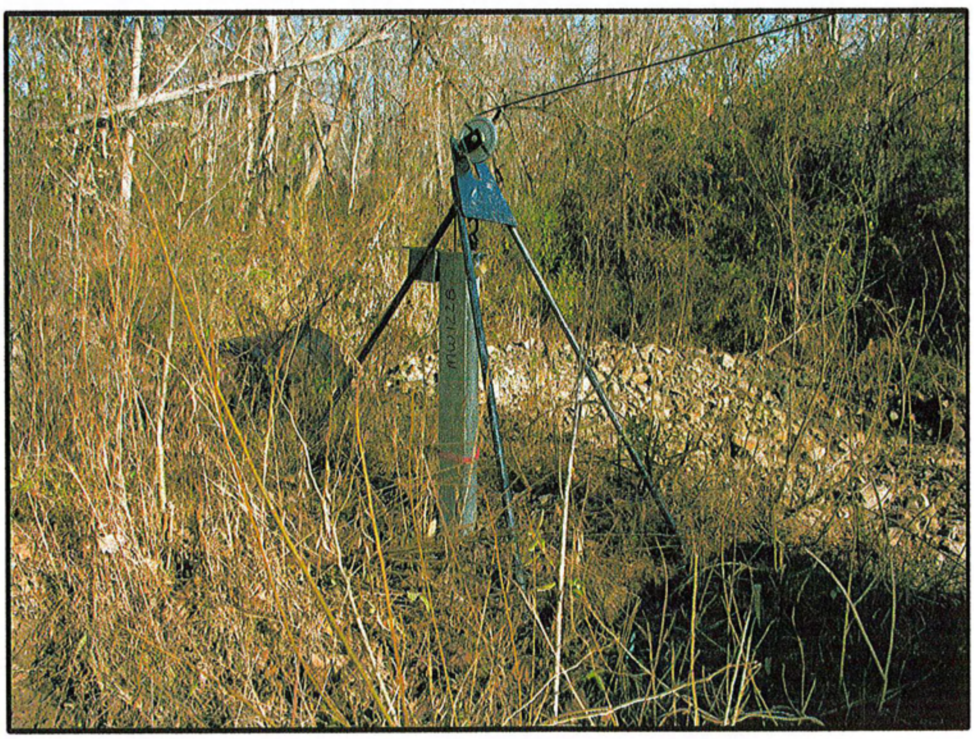
Well: MW122B — Log: 122B-B

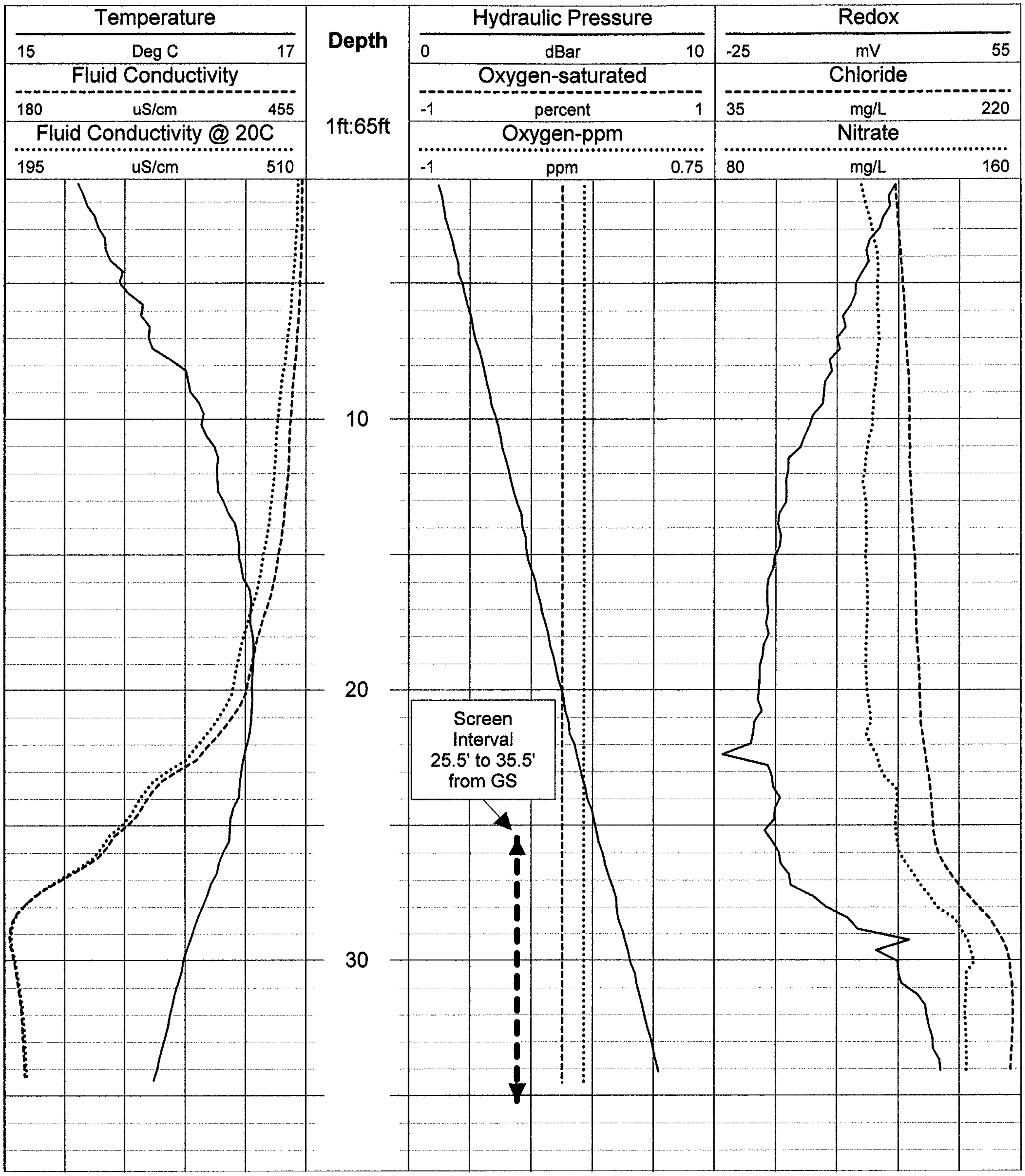
Site: PSC

City/State: Rock Hill, South Carolina		
Date: 12/18/06	Time: 10:15	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 6.36'	Measured From: GS @ ~ 09:50	
Outer Casing Height AGL (with cap open/removed): 3.7'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: -0.02	Casing Type: PVC	
Log Direction: Down	Measured from: GS	Log Speed: 15 fpm
Log Top: 6'	Log Bottom: 34.2'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9060, 2EMA
Well Diameter: 2"	Well Depth: 35.21'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: N/A	
Screen Interval: 25.5' to 35.5'; GS	Screen Type: steel	
Latitude: 34.887378°N	Longitude: -81.070457°W	

Notes:

Screen interval data obtained from previous well construction documents.
Smooting points: redox = 1; NO3, Cl = 5; conductivities = 7.
GS references converted from a TIC height of 3.68' (org. ref. pt.)
GPS values; NAD83




Temperature
15 Deg C 17
Fluid Conductivity
180 uS/cm 455
Fluid Conductivity @ 20C
195 uS/cm 510
Depth
1ft:65ft
10
20
30
Hydraulic Pressure
0 dBar 10
Oxygen-saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-25 mV 55
Chloride
35 mg/L 220
Nitrate
80 mg/L 160
Screen Interval 25.5' to 35.5' from GS

Well:	**MW122B**	**Log: 122B-C**

Site: **PSC**

City/State: Rock Hill, South Carolina	
Date: 12/18/06	Time: 10:46 2EMA; 10:58 9060
System Configuration: Mount Sopris 2EMA; Century 9060	
Water Level: 6.36'	Measured From: GS @ ~ 09:50
Outer Casing Height AGL (with cap open/removed): 3.7'	Type: Steel
Inner Casing Ht. ± Outer Casing Ht.: -0.02	Casing Type: PVC

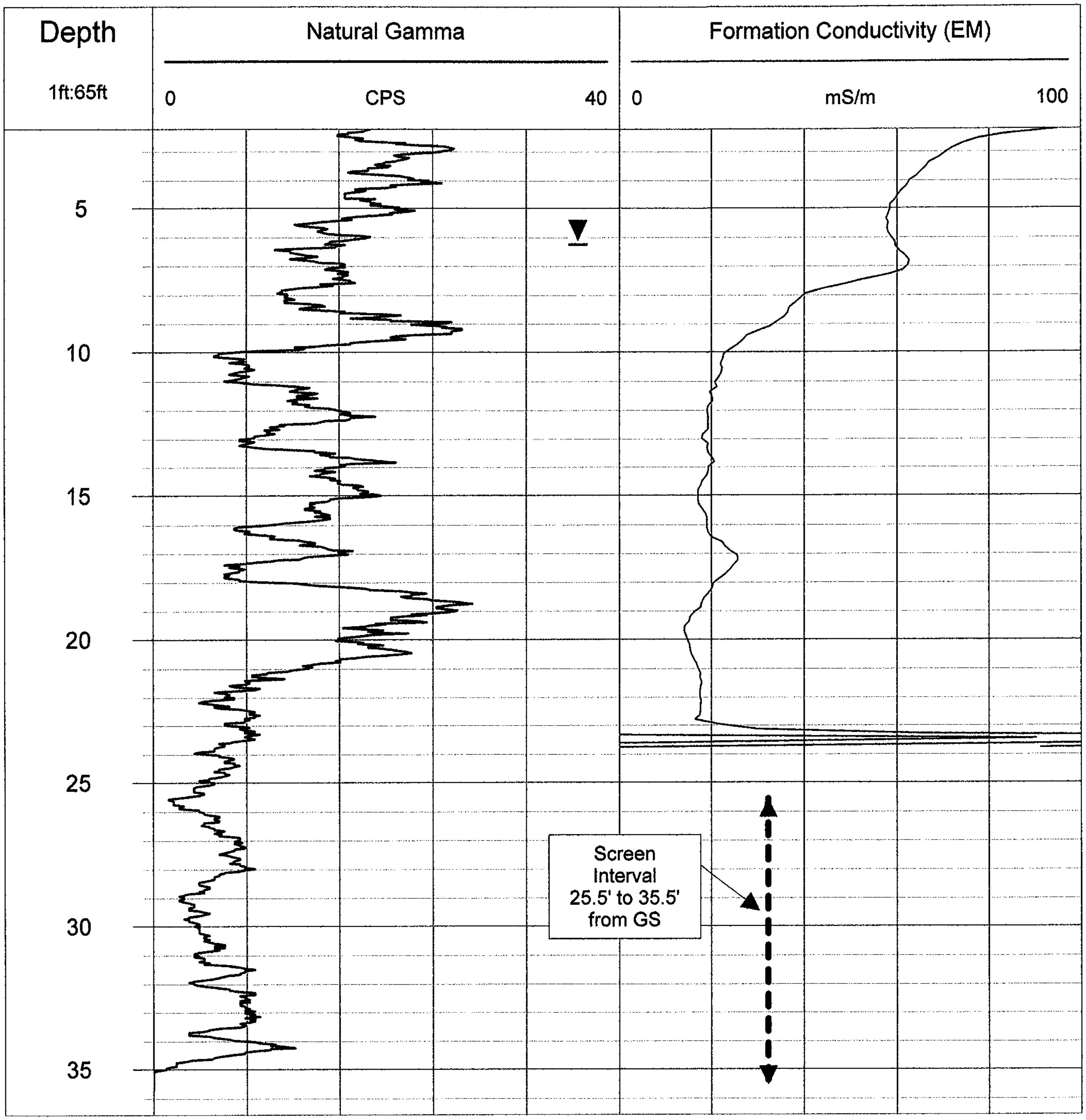
Log Direction: see notes	Measured from: GS	Log Speed: see notes
Log Top: 2.32'	Log Bottom: 35.12'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 23	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 2"	Well Depth: 38.89'	Referenced From: GS

Casing Material: PVC	Non-Cased Interval: N/A'
Screen Interval: 25.5' to 35.5'; GS	Screen Type: steel
Latitude: 34.887378°N	Longitude: -81.070457°W

Notes:

Screen interval data obtained from previous well construction documents.
9060 logged up; speed 16 fpm.
2EMA logged up; speed 15.7 fpm.
GS references converted from a TIC height of 3.68' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Depth
1ft:65ft
Natural Gamma
0
CPS
40
Formation Conductivity (EM)
0
mS/m
100
5
10
15
20
25
30
35
Screen Interval 25.5' to 35.5' from GS

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for MW123B

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 123B – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 123B – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 123B - C

Natural gamma – cps (9060 Tool)

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

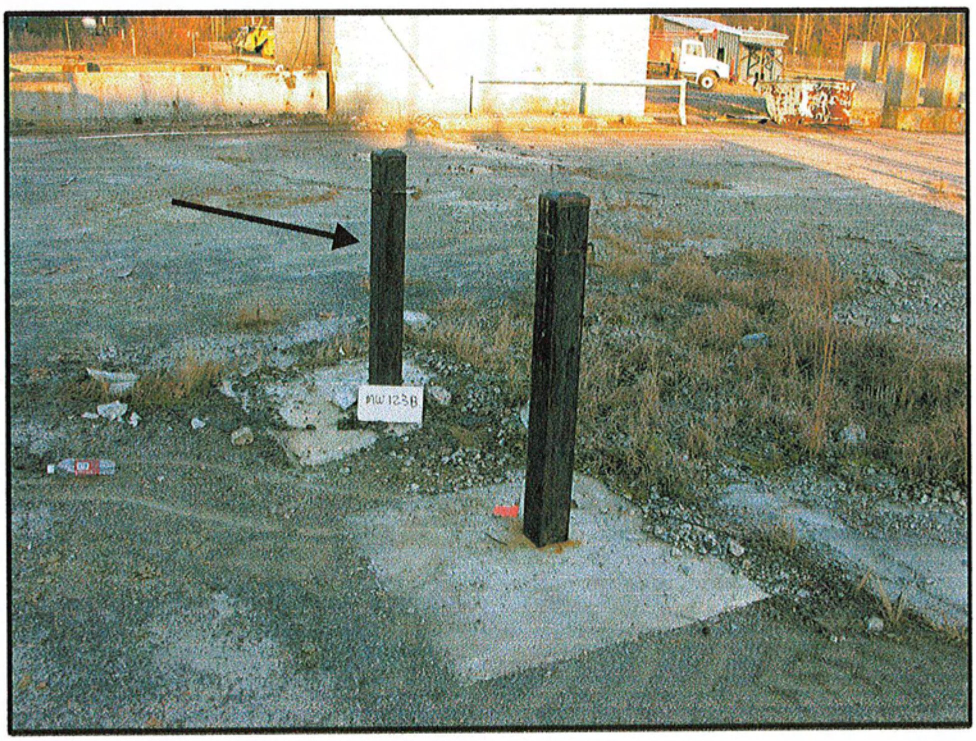
Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

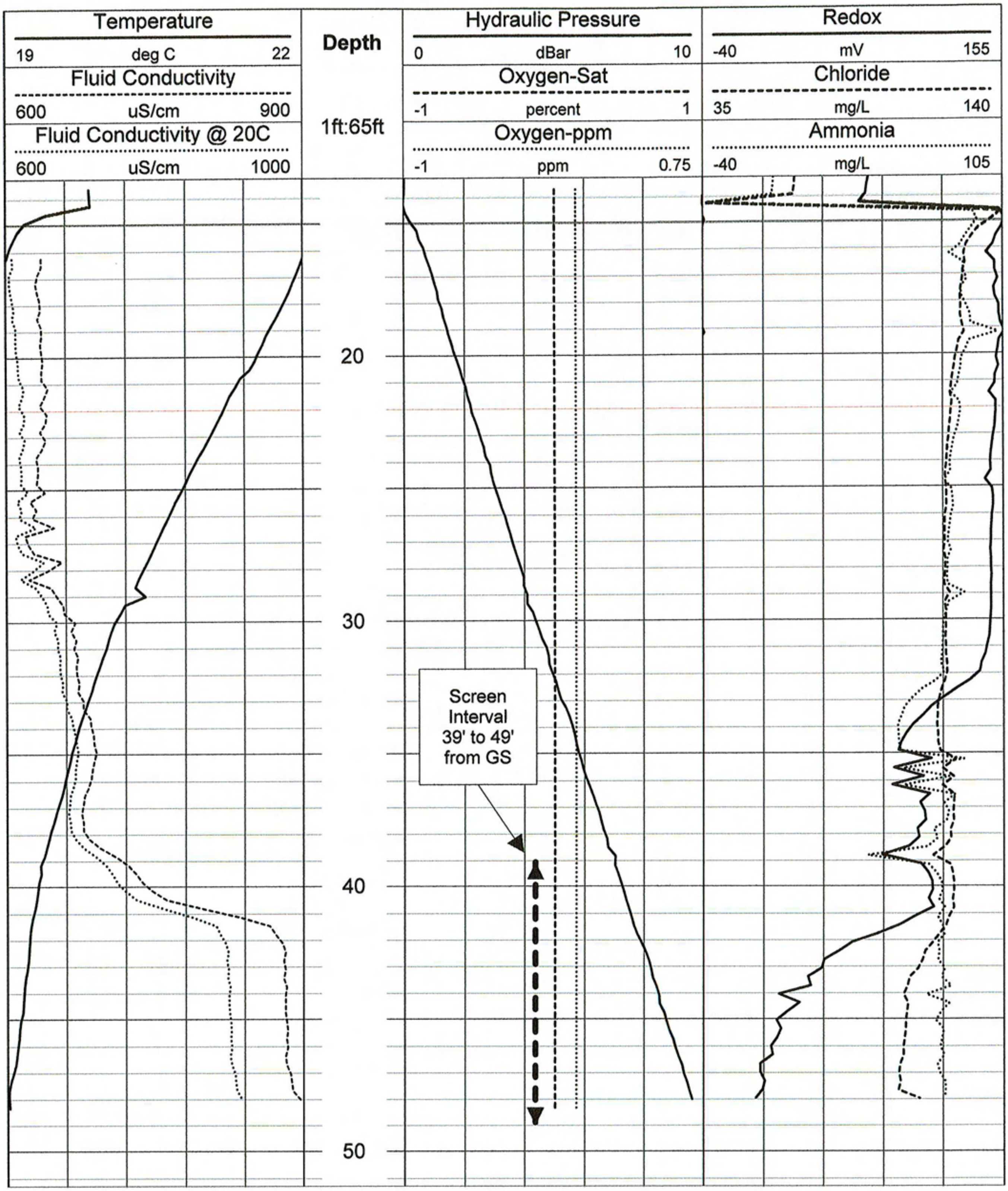
Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

Well:	MW123B	Log: 123B-A
Site:	PSC	
City/State: Rock Hill, South Carolina		
Date: 12/18/06	Time: 15:32	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 14.61'	Measured From: GS @ ~ 15:15	
Outer Casing Height AGL (with cap open/removed): 2.86'	Type: steel	
Inner Casing Ht. ± Outer Casing Ht.: +0.01	Casing Type: Stainless steel	
Log Direction: Down	Measured from: GS	Log Speed: 12.5 fpm
Log Top: 14.5'	Log Bottom: 48.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 9060
Well Diameter: 2"	Well Depth: 49'	Referenced From: GS
Casing Material: Stainless steel	Non-Cased Interval: N/A	
Screen Interval: 39' to 49'; GS	Screen Type: Stainless Steel	
Latitude: 34.888253°N	Longitude: -81.072554°W	

Notes: Screen interval data obtained from previous well consturction documents.
Fluid conductivity logs were recored at mS/cm scale, but converted to uS/cm for this log presentation.
GPS values; NAD83
GS references converted from a TIC height of 2.87' (org. ref. pt.)



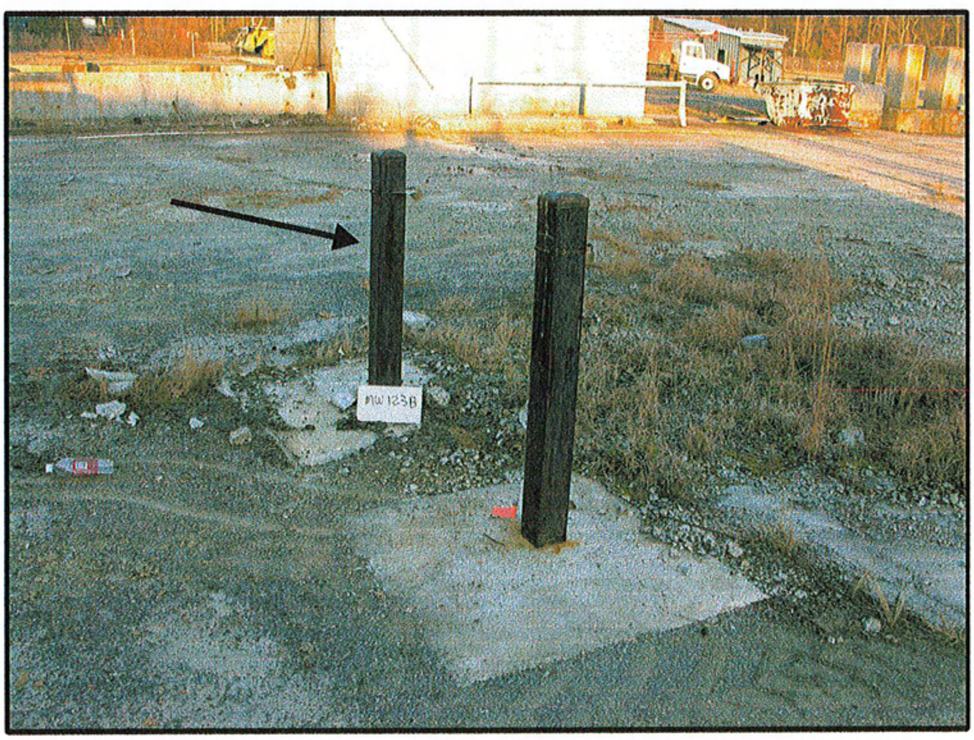


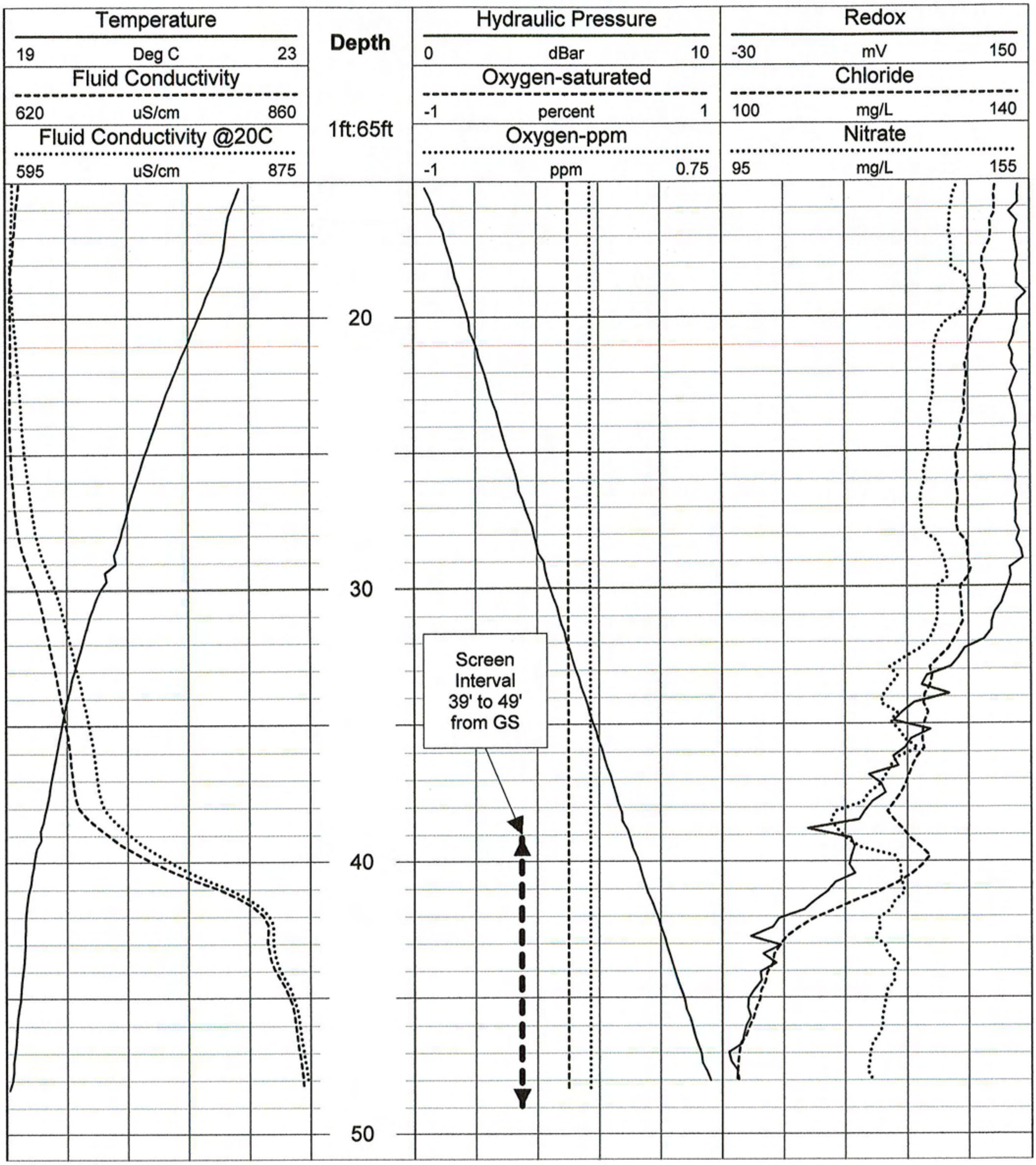
Temperature
19 deg C 22
Fluid Conductivity
600 uS/cm 900
Fluid Conductivity @ 20C
600 uS/cm 1000
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 10
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-40 mV 155
Chloride
35 mg/L 140
Ammonia
-40 mg/L 105
20
30
40
50
Screen Interval 39' to 49' from GS

Well:	MW123B	Log: 123B-B
Site:	PSC	

City/State: Rock Hill, South Carolina		
Date: 12/18/06	Time: 15:53	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 14.61'	Measured From: GS @ ~ 15:15	
Outer Casing Height AGL (with cap open/removed): 2.86'	Type: steel	
Inner Casing Ht. ± Outer Casing Ht.: +0.01	Casing Type: Stainless steel	
Log Direction: Down	Measured from: GS	Log Speed: 14.4 fpm
Log Top: 15.2'	Log Bottom: 48.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9060
Well Diameter: 2"	Well Depth: 49'	Referenced From: GS
Casing Material: Stainless steel	Non-Cased Interval: N/A	
Screen Interval: 39' to 49'; GS	Screen Type: Stainless Steel	
Latitude: 34.888253°N	Longitude: -81.072554°W	

Notes: Screen interval data obtained from previous well consturction documents.
Smoothing points: redox = 1; conductivities, Cl, NO3 = 5.
GS references converted from a TIC height 2.87' (org. ref. pt.)
GPS values; NAD83





Temperature
19 Deg C 23
Fluid Conductivity
620 uS/cm 860
Fluid Conductivity @20C
595 uS/cm 875
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 10
Oxygen-saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-30 mV 150
Chloride
100 mg/L 140
Nitrate
95 mg/L 155
20
30
40
50
Screen Interval 39' to 49' from GS

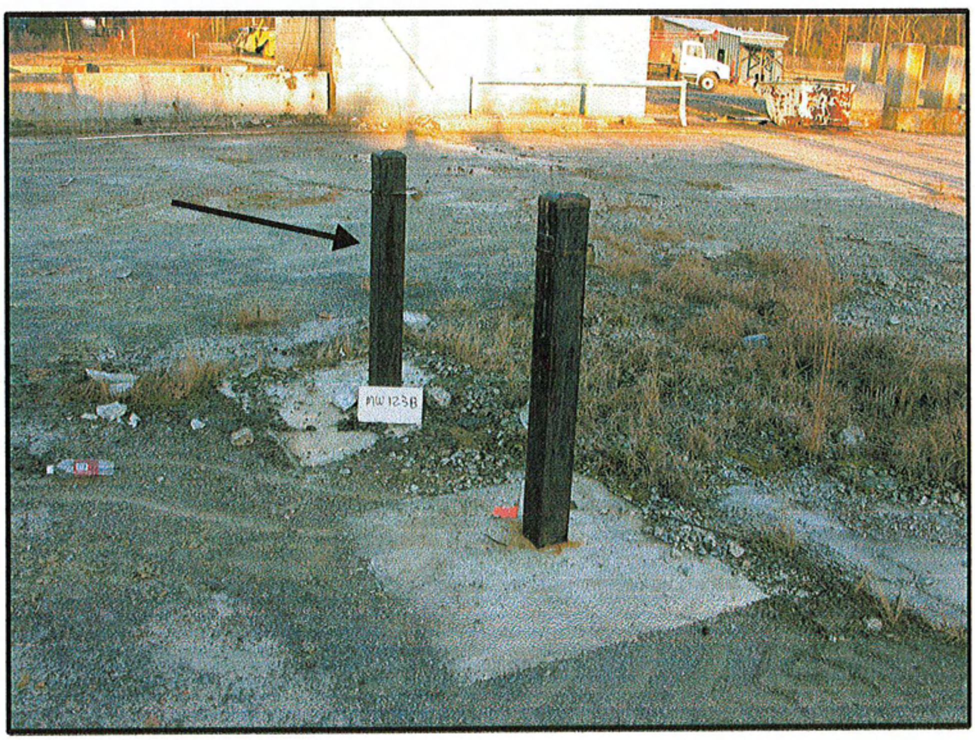
Well:	MW123B	Log: 123B-C

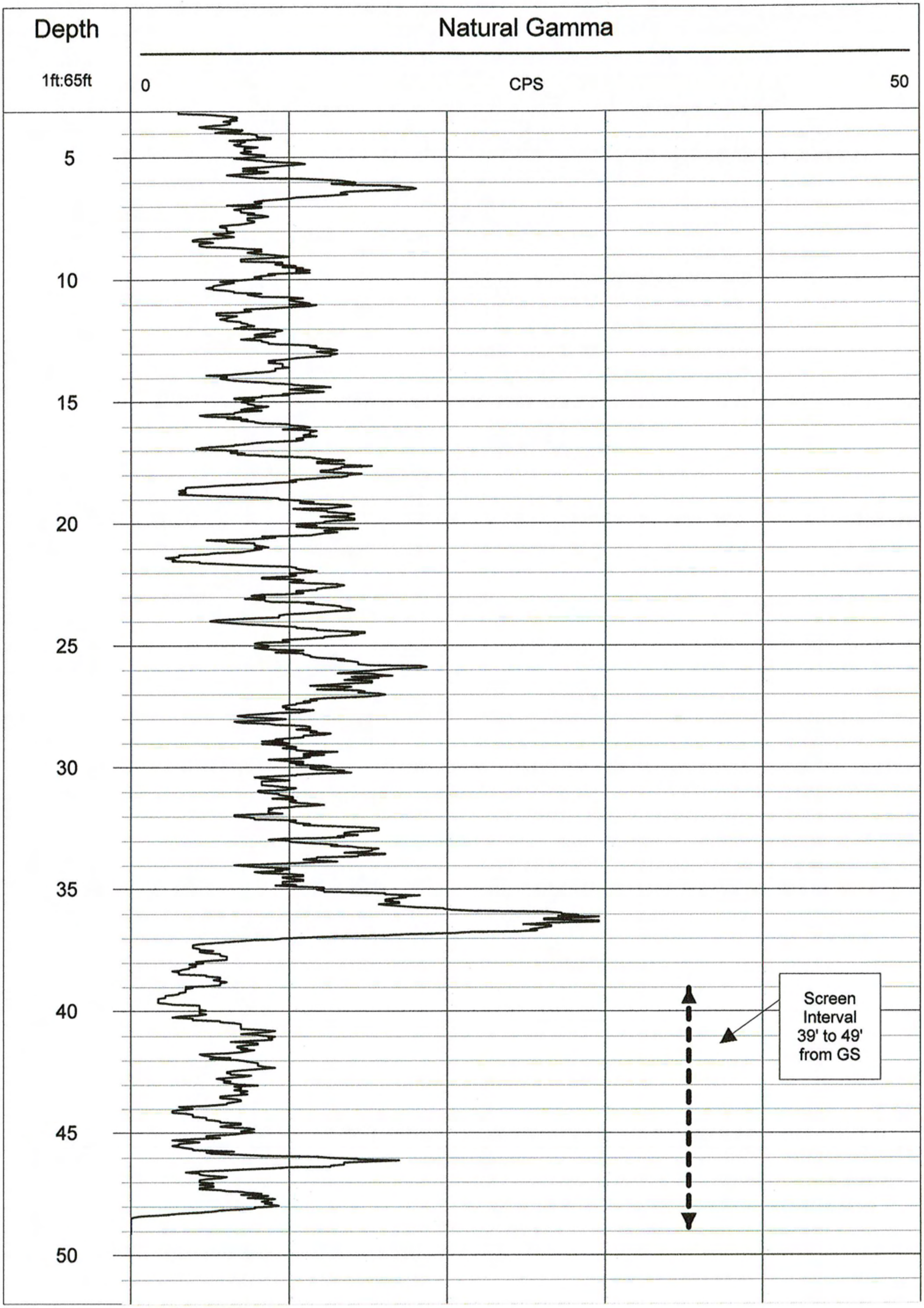
Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/18/06	Time: 16:14	
System Configuration: Century 9060		
Water Level: 14.61'	Measured From: GS @ ~ 15:15	
Outer Casing Height AGL (with cap open/removed): 2.86'	Type: steel	
Inner Casing Ht. ± Outer Casing Ht.: +0.01	Casing Type: Stainless steel	
Log Direction: Up	Measured from: GS	Log Speed: 18 fpm
Log Top: 3.1'	Log Bottom: 49.1'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: natural gamma = 23	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 2"	Well Depth: 49'	Referenced From: GS
Casing Material: Stainless steel	Non-Cased Interval: N/A	
Screen Interval: 39' to 49'	Screen Type: Stainless Steel	
Latitude: 34.888253°N	Longitude: -81.072554°W	

Notes: Screen interval data obtained from previous well consturction documents.
GS references converted from a TIC height 2.87' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Depth
1ft:65ft
Natural Gamma
0
CPS
50
5
10
15
20
25
30
35
40
45
50
Screen
Interval
39' to 49'
from GS

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for OB 109B

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 109B – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 109B – B

Natural gamma – cps (9060 Tool)
Caliper, 3-arm - inches
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5” diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4” diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

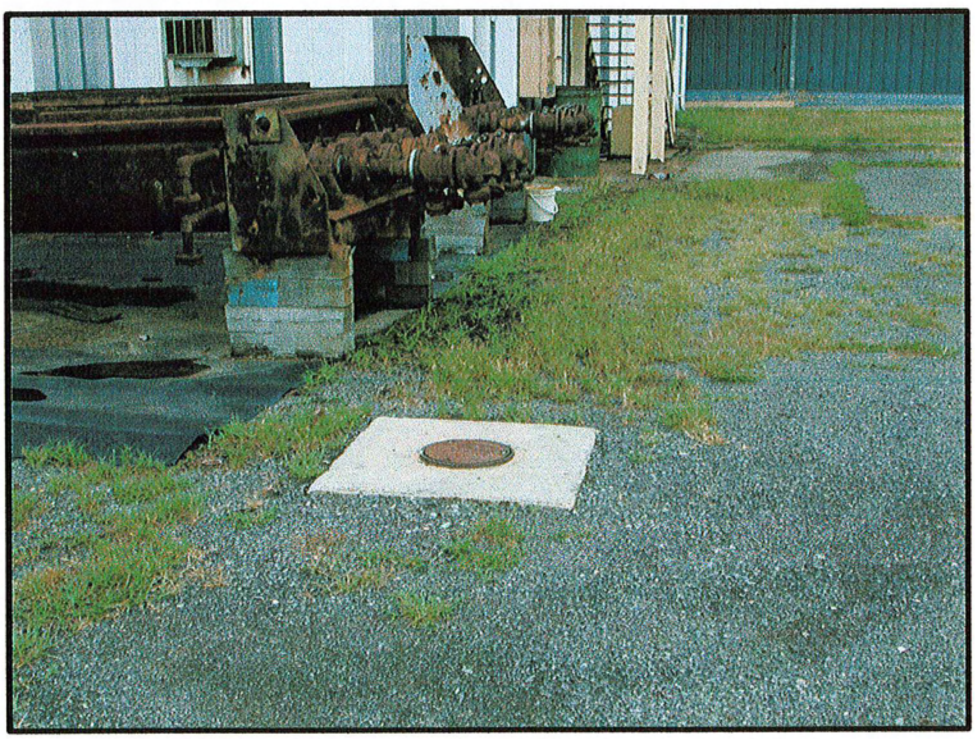
Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

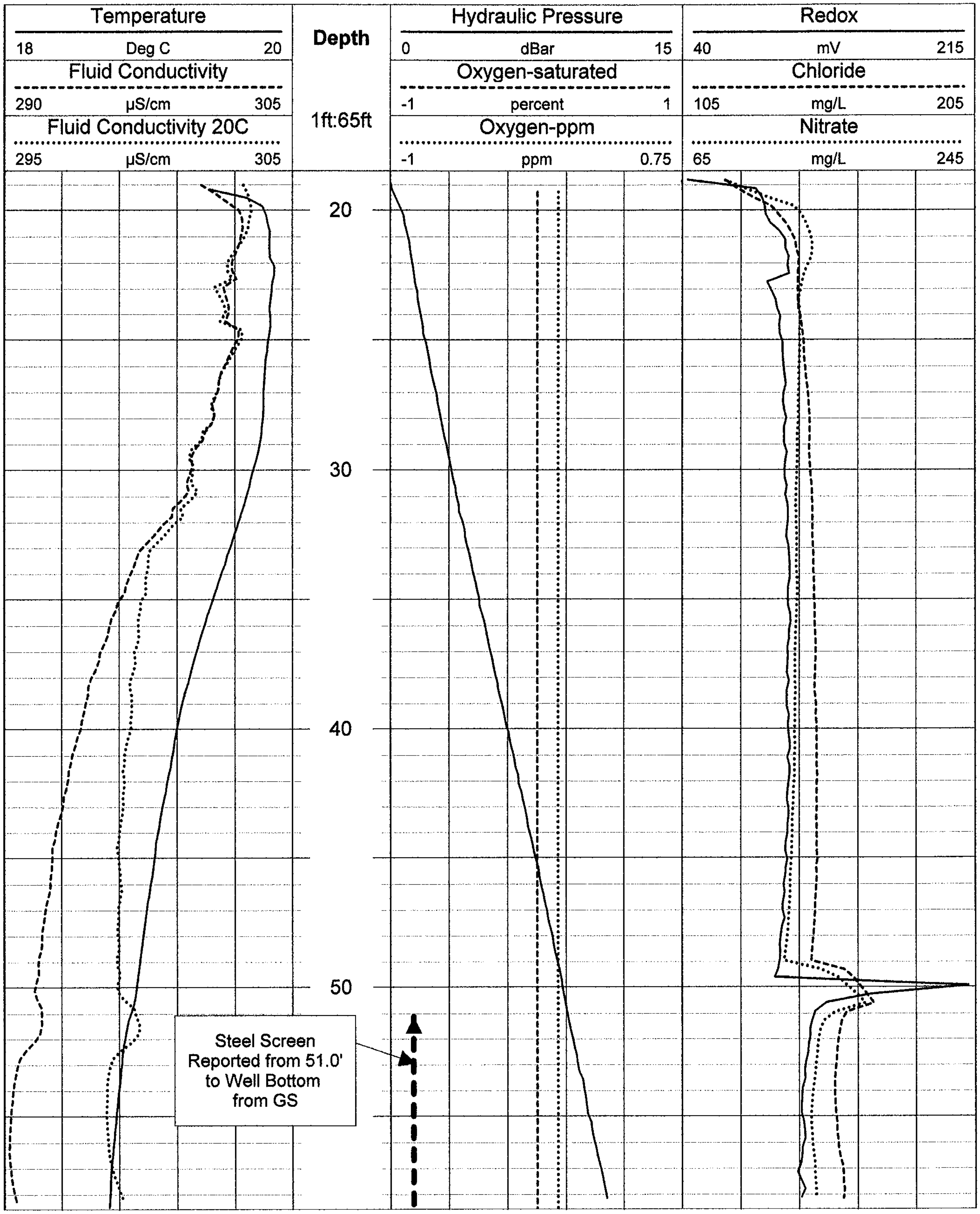
Well: OB 109B   Log: 109B-A

Site: PSC

City/State: Rock Hill, South Carolina		
Date: 12/16/06	Time: 09:10	
System Configuration: Mount sopris 2IDA with nitrate option		
Water Level: 18.95'	Measured From: GS @ ~ 09:00	
Outer Casing Height AGL (with cap open/removed): 0'	Type: Flush mount	
Inner Casing Ht. ± Outer Casing Ht.: -0.4	Casing Type: see notes	
Log Direction: Down	Measured from: GS	Log Speed: 11.8 fpm
Log Top: 18.9'	Log Bottom: 58.6'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9060
Well Diameter: 2"	Well Depth: 62'	Referenced From: GS
Casing Material: See notes	Non-Cased Interval: N/A	
Screen Interval: 51.0' to end; GS	Screen Type: Steel	
Latitude: 34.88801120°N	Longitude: -81.07295565°W	

Notes: PVC casing to 51.0'; Steel well screen from 51.0' to bottom.
Screen interval data obtained from previous well construction documents.
Smoothing; redox = 1; conductivities, NO3, and Cl = 5.
This log was the first well traverse.
GS references converted from a casing height -0.4' (org. ref. pt.)





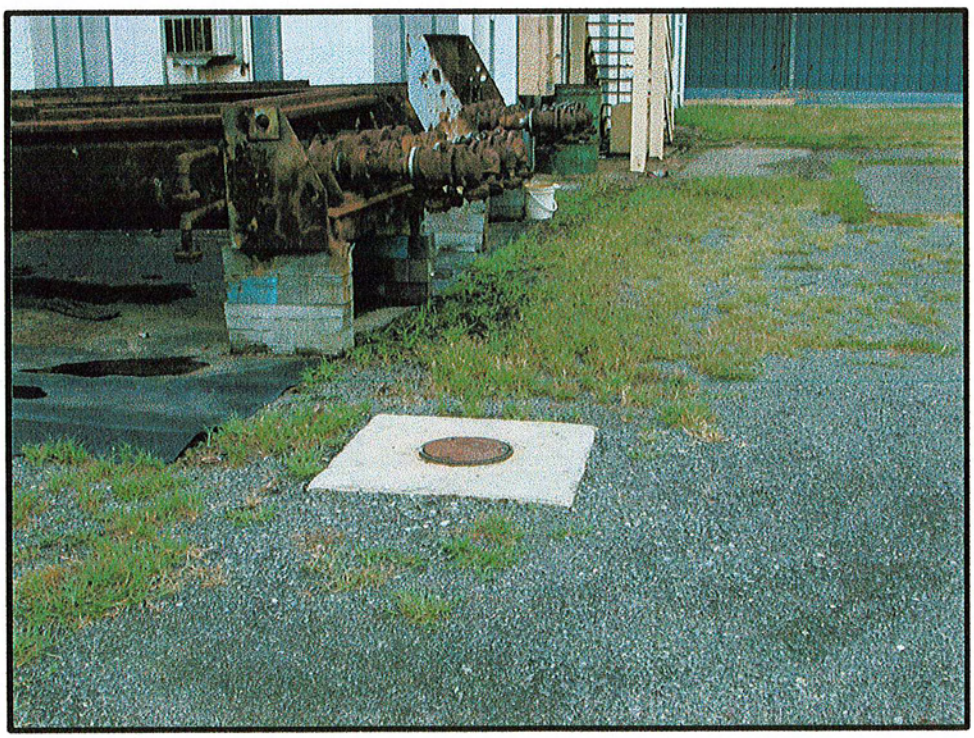
Temperature
18 Deg C 20
Fluid Conductivity
290 µS/cm 305
Fluid Conductivity 20C
295 µS/cm 305
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 15
Oxygen-saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
40 mV 215
Chloride
105 mg/L 205
Nitrate
65 mg/L 245
20
30
40
50
Steel Screen Reported from 51.0' to Well Bottom from GS

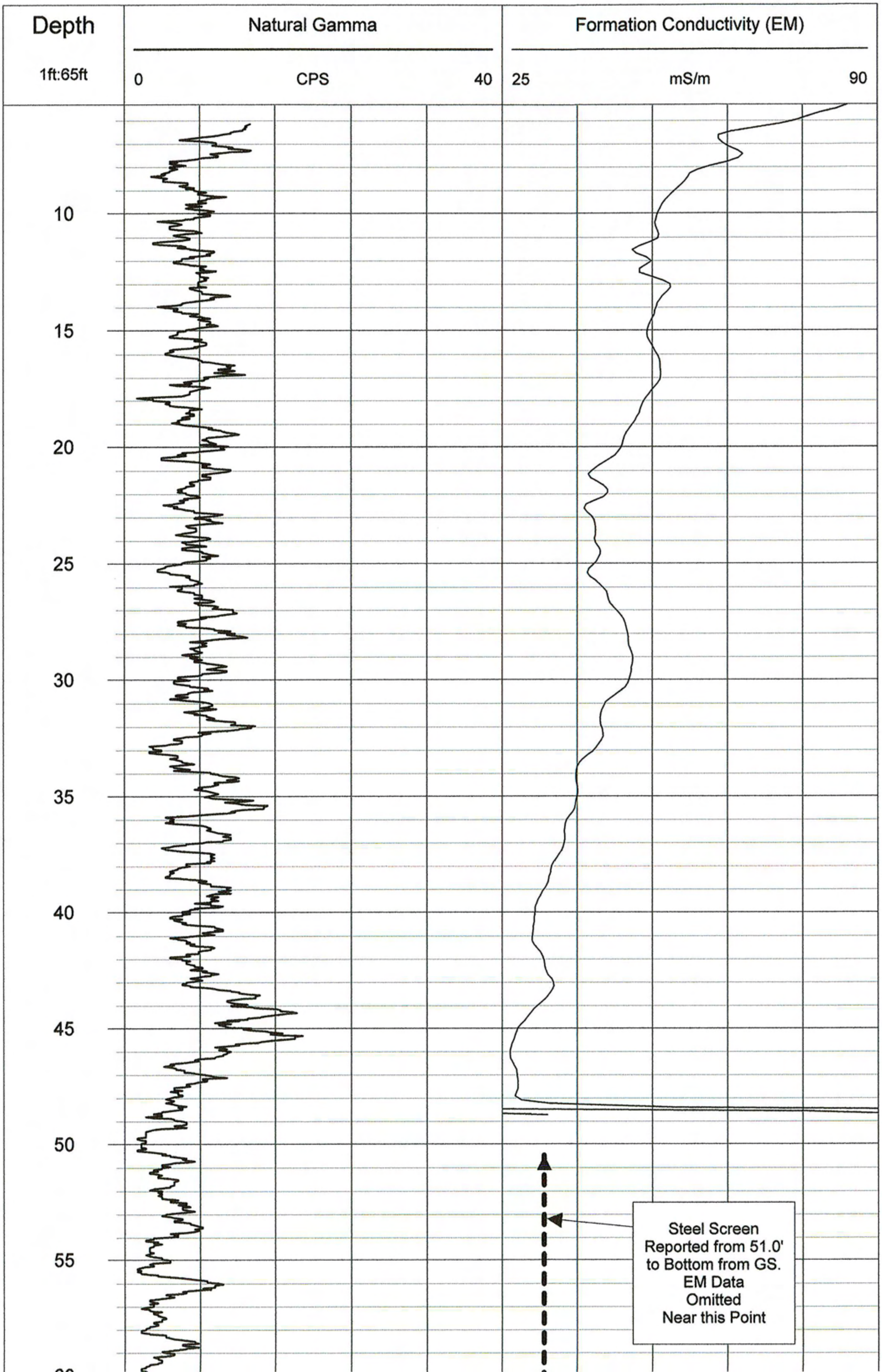
Well:	**OB 109B**	**Log: 109B-B**

Site:	**PSC**

City/State: Rock Hill, South Carolina		
Date: 12/16/06	Time: See notes	
System Configuration: Century 9060; mount sopris 2EMA		
Water Level: 18.95'	Measured From: GS @ ~ 09:00	
Outer Casing Height AGL (with cap open/removed): 0'	Type: Flush mount	
Inner Casing Ht. ± Outer Casing Ht.: -0.4	Casing Type: see notes	
Log Direction: Up	Measured from: GS	Log Speed: see notes
Log Top: 5.3'	Log Bottom: 60.1'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: natural gamma = 23	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 2"	Well Depth: 62'	Referenced From: GS
Casing Material: See notes	Non-Cased Interval: N/A	
Screen Interval: 51.0' to bottom	Screen Type: Steel	
Latitude: 34.88801120°N	Longitude: -81.07295565°W	

Notes: PVC casing to 51.0'; Steel well screen from 51.0' to bottom.
2EMA 09:53@ 14.4 fpm; natural gamma 10:19 @ 17 fpm.
Screen interval data obtained from previous well construction documents.
2EMA stabilized after 22 minutes.
GS references converted from a casing height -0.4' (org. ref. pt.)





Depth
1ft:65ft
Natural Gamma
0
CPS
40
Formation Conductivity (EM)
25
mS/m
90
10
15
20
25
30
35
40
45
50
55
Steel Screen
Reported from 51.0'
to Bottom from GS.
EM Data
Omitted
Near this Point

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for P3

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log P3 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log P3 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log P3 - C

Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

Well:	**P3**	**Log: P3 - A**

Site:	**PSC**

City/State: Rock Hill, South Carolina

Date: 12/15/06	Time: 14:25

System Configuration: Mount Sopris 2IDA with ammonia option

Water Level: 14.45'	Measured From: GS @ ~ 15:00

Outer Casing Height AGL (with cap open/removed): 0.0 Type: Flushmount

Inner Casing Ht. ± Outer Casing Ht.: -0.2	Casing Type: PVC

Log Direction: Down	Measured from: GS	Log Speed: 18 fpm
Log Top: 14.7'	Log Bottom: 32.5'	Reference Point: GS

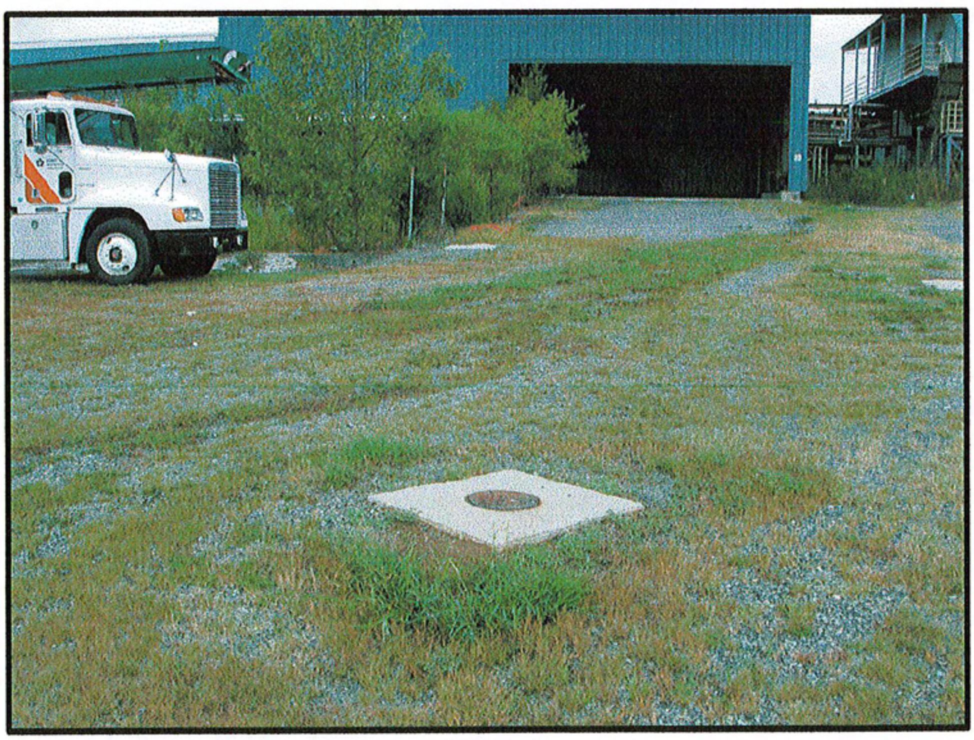
Analysis Software: WellCAD	Smoothing Points: Redox = 1

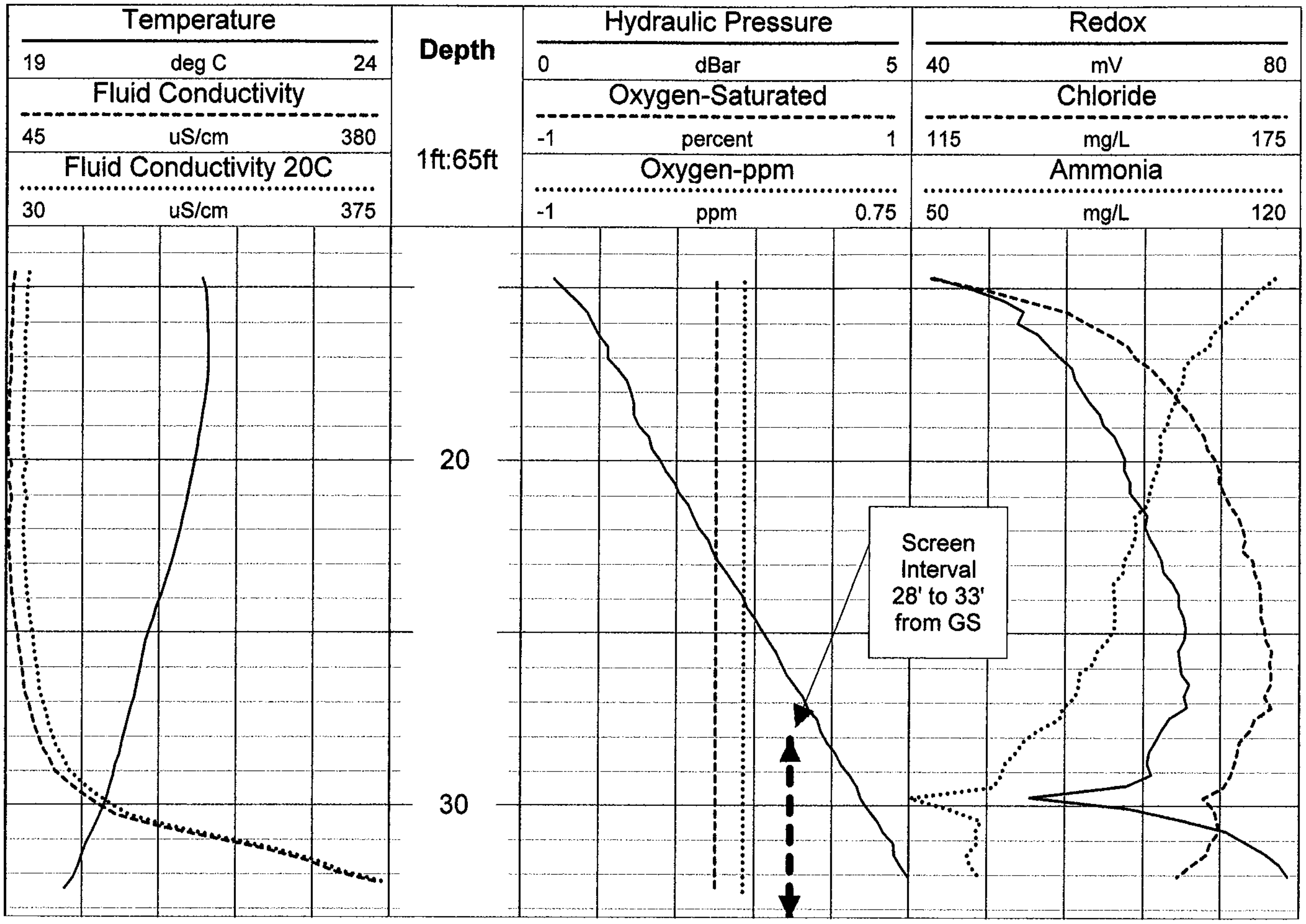
Operator: JRU	Witness: None	Other Tools Used: 2EMA
Well Diameter: 2"	Well Depth: 34.69'	Referenced From: GS

Casing Material: PVC	Non-Cased Interval: N/A
Screen Interval: 28' to 33'	Screen Type: PVC
Latitude: 34.88858218°N	Longitude: -81.07199365°W

Notes: Screen interval data obtained from previous well construction documents.
GS references converted from a TIC height of +0.2' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Temperature
19 deg C 24
Fluid Conductivity
45 uS/cm 380
Fluid Conductivity 20C
30 uS/cm 375
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 5
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
40 mV 80
Chloride
115 mg/L 175
Ammonia
50 mg/L 120
20
30
Screen Interval 28' to 33' from GS

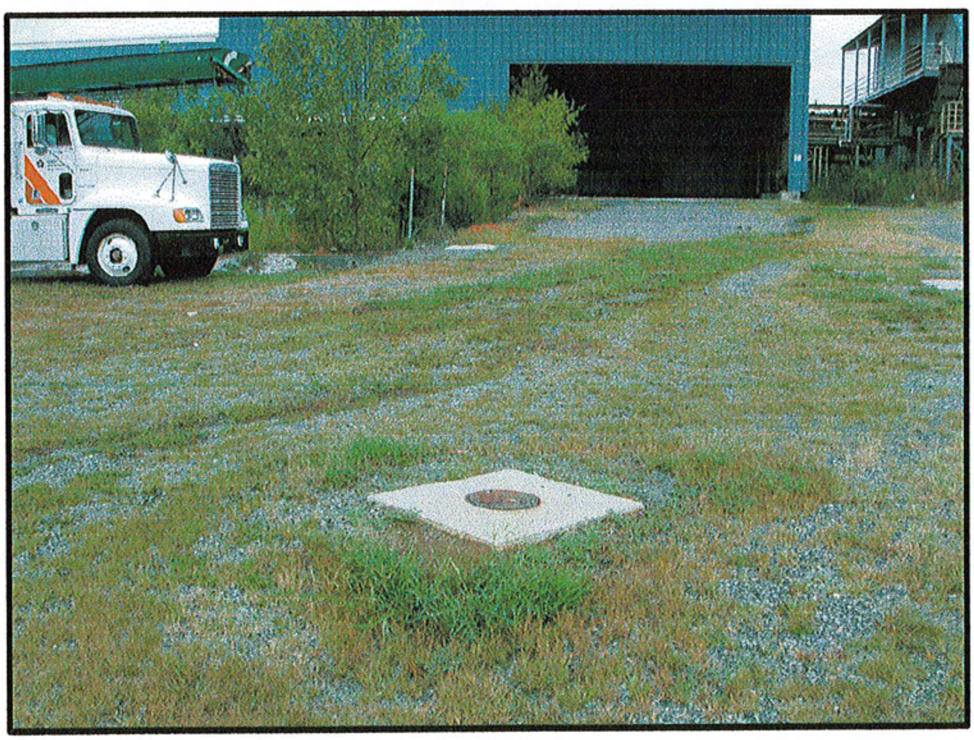
Well:	P3	Log: P3 - B

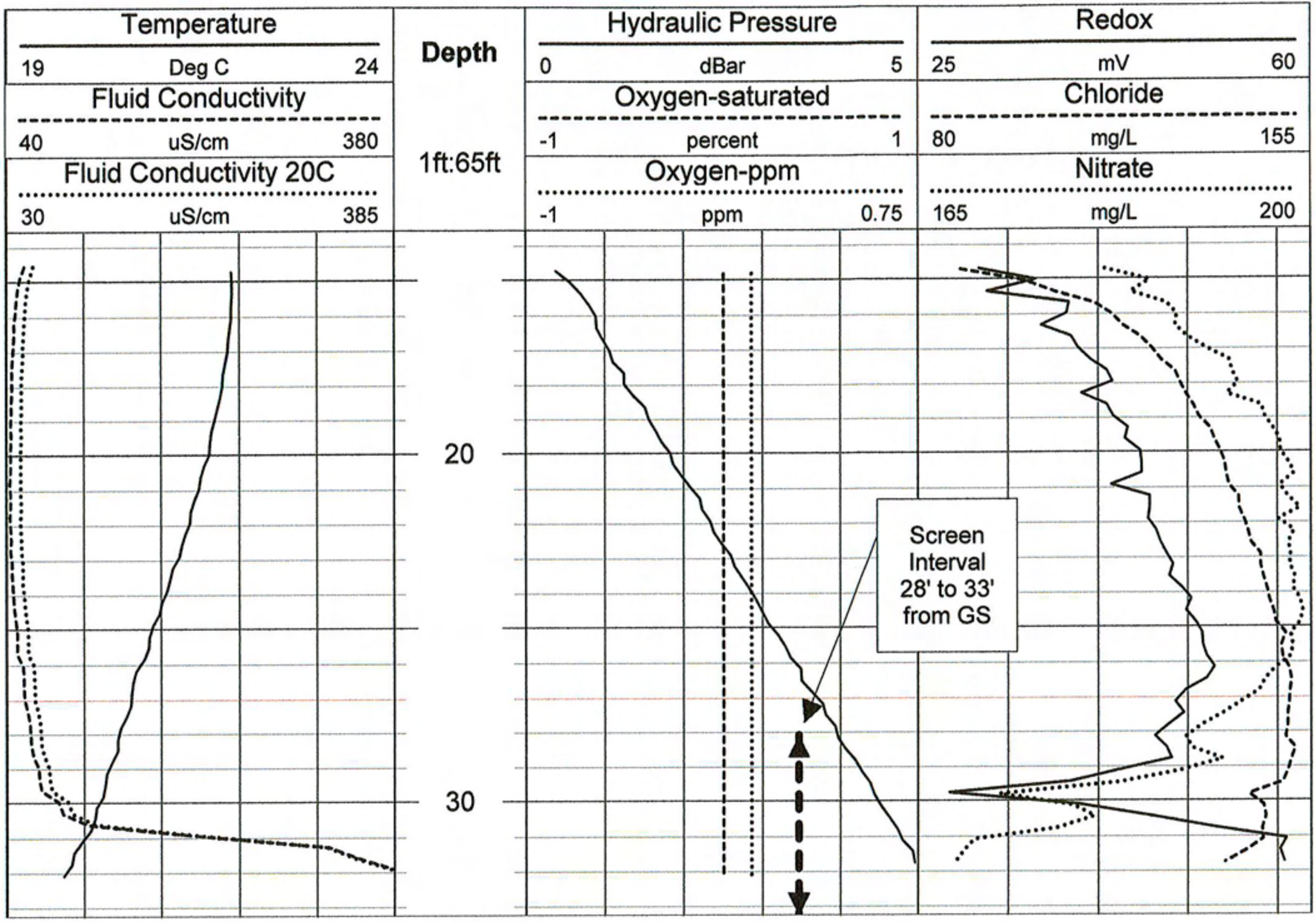
Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/15/06	Time: 14:15	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 14.45'	Measured From: GS @ ~ 15:00	
Outer Casing Height AGL (with cap open/removed): 0.0	Type: Flushmount	
Inner Casing Ht. ± Outer Casing Ht.: -0.2	Casing Type: PVC	
Log Direction: Down	Measured from: GS	Log Speed: 12 fpm
Log Top: 14.7'	Log Bottom: 32.2'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: See notes	
Operator: JRU	Witness: none	Other Tools Used: 2EMA
Well Diameter: 2"	Well Depth: 34.69'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: N/A	
Screen Interval: 28' to 33'	Screen Type: PVC	
Latitude: 34.88858218°N	Longitude: -81.07199365°W	

Notes: GS references converted from a TIC height of +0.2' (org. ref. pt.)
Smoothing points; Cl, redox, conductivites, NO3 = 1
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





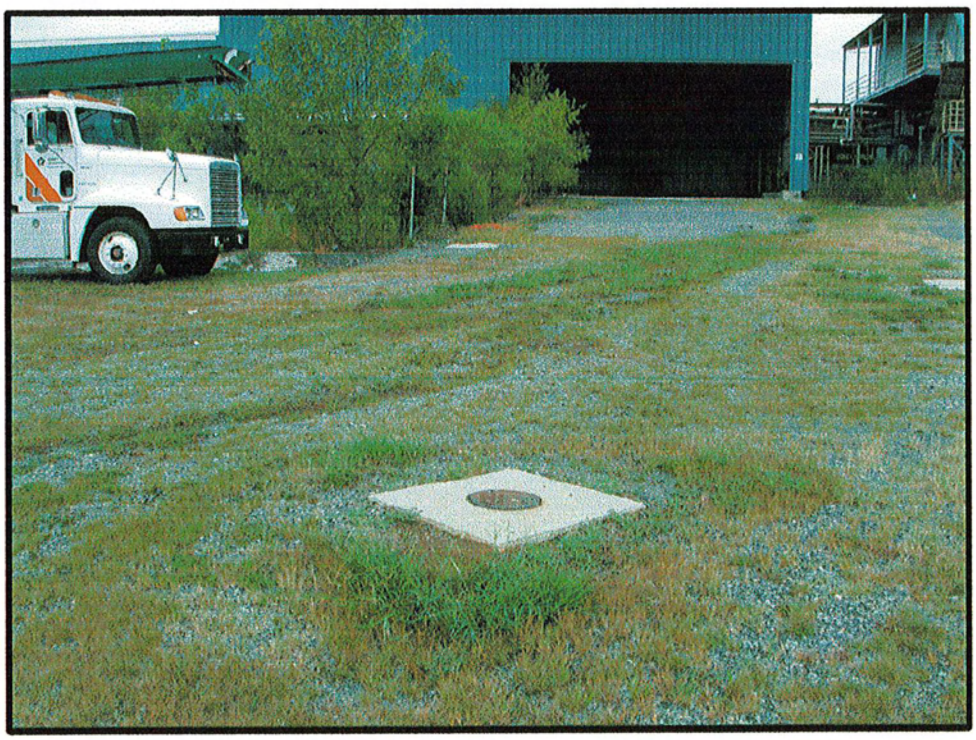
Temperature
19 Deg C 24
Fluid Conductivity
40 uS/cm 380
Fluid Conductivity 20C
30 uS/cm 385
Depth
1ft:65ft
20
30
Hydraulic Pressure
0 dBar 5
Oxygen-saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Screen Interval 28' to 33' from GS
Redox
25 mV 60
Chloride
80 mg/L 155
Nitrate
165 mg/L 200

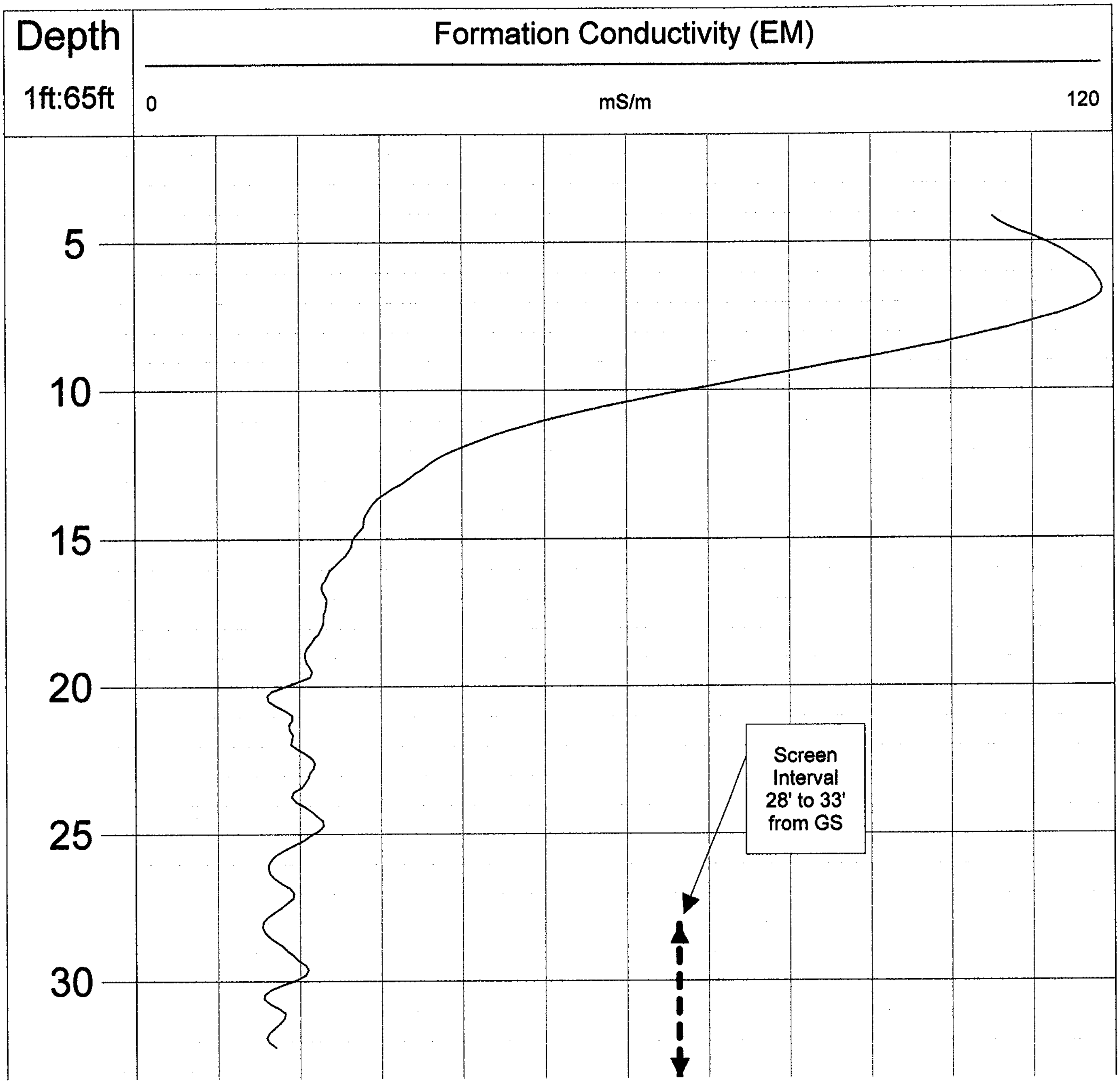
Well: P3 Log: P3 - C

Site: PSC

City/State: Rock Hill, South Carolina		
Date: 12/15/06	Time: 14:57	
System Configuration: Mount Sopris 2EMA		
Water Level: 14.45'	Measured From: GS @ ~ 15:00	
Outer Casing Height AGL (with cap open/removed): 0.0	Type: Flushmount	
Inner Casing Ht. ± Outer Casing Ht.: -0.2	Casing Type: PVC	
Log Direction: Up	Measured from: GS	Log Speed: 12.5 fpm
Log Top: 4.2'	Log Bottom: 32.2'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: None	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 2"	Well Depth: 34.69'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: N/A	
Screen Interval: 28' to 33'	Screen Type: PVC	
Latitude: 34.88858218°N	Longitude: -81.07199365°W	

Notes: Screen interval data obtained from previous well construction documents.
2EMA stabilized after 14 minutes.
GS references converted from a TIC height of +0.2' (org. ref. pt.)
GPS values; NAD83




Depth
1ft:65ft
Formation Conductivity (EM)
0
mS/m
120
5
10
15
20
25
30
Screen Interval 28' to 33' from GS

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for PW3

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log PW3 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log PW3 – B

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log PW3 - C

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5” diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4” diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

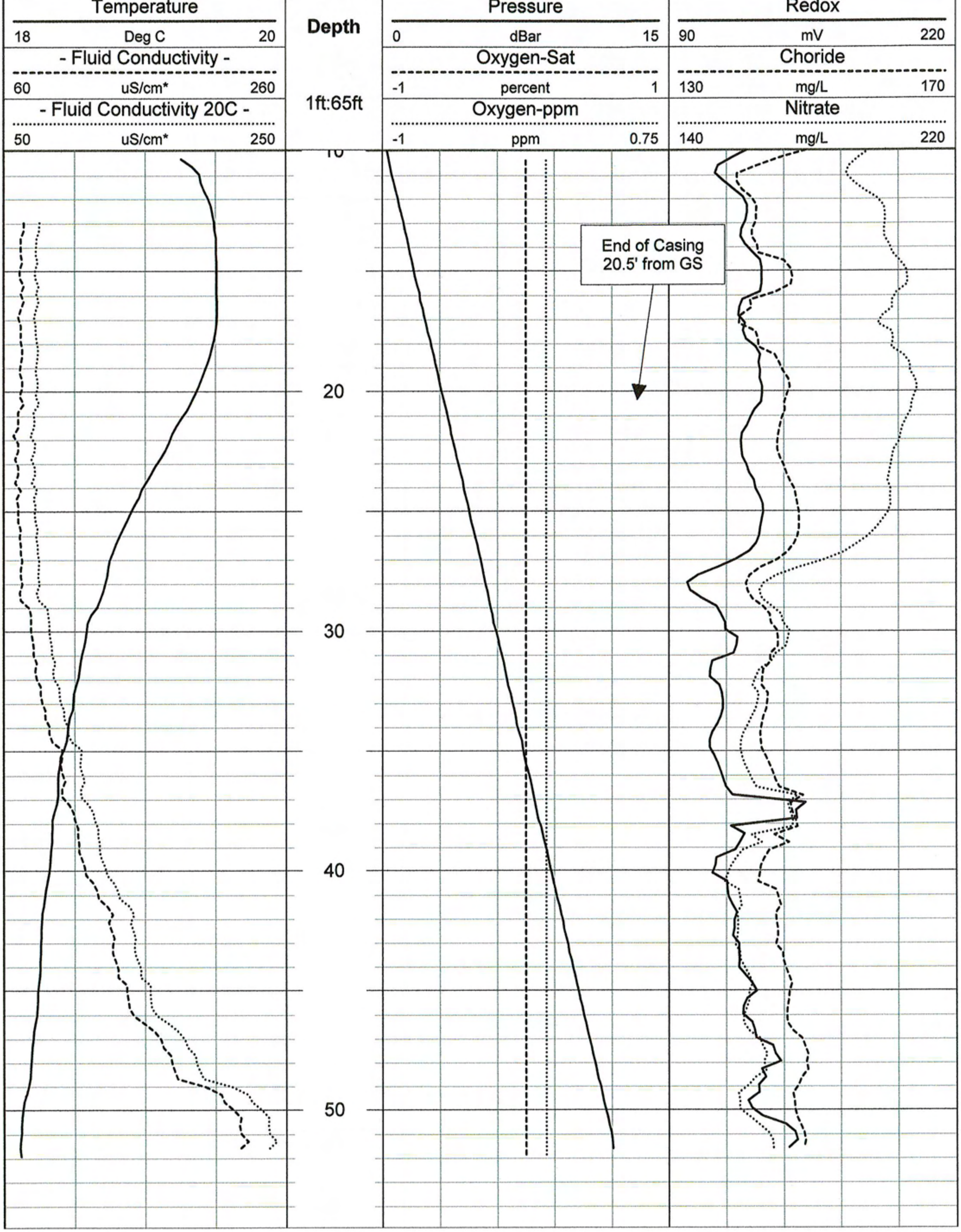
Well:	PW3	Log: PW3-A

Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/13/06	Time: 14:30	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 9.63'	Measured From: GS @ ~ 14:10	
Outer Casing Height AGL (with cap open/removed): 2.9'	Type: Steel riser	
Inner Casing Ht. ± Outer Casing Ht.: none	Casing Type: Steel	
Log Direction: Down	Measured from: GS	Log Speed: 17 fpm
Log Top: 10.0'	Log Bottom: 52.0'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox=3; Cl & NO3= 5	
Operator: JRU	Witness: None	Other Tools Used: 2EMA
Well Diameter: 6"	Well Depth: 52.3'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 20.5' to bottom	
Screen Interval: Unknown	Screen Type: N/A	
Latitude: 34.88858218°N	Longitude: -81.07422663°W	

Notes: GS references converted from a casin height of 2.9' (org. ref. pt.).
* Fluid conductivity in uS/cm converted from data collected at mS/cm.
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Temperature
18 Deg C 20
- Fluid Conductivity -
60 uS/cm* 260
- Fluid Conductivity 20C -
50 uS/cm* 250
Depth
1ft:65ft
Pressure
0 dBar 15
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
90 mV 220
Choride
130 mg/L 170
Nitrate
140 mg/L 220
10
20
30
40
50
End of Casing
20.5' from GS

Well:	PW3	Log: PW3-B

Site:	PSC

City/State: Rock Hill, South Carolina

Date: 12/13/06	Time: See notes

System Configuration: Century 9041 & 9065

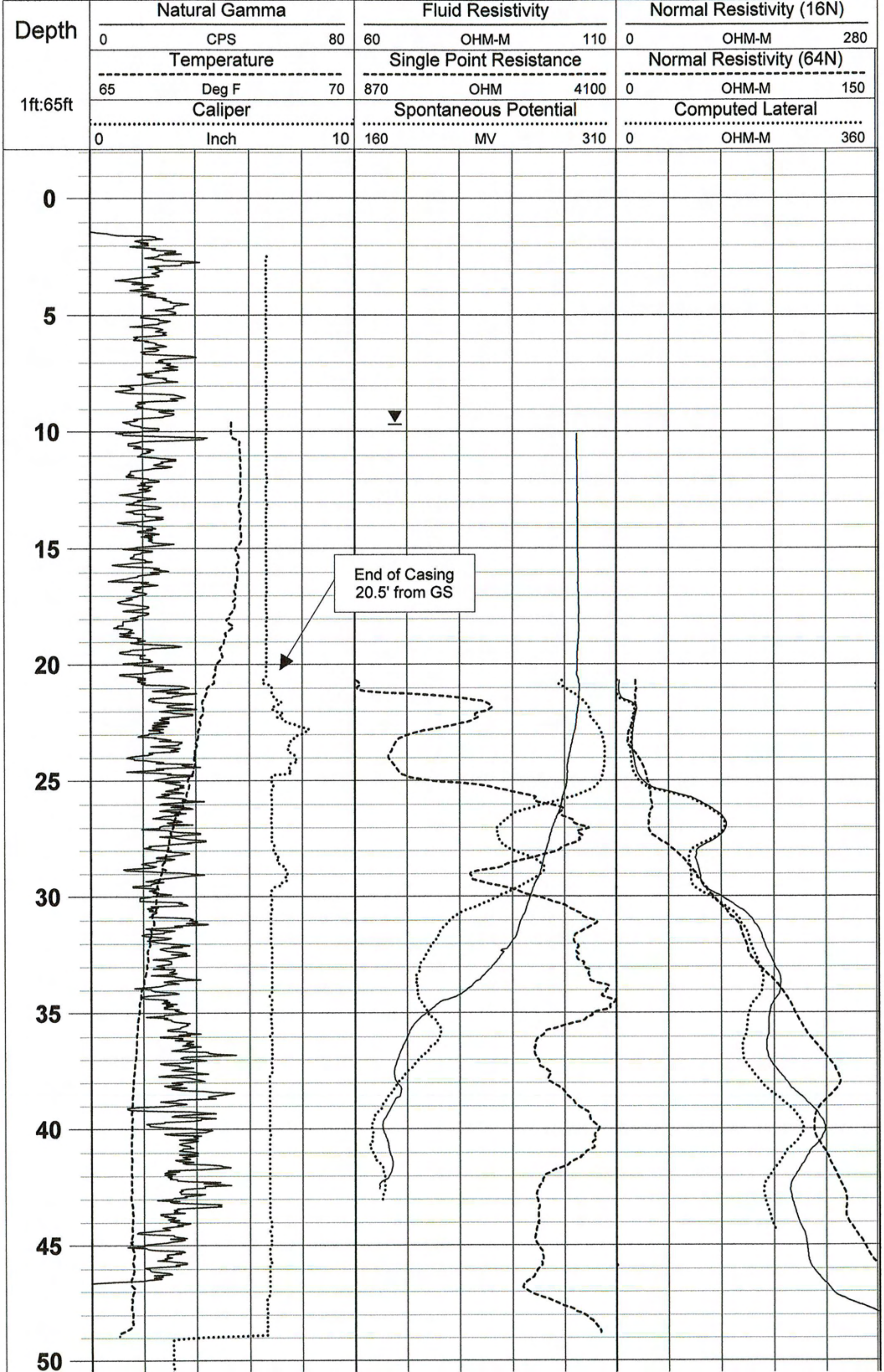
Water Level: 9.63'	Measured From: GS at ~ 14:30

Outer Casing Height AGL (with cap open/removed): 2.9' Type: Steel riser

Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: GS	Log Speed: various
Log Top: 1.5'	Log Bottom: 52.2'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: natural gamma = 9	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 2IDA
Well Diameter: 6"	Well Depth: 52.3'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 20.5' to bottom	
Screen Interval: Unknown	Screen Type: N/A	
Latitude: 34.88858218°N	Longitude: -81.07422663°W	

Notes:
9065 (caliper) logged up @ 18 fpm at 14:39.
9041 (natural gamma only) logged down @ 18 fpm at 15:19.
GS references converted from a casing height of 2.9' (org. ref. pt.).
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

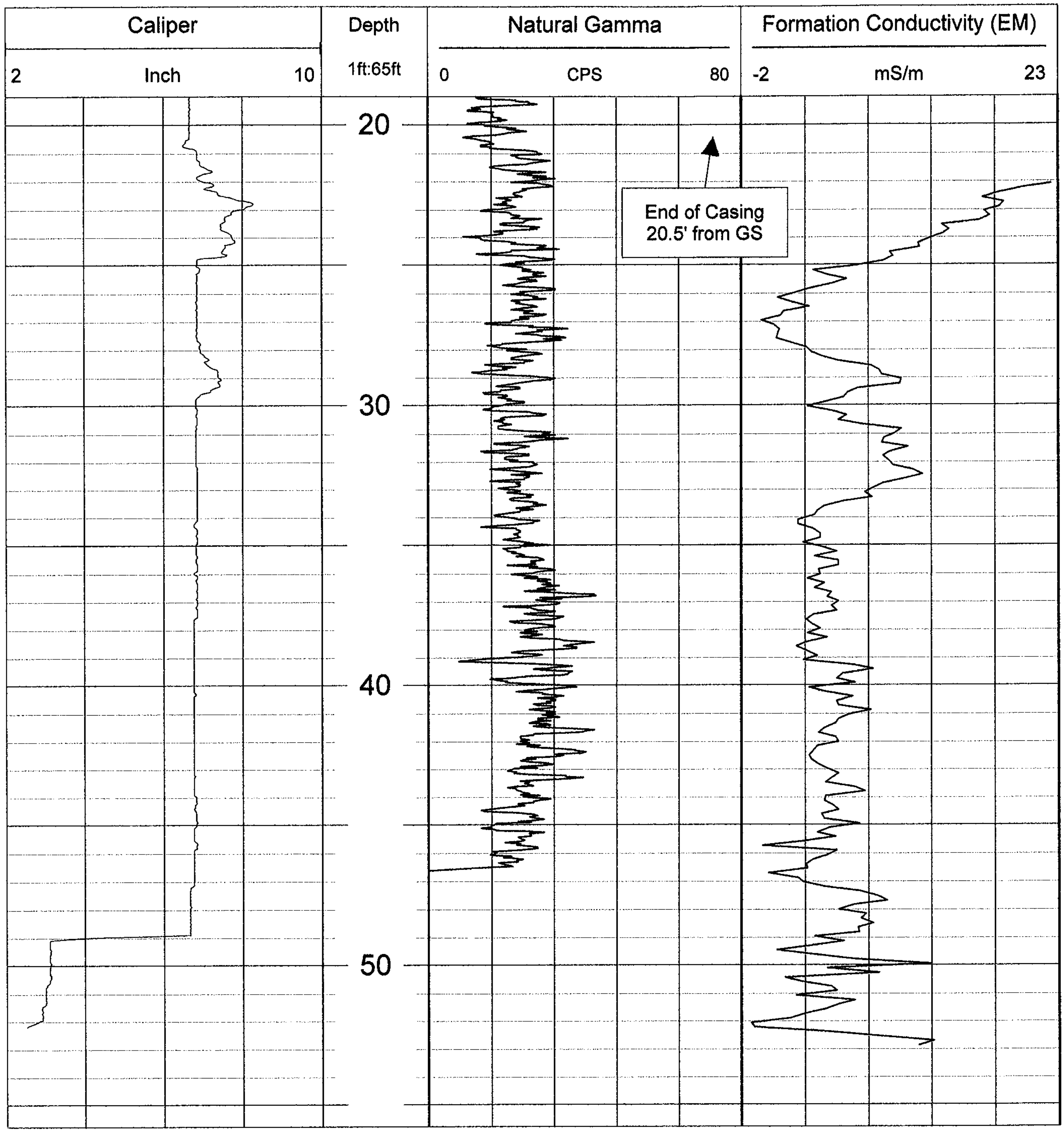

Depth
1ft:65ft
Natural Gamma
0 CPS 80
Temperature
65 Deg F 70
Caliper
0 Inch 10
Fluid Resistivity
60 OHM-M 110
Single Point Resistance
870 OHM 4100
Spontaneous Potential
160 MV 310
Normal Resistivity (16N)
0 OHM-M 280
Normal Resistivity (64N)
0 OHM-M 150
Computed Lateral
0 OHM-M 360
0
5
10
15
20
25
30
35
40
45
50
End of Casing
20.5' from GS

Well:	PW3	Log: PW3-C

Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/13/06	Time: See notes	
System Configuration: Century 9065, 9041 (N. gamma only); Mt. Sopris 2EMA		
Water Level: 9.63'	Measured From: GS at ~ 14:30	
Outer Casing Height AGL (with cap open/removed): 2.9'	Type: Steel pipe	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: GS	Log Speed: vairous
Log Top: 19'	Log Bottom: 52.9'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 9	
Operator: JRU	Witness: None	Other Tools Used: Idronaut
Well Diameter: 6"	Well Depth: 52.3'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 20.5' to bottom	
Screen Interval: Unknown	Screen Type: N/A	
Latitude: 34.88858218°N	Longitude: -81.07422663°W	

Notes:
9065 (caliper) logged up @ 18 fpm at 14:39.
9041 (natural gamma only) logged down @ 18 fpm at 15:19.
2EMA (formation conductivity) logged up @ 12.5 fpm at 16:05.
GS references converted from a casing height of 2.9' (org. ref. pt.).
GPS values; NAD83



Caliper
2
Inch
10
Depth
1ft:65ft
Natural Gamma
0
CPS
80
Formation Conductivity (EM)
-2
mS/m
23
End of Casing
20.5' from GS
20
30
40
50

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW 13

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 13 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 13 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 13 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 13 - D

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5” diameter)

- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4” diameter)

- Natural gamma – cps

Century 9065 tool

- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration

- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration

- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool

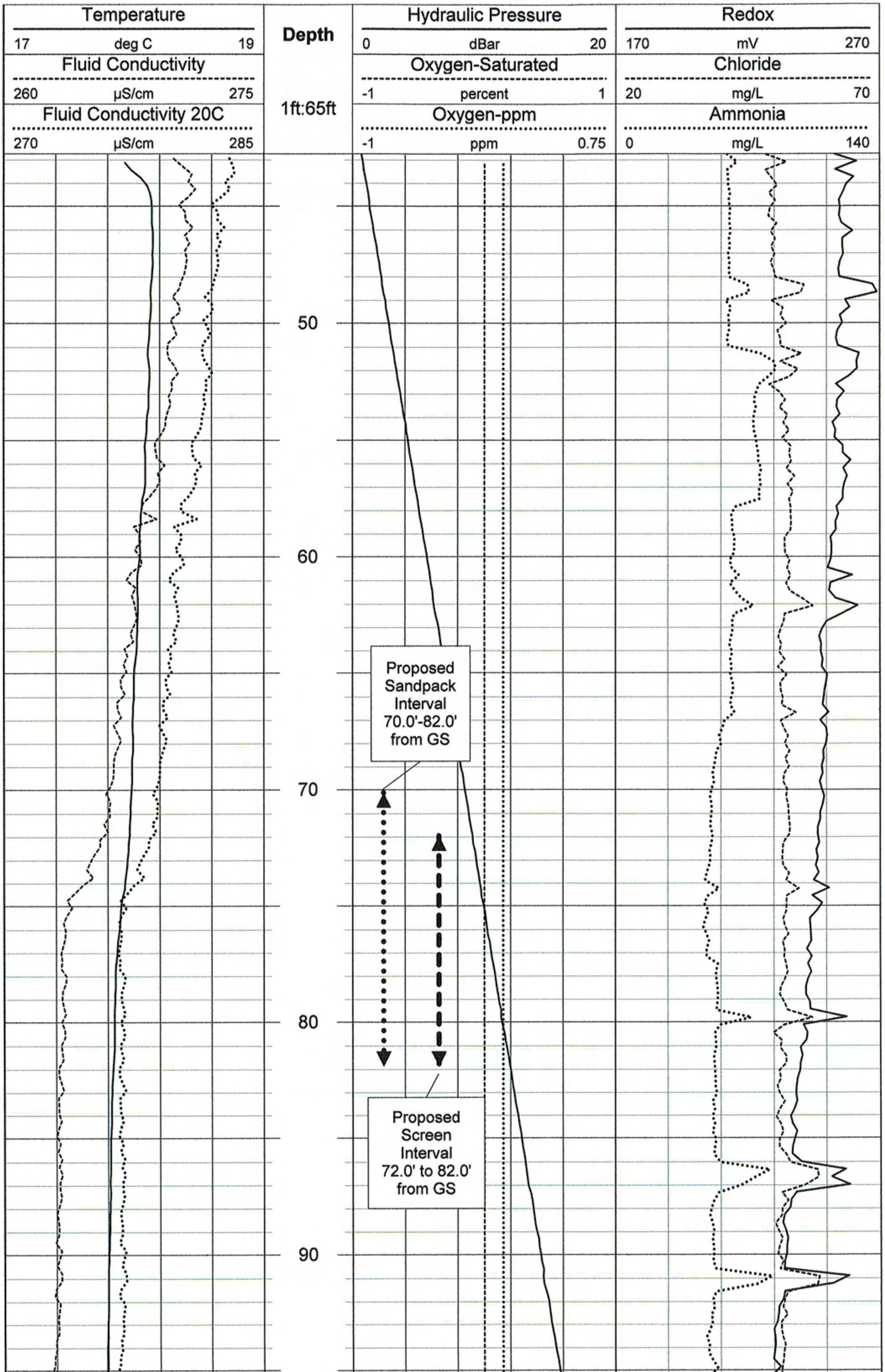
- Formation conductivity – mS/m

Well: RIMW13 Log: 13 - A

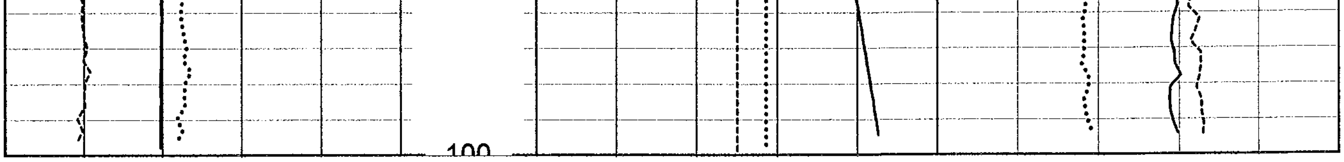
Site: PSC

City/State: Rock Hill, South Carolina		
Date: 12/14/06	Time: 12.57	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: See notes	Measured From: GS at ~ 12:00	
Outer Casing Height AGL (with cap open/removed): 0.56'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 18 fpm
Log Top: 42.94'	Log Bottom: 99.54'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 9065, 9041, 2EMA
Well Diameter: 6"	Well Depth: 101.44'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 37.24' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88914° N	Longitude: -81.07303° W	

Notes: GWL @ 07:30 = 47.89'; 11:30 = 44.15'
GS references converted from a casing height 0.56' (org. ref. pt.)
GPS values; NAD83



Temperature
17 deg C 19
Fluid Conductivity
260 µS/cm 275
Fluid Conductivity 20C
270 µS/cm 285
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
170 mV 270
Chloride
20 mg/L 70
Ammonia
0 mg/L 140
50
60
70
80
90
Proposed Sandpack Interval 70.0'-82.0' from GS
Proposed Screen Interval 72.0' to 82.0' from GS


100

Well:	RIMW13	Log: 13 - B

Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/14/06	Time: 11:48	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: See notes	Measured From: GS at ~ 12:00	
Outer Casing Height AGL (with cap open/removed): 0.56'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 17.7 fpm
Log Top: 44.14'	Log Bottom: 100.44'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9065, 9041, 2EMA
Well Diameter: 6"	Well Depth: 101.44'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 37.24' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88914° N	Longitude: -81.07303° W	

Notes:

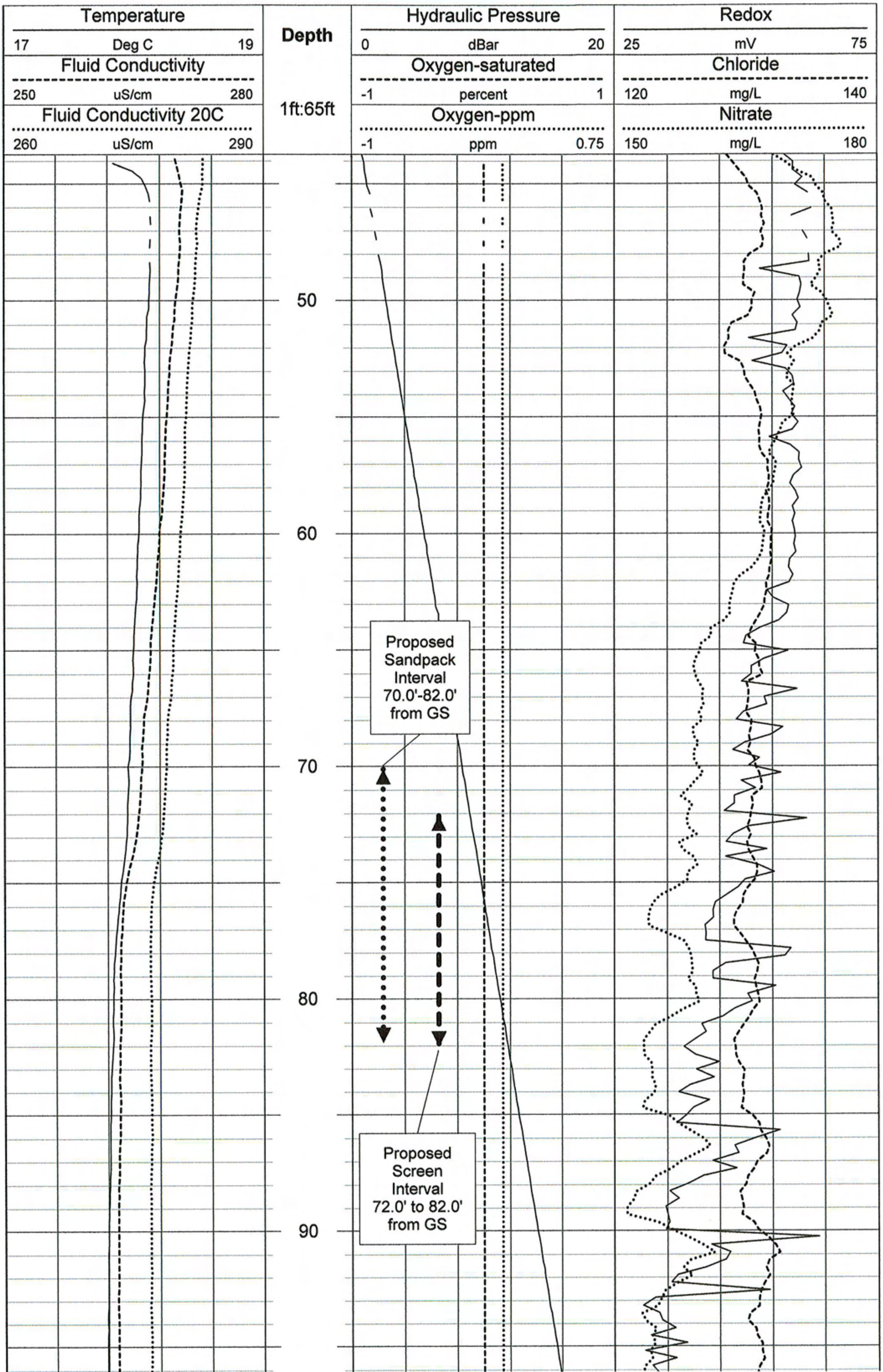
GWL @ 07:30 = 47.89'; 11:30 = 44.15'

Smoothing points: conductivities =7; Redox = 1; Nitrate = 5; Chloride = 5.

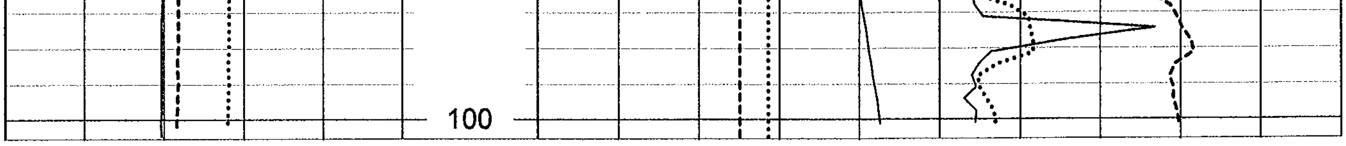
GS references converted from a casing height 0.56' (org. ref. pt.)

GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Temperature
17
Deg C
19
Fluid Conductivity
250
uS/cm
280
Fluid Conductivity 20C
260
uS/cm
290
Depth
1ft:65ft
Hydraulic Pressure
0
dBar
20
Oxygen-saturated
-1
percent
1
Oxygen-ppm
-1
ppm
0.75
Redox
25
mV
75
Chloride
120
mg/L
140
Nitrate
150
mg/L
180
50
60
70
80
90
Proposed Sandpack Interval 70.0'-82.0' from GS
Proposed Screen Interval 72.0' to 82.0' from GS


100

Well:	RIMW13	Log: 13 - C

Site:	PSC

City/State: Rock Hill, South Carolina

Date: 12/14/06	Time: See notes

System Configuration: Century 9065, 9041

Water Level: See notes	Measured From: GS at ~ 12:00

Outer Casing Height AGL (with cap open/removed): 0.56' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A

Log Direction: See notes	Measured from: GS	Log Speed: various
Log Top: 4..34'	Log Bottom: 100.84'	Reference Point: GS

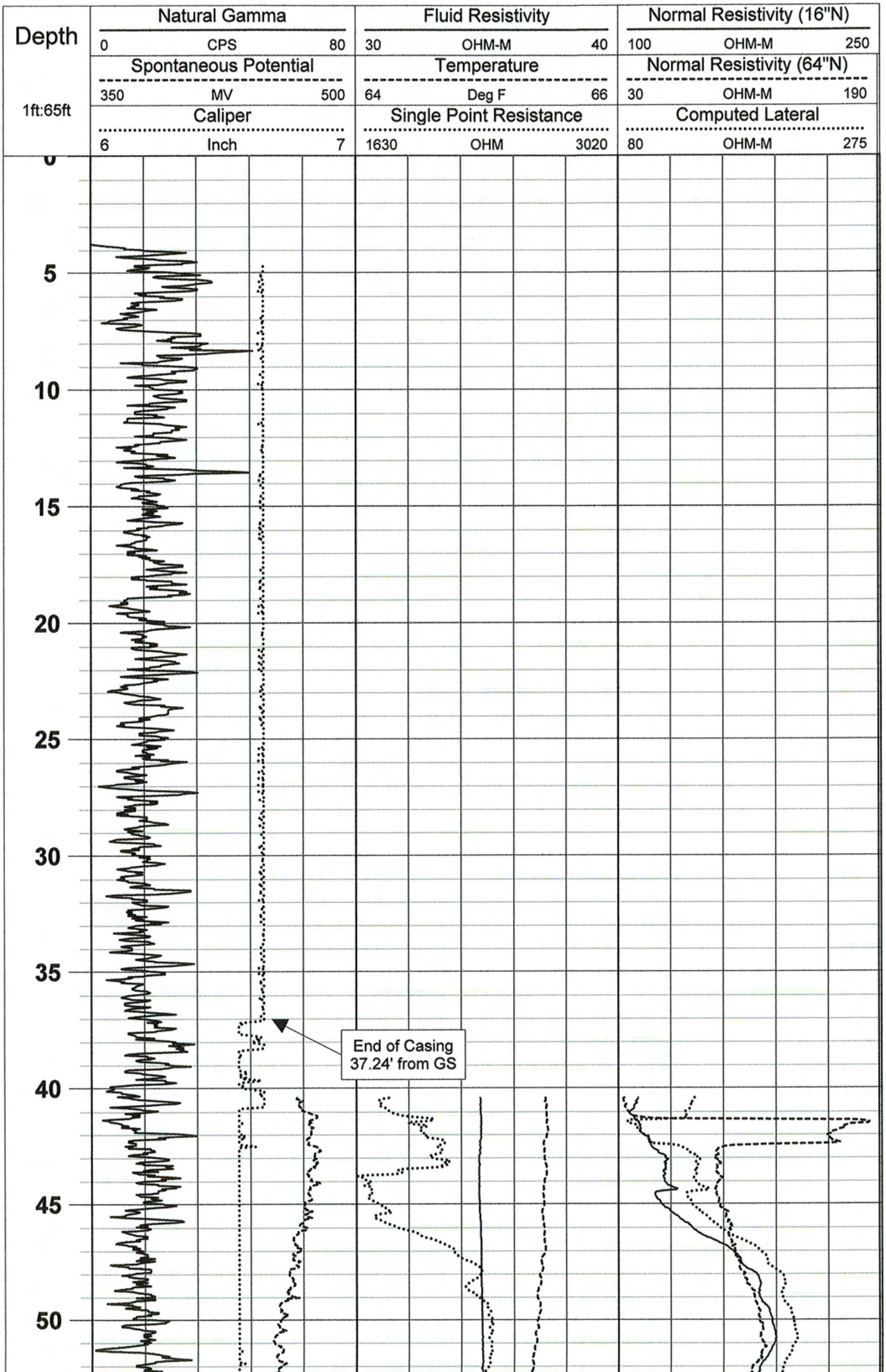
Analysis Software: WellCAD	Smoothing Points: natural gamma = 9

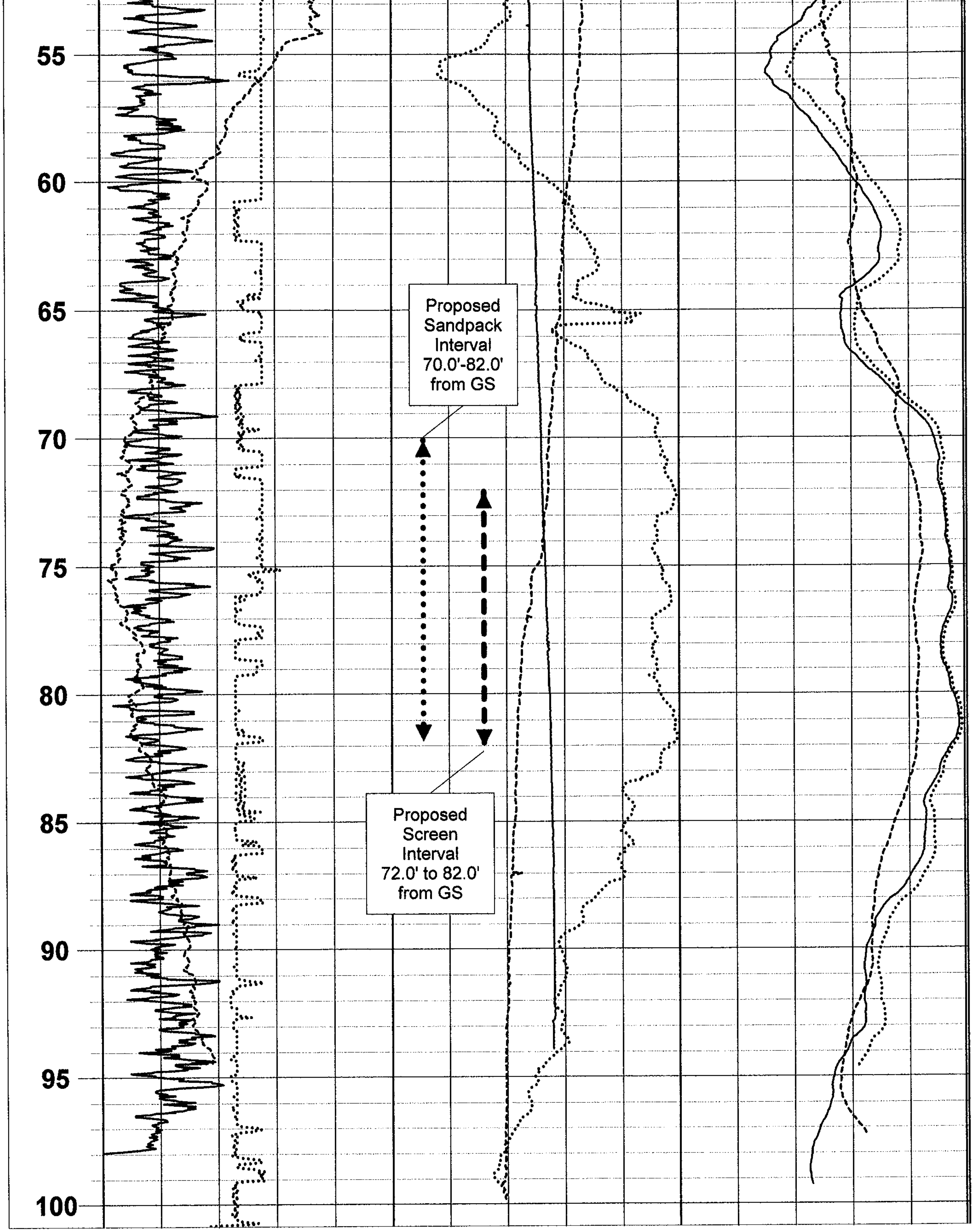
Operator: JRU	Witness: none	Other Tools Used: 2IDA, 2EMA
Well Diameter: 6"	Well Depth: 101.44'	Referenced From: GS

Casing Material: Steel	Non-Cased Interval: 37.24' to bottom
Screen Interval: None	Screen Type: N/A
Latitude: 34.88914° N	Longitude: -81.07303° W

Notes: Caliper logged up @ 13:20; speed 18 fpm
9041 logged down @ 13:49; speed 17 fpm
GWL @ 07:30 = 47.89'; 11:30 = 44.15'
GS references converted from a casing height 0.56' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Depth
1ft:65ft
Natural Gamma
0 CPS 80
Spontaneous Potential
350 MV 500
Caliper
6 Inch 7
Fluid Resistivity
30 OHM-M 40
Temperature
64 Deg F 66
Single Point Resistance
1630 OHM 3020
Normal Resistivity (16"N)
100 OHM-M 250
Normal Resistivity (64"N)
30 OHM-M 190
Computed Lateral
80 OHM-M 275
0
5
10
15
20
25
30
35
40
45
50
End of Casing
37.24' from GS



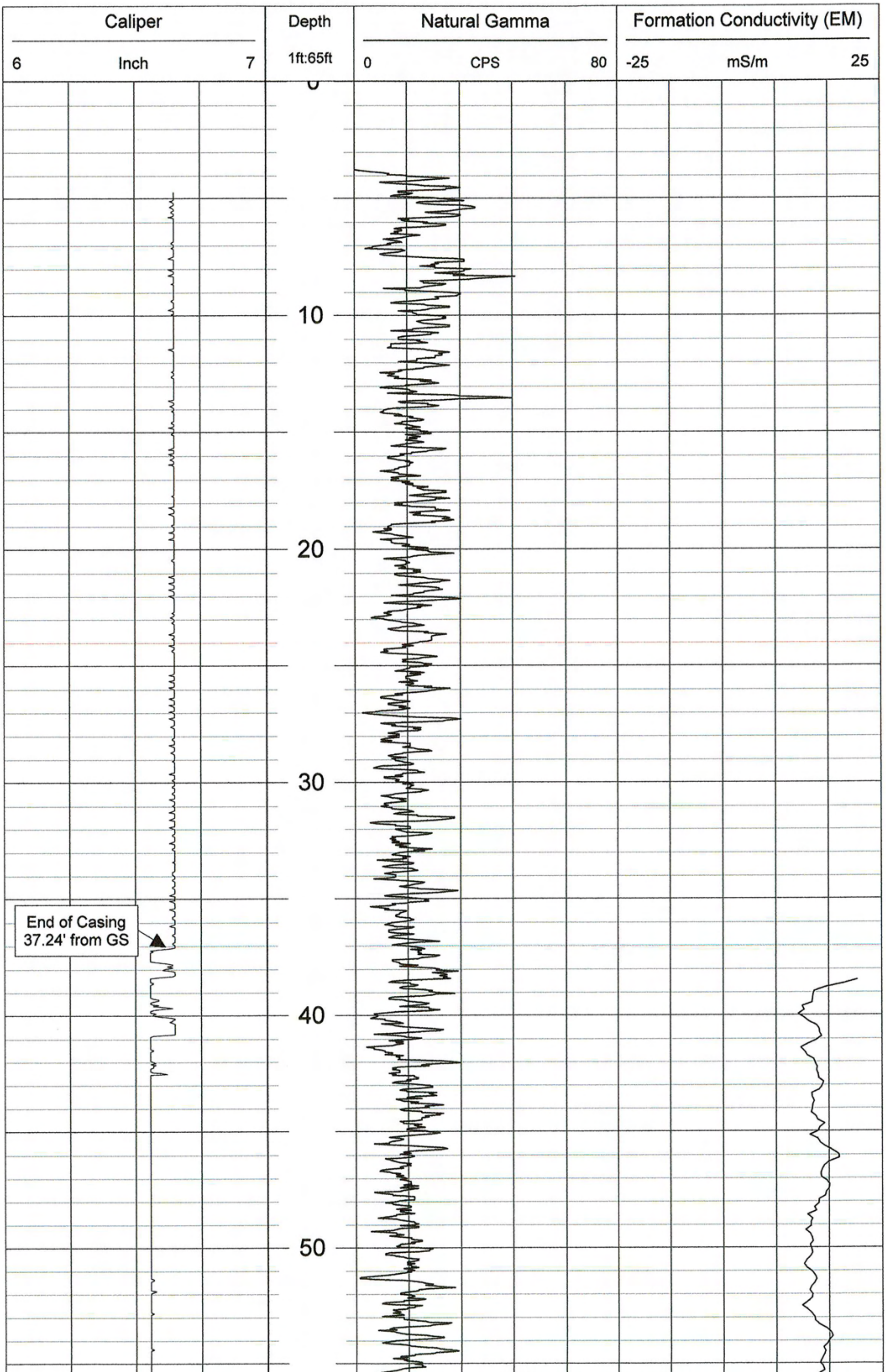
55
60
65
70
75
80
85
90
95
100
Proposed Sandpack Interval 70.0'-82.0' from GS
Proposed Screen Interval 72.0' to 82.0' from GS

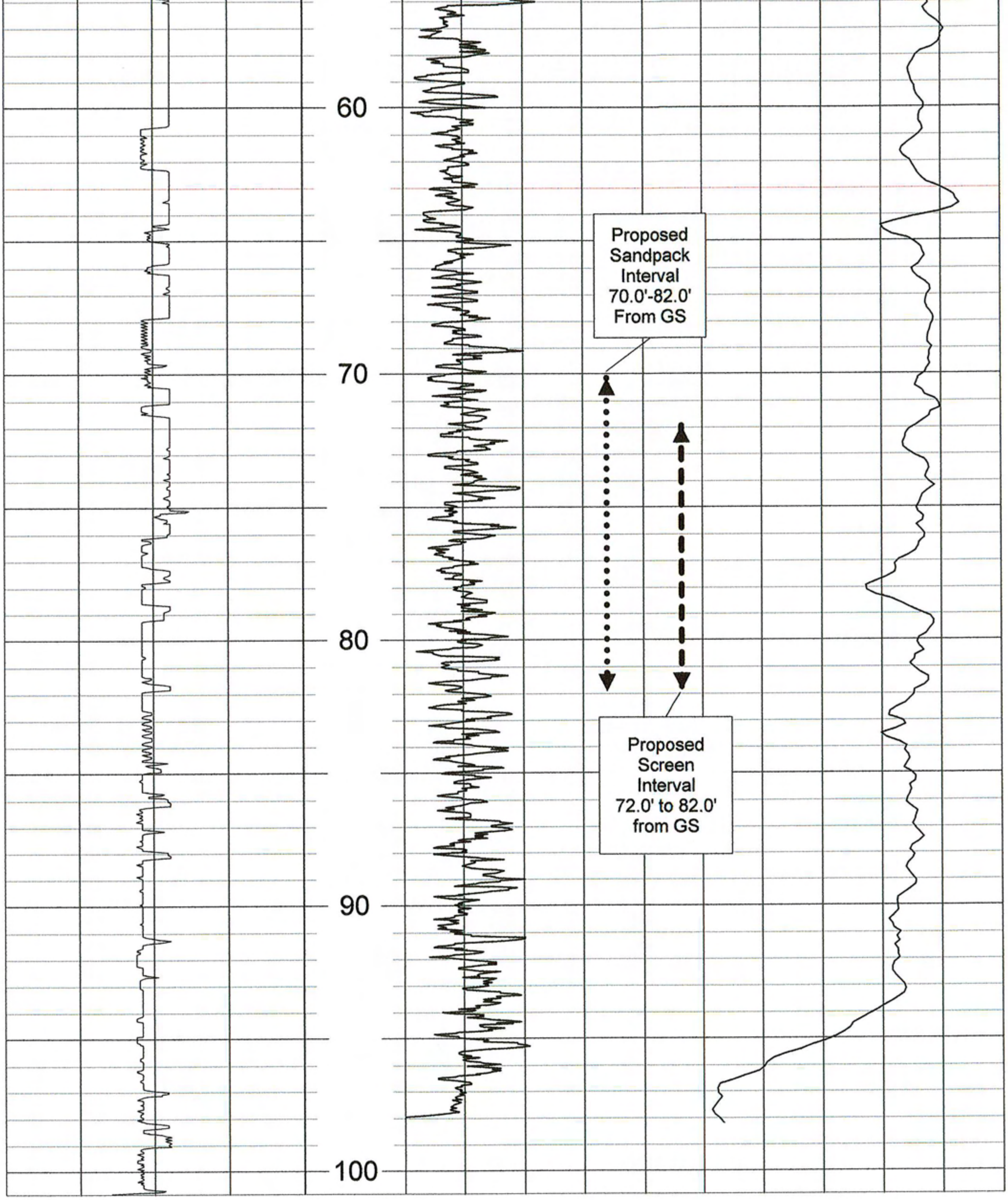
Well:	**RIMW13**	**Log: 13 - D**
Site:	**PSC**	

City/State: Rock Hill, South Carolina		
Date: 12/14/06	Time: See notes	
System Configuration: Century 9065, 9041 (N. gamma only); Mt. Sopris 2EMA		
Water Level: See notes	Measured From: GS at ~ 12:00	
Outer Casing Height AGL (with cap open/removed): 0.56'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: GS	Log Speed: see notes
Log Top: 3.84'	Log Bottom: 100.84'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: EM = 2	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 6"	Well Depth: 101.44'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 37.24' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88914° N	Longitude: -81.07303° W	

Notes:

Caliper logged up @ 13:20; speed 18 fpm
9041 logged down @ 13:49; speed 17 fpm
2EMA logged up @ 12:26; speed 11.5 fpm
GWL @ 07:30 = 47.89'; 11:30 = 44.15'
GS references converted from a casing height 0.56' (org. ref. pt.)
GPS values; NAD83


Caliper
6
Inch
7
Depth
1ft:65ft
Natural Gamma
0
CPS
80
Formation Conductivity (EM)
-25
mS/m
25
0
10
20
30
40
50
End of Casing
37.24' from GS


60
70
80
90
100
Proposed Sandpack Interval 70.0'-82.0' From GS
Proposed Screen Interval 72.0' to 82.0' from GS

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW 14

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 14 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 14 – B

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 14 - C

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – μS/cm
- Fluid conductivity at 20° C – μS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – μS/cm
- Fluid conductivity at 20° C – μS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

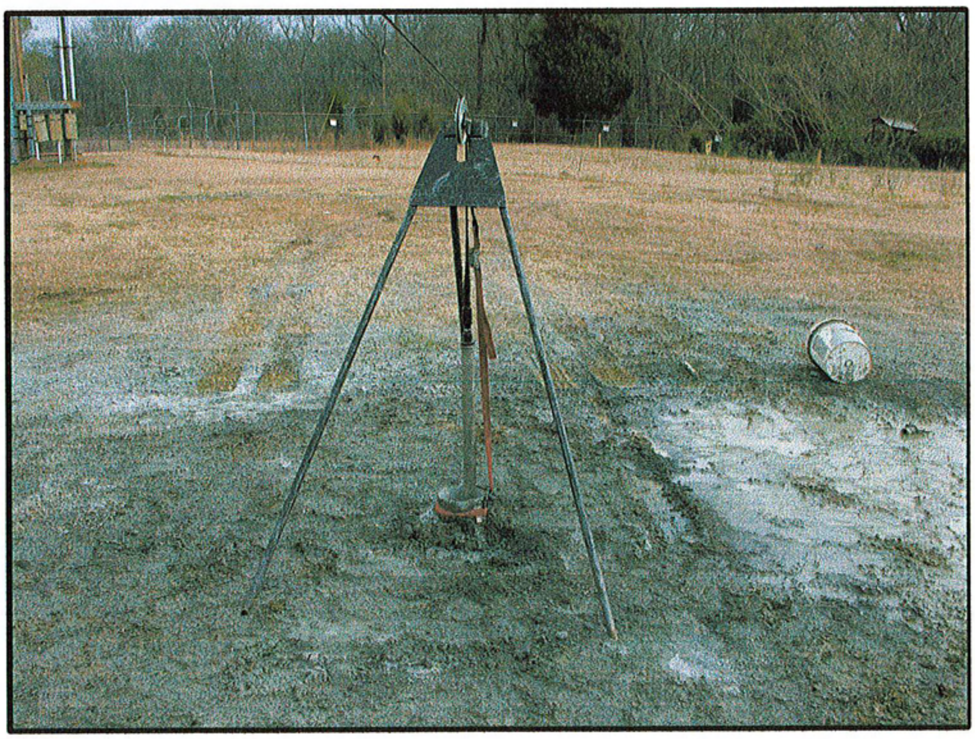
Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

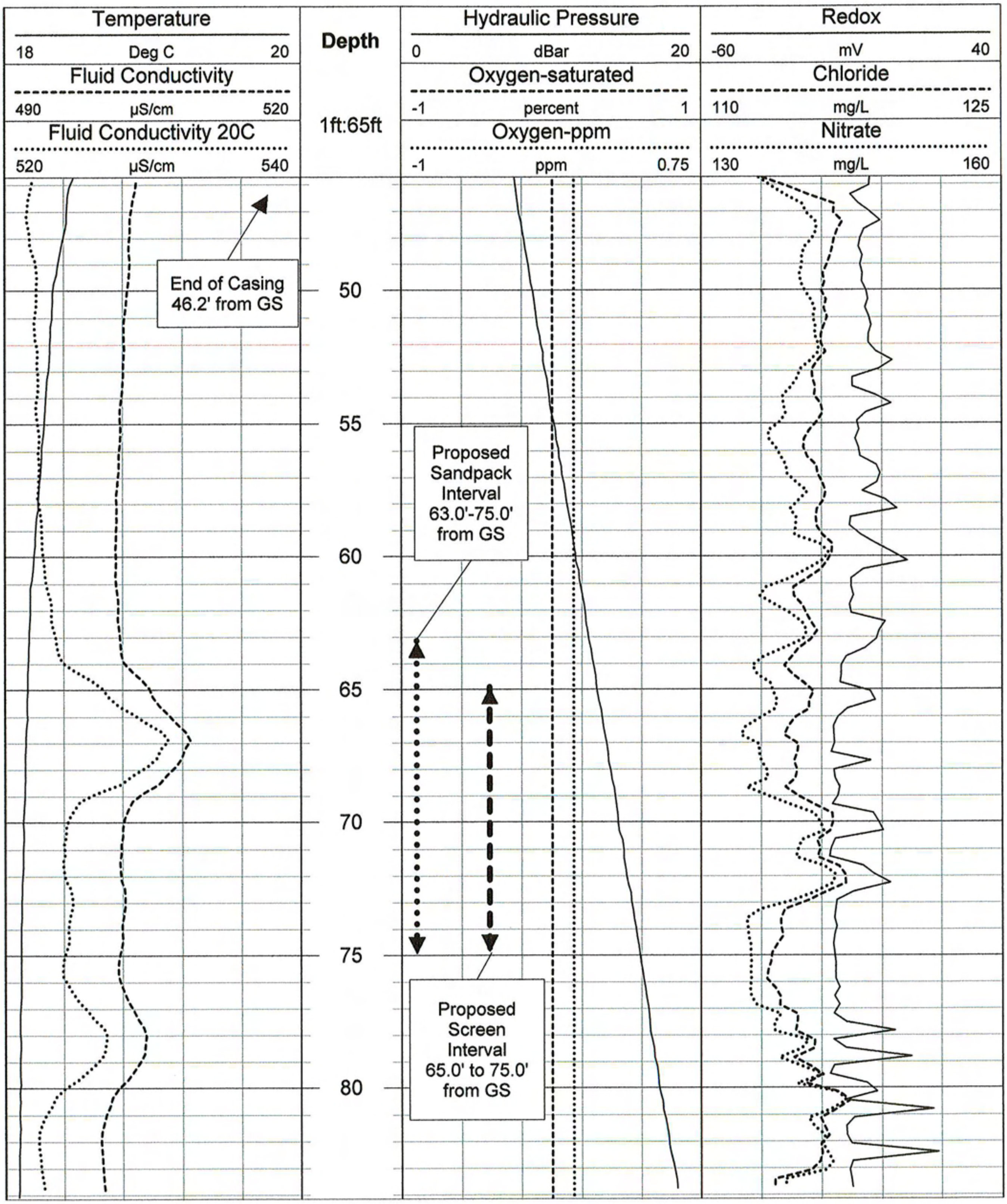
Well: RIMW14 Log: 14 - A

Site: PSC

City/State: Rock Hill, South Carolina	
Date: 12/14/06	Time: 09:04
System Configuration: Mount Sopris 2IDA with nitrate option	
Water Level: 20.25'	Measured From: GS ~07:30 on 12/14/06
Outer Casing Height AGL (with cap open/removed): 0.2'	Type: Steel
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A
Log Direction: Down	Measured from: GS	Log Speed: 13.5 fpm
Log Top: 45.9'	Log Bottom: 84.2'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: See notes
Operator: JRU	Witness: None	Other Tools Used: 9041, 9065, 2EMA
Well Diameter: 6"	Well Depth: ~86'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 46.2' to bottom
Screen Interval: None	Screen Type: N/A
Latitude: 34.88725° N	Longitude: 81.07275° W

Notes: Two traverses with 9041 tool were made prior to this log on 12/14.
Conductivity values used 7 smoothing points
Chloride and Nitrate used 5 smoothing points; Redox = 1
GS references converted from a casing height of 0.2' (org. ref. pt.)
GPS values; NAD83





Temperature
18 Deg C 20
Fluid Conductivity
490 µS/cm 520
Fluid Conductivity 20C
520 µS/cm 540
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-60 mV 40
Chloride
110 mg/L 125
Nitrate
130 mg/L 160
End of Casing
46.2' from GS
50
55
60
65
70
75
80
Proposed
Sandpack
Interval
63.0'-75.0'
from GS
Proposed
Screen
Interval
65.0' to 75.0'
from GS

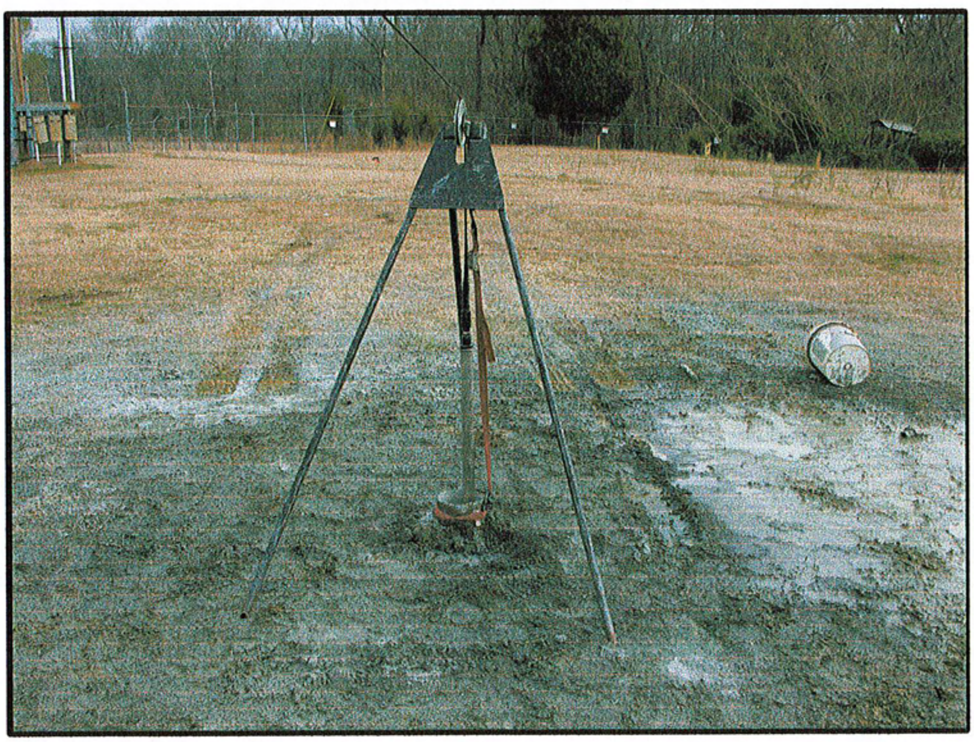
Well:	RIMW14	Log: 14 - B

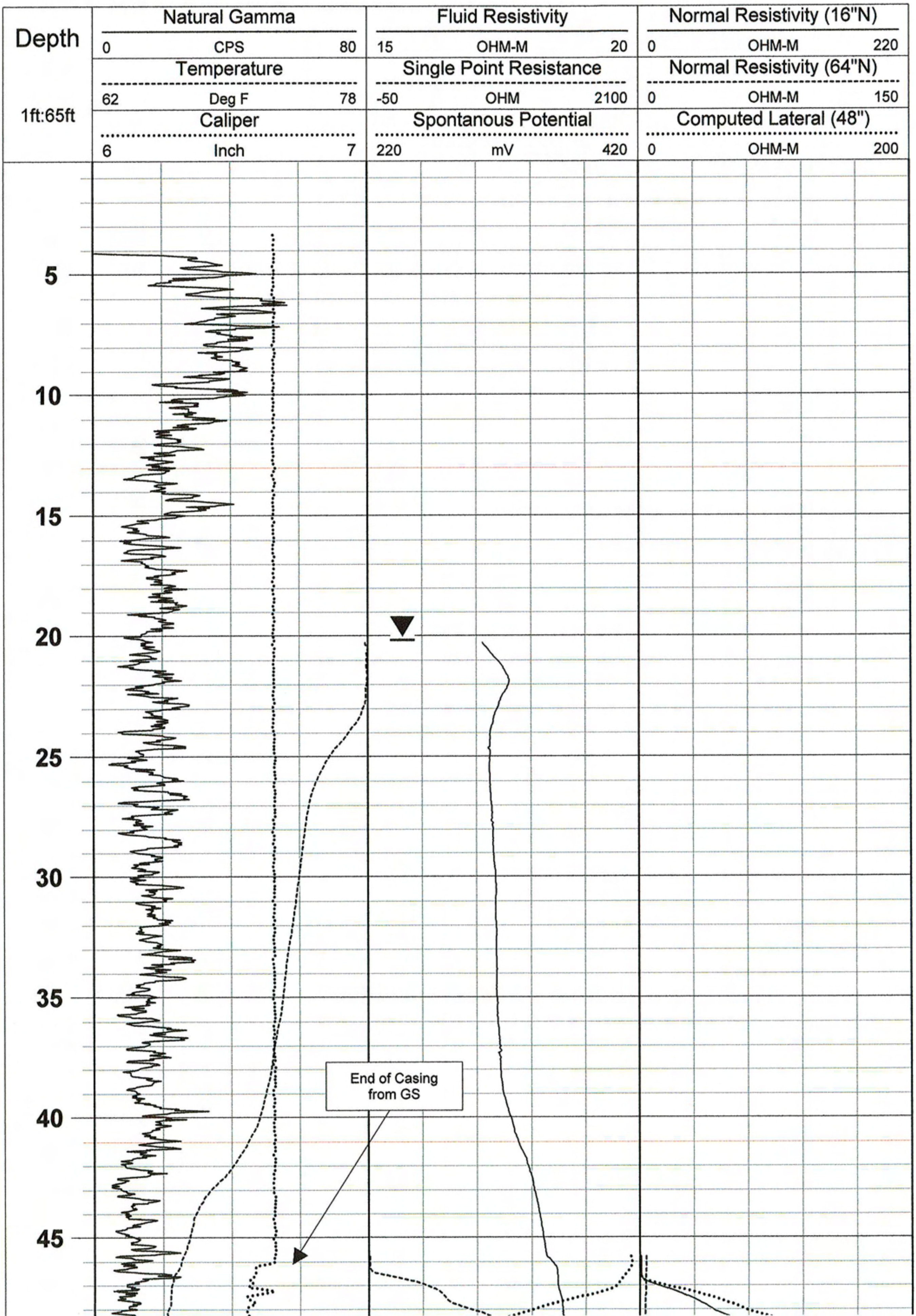
Site:	PSC

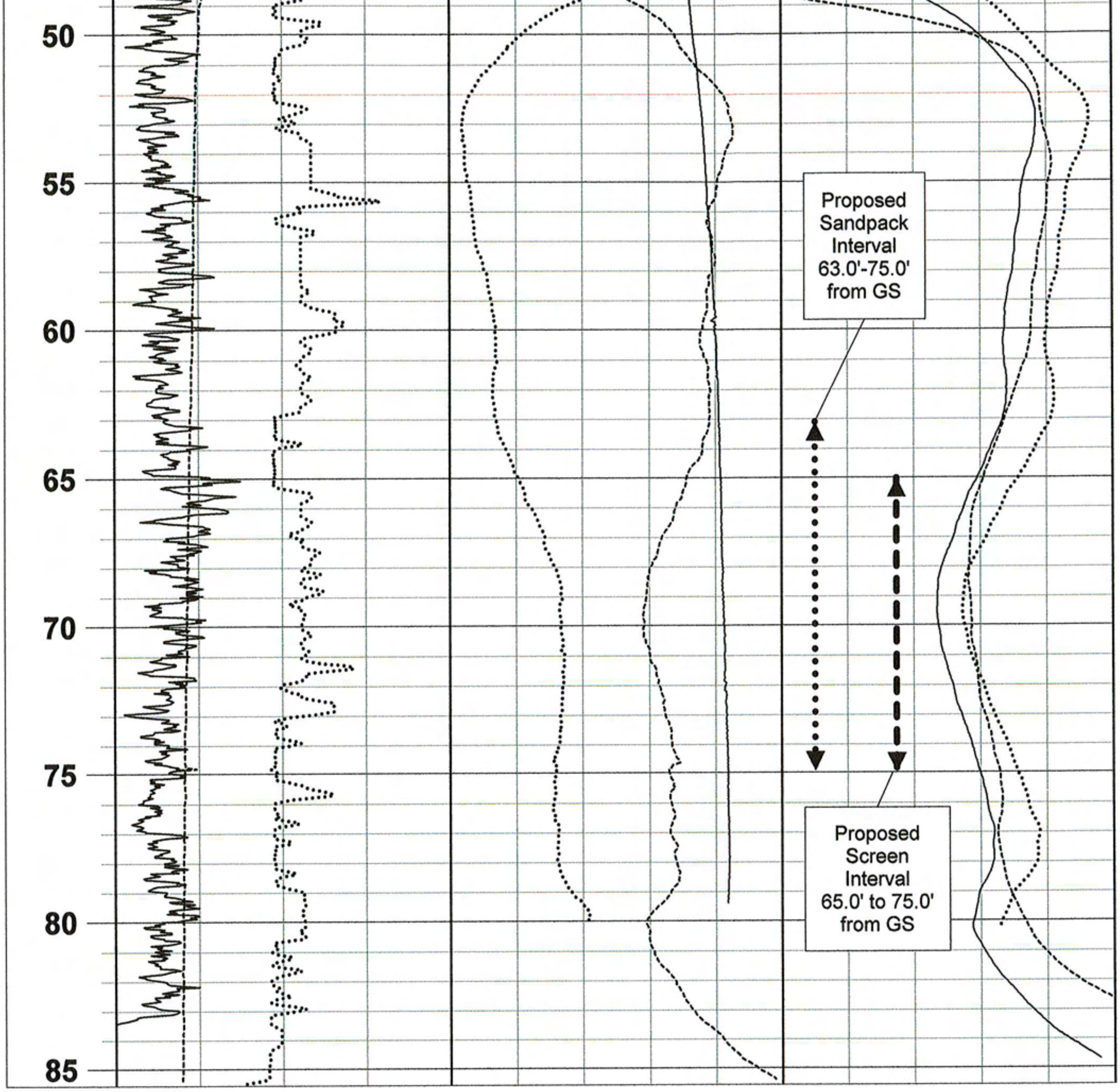
City/State: Rock Hill, South Carolina		
Date: 12/13-14/06	Time: See notes	
System Configuration: Century 9041, 9065		
Water Level: 20.25'	Measured From: GS at ~ 07:30 12/14	
Outer Casing Height AGL (with cap open/removed): 0.2'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: GS	Log Speed: see notes
Log Top: 3.4'	Log Bottom: 85.6'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma, caliper = 9	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 2IDA
Well Diameter: 6"	Well Depth: ~86'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 46.2' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88725° N	Longitude: 81.07275° W	

Notes: Caliper logged up on 12/13/06 @ 10:02; speed 12 fpm
9041 logged down on 12/14/06 @ 07:31; speed 11 fpm
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



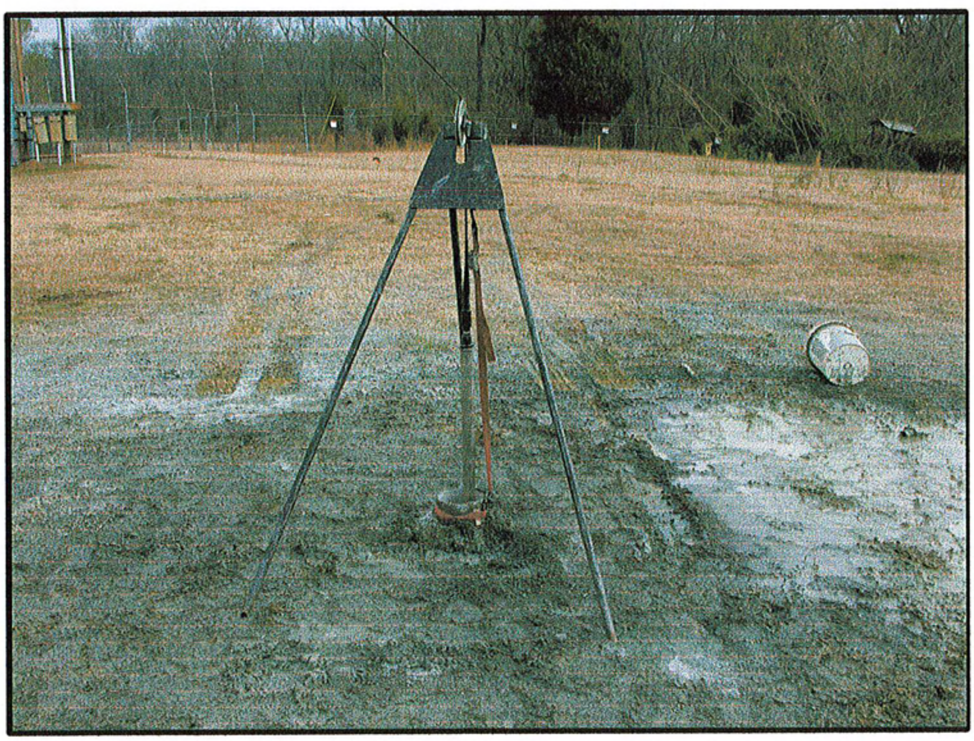

Depth
1ft:65ft
Natural Gamma
0 CPS 80
Temperature
62 Deg F 78
Caliper
6 Inch 7
Fluid Resistivity
15 OHM-M 20
Single Point Resistance
-50 OHM 2100
Spontanous Potential
220 mV 420
Normal Resistivity (16"N)
0 OHM-M 220
Normal Resistivity (64"N)
0 OHM-M 150
Computed Lateral (48")
0 OHM-M 200
5
10
15
20
25
30
35
40
45
End of Casing from GS

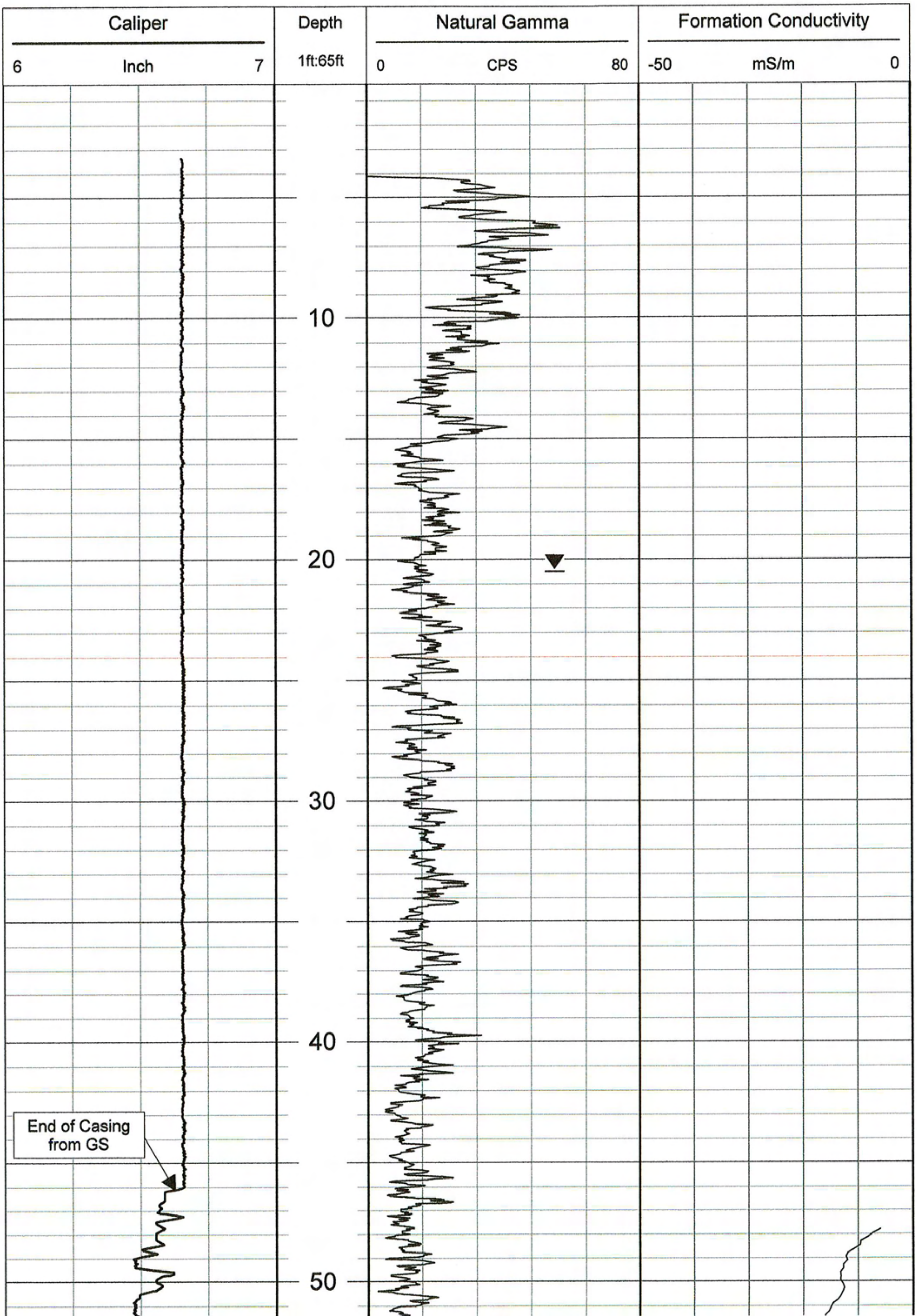

50
55
60
65
70
75
80
85
Proposed Sandpack Interval 63.0'-75.0' from GS
Proposed Screen Interval 65.0' to 75.0' from GS

Well: RIMW14			Log: 14 - C
Site: PSC			
City/State: Rock Hill, South Carolina			
Date: 12/13-14/06		Time: See notes below	
System Configuration: Century 9065; 9041 (N. gamma only); Mt. Sopris 2EMA			
Water Level: See notes	Measured From: GS		
Outer Casing Height AGL (with cap open/removed): 0.2'		Type: Open steel pipe	
Inner Casing Ht. ± Outer Casing Ht.: None		Casing Type: N/A	
Log Direction: See Notes	Measured from: GS		Log Speed: various
Log Top: 3.4'	Log Bottom: 85.6'	Reference Point: GS	
Analysis Software: WellCAD	Smoothing Points: natural gamma, caliper = 9		
Operator: JRU	Witness: None	Other Tools Used: Idronaut; 9041	
Well Diameter: 6"	Well Depth: ~86'	Referenced From: GS	
Casing Material: Steel		Non-Cased Interval: 46.2' to bottom	
Screen Interval: None		Screen Type: N/A	
Latitude: 34.88725° N		Longitude: 81.07275° W	

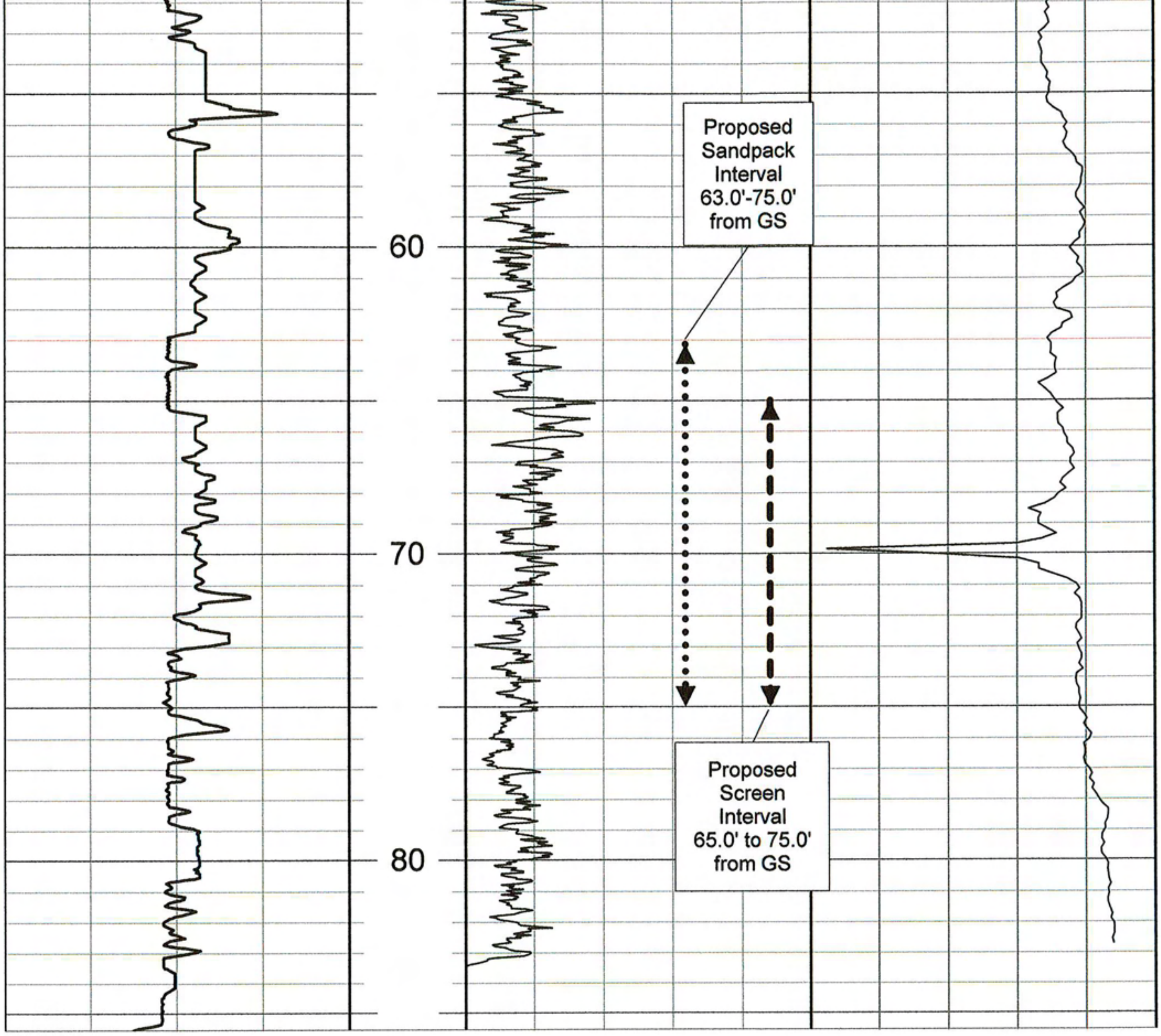
Notes:
Caliper log: 12/13/06 @ 10:02 logged up; 12 fpm
Natural Gamma: 12/14/06 @ 07:42 logged down; 11 fpm
FormationConductivity: 12/13/06 @ 12:50 logged up; 8 fpm
Water level taken 12/14/06 @ ~07:30 when stabilized @ 20.25'
Water recovery after drilling about 0.1 fpm from 81.81' on 12/13/06
GS references converted from a casing height of 0.2' (org. ref. pt.)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Caliper
6
Inch
7
Depth
1ft:65ft
Natural Gamma
0
CPS
80
Formation Conductivity
-50
mS/m
0
10
20
30
40
50
End of Casing from GS


Proposed
Sandpack
Interval
63.0'-75.0'
from GS
60
70
80
Proposed
Screen
Interval
65.0' to 75.0'
from GS

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW 18

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 18 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 18 – B

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 18 - C

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – μS/cm
- Fluid conductivity at 20° C – μS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – μS/cm
- Fluid conductivity at 20° C – μS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

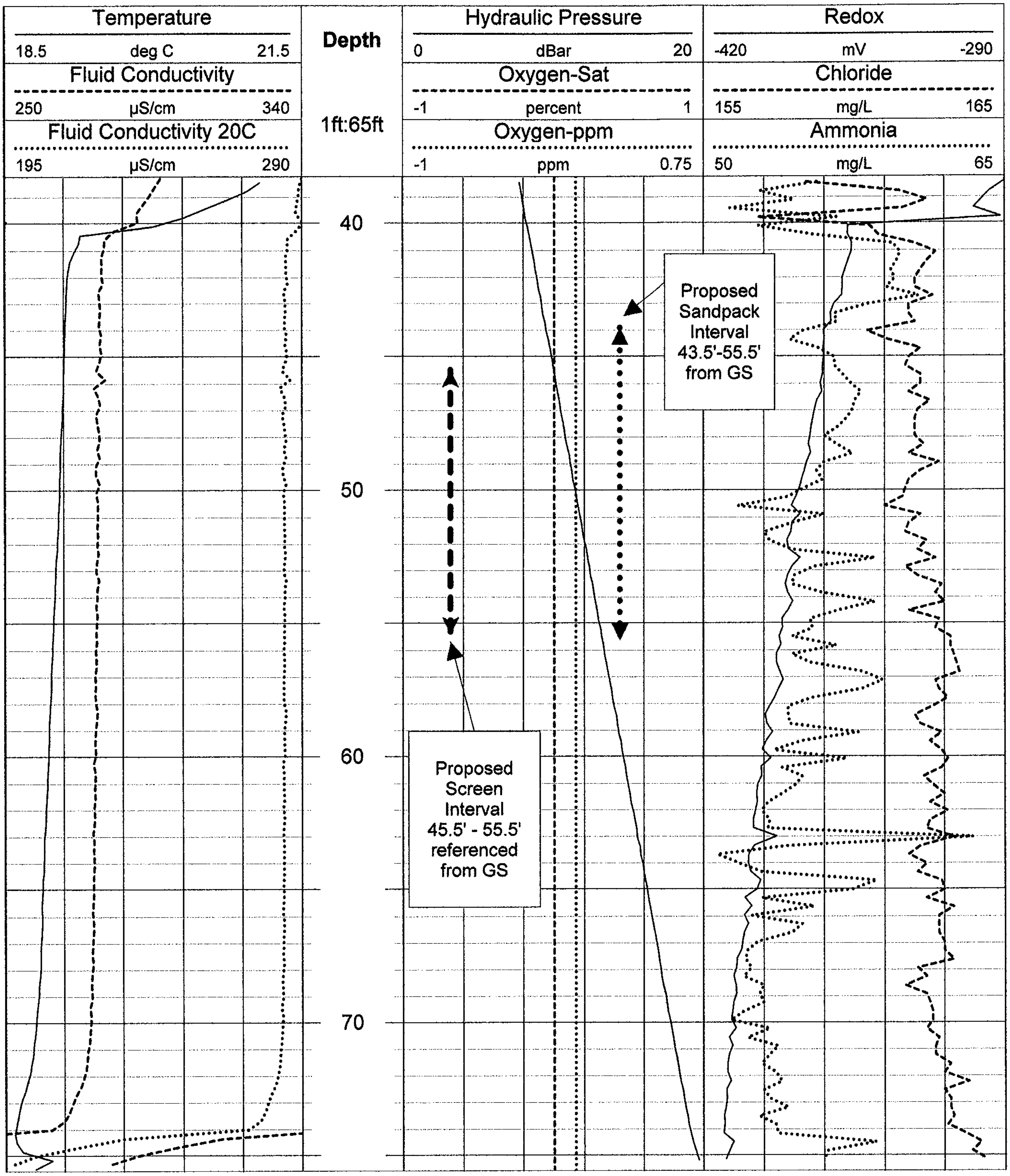
Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

Well:	RIMW18	Log: 18 - A
Site:	PSC	

City/State: Rock Hill, South Carolina		
Date: 12/15/06	Time: 10:50	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 11.30'	Measured From: GS @ ~ 08:45	
Outer Casing Height AGL (with cap open/removed): 1.6'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 16.4 fpm
Log Top: 38.50'	Log Bottom: 75.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: See notes	
Operator: JRU	Witness: None	Other Tools Used: 9065, 9041, 2EMA
Well Diameter: 6"	Well Depth: 77.69'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 39.9' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88844°N	Longitude: -81.07347°W	

Notes: Smoothing points; redox, ammonium, chloride = 1.
Six traverses were made before this log was recorded.
GS references converted from a casing height of 1.6' (org. ref. pt.)
GPS values; NAD83
Probe hanging near 39.9'

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Temperature
18.5 deg C 21.5
Fluid Conductivity
250 µS/cm 340
Fluid Conductivity 20C
195 µS/cm 290
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-420 mV -290
Chloride
155 mg/L 165
Ammonia
50 mg/L 65
40
50
60
70
Proposed Sandpack Interval 43.5'-55.5' from GS
Proposed Screen Interval 45.5' - 55.5' referenced from GS

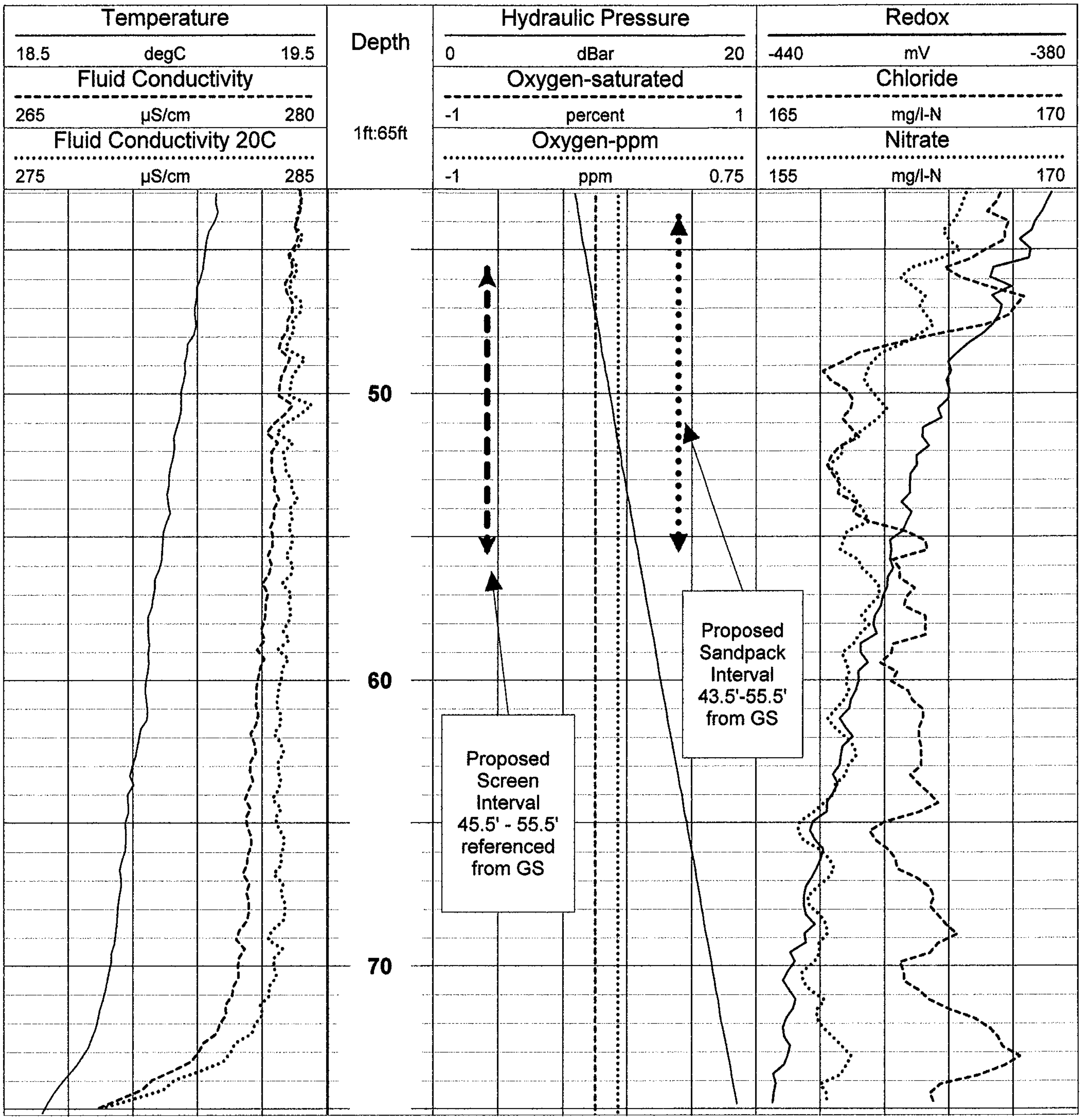
Well:	RIMW18	Log: 18 - B

Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/15/06	Time: 11:00	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 11.30'	Measured From: GS @ ~ 08:45	
Outer Casing Height AGL (with cap open/removed): 1.6'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 15.4 fpm
Log Top: 43'	Log Bottom: 75.2	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9065, 9041, 2EMA
Well Diameter: 6"	Well Depth: 77.69'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 39.9' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88844°N	Longitude: -81.07347°W	

Notes: Smoothing points; conductivities & redox = 1; Cl & NH4 = 3.
Eight traverses were made before this log was recorded.
GS references converted from a casing height of 1.6' (org. ref. pt.)
GPS values; NAD83
Probe hanging near 39.9'

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Temperature
18.5 degC 19.5
Fluid Conductivity
265 µS/cm 280
Fluid Conductivity 20C
275 µS/cm 285
Depth
1ft:65ft
50
60
70
Hydraulic Pressure
0 dBar 20
Oxygen-saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-440 mV -380
Chloride
165 mg/l-N 170
Nitrate
155 mg/l-N 170
Proposed Screen Interval 45.5' - 55.5' referenced from GS
Proposed Sandpack Interval 43.5'-55.5' from GS

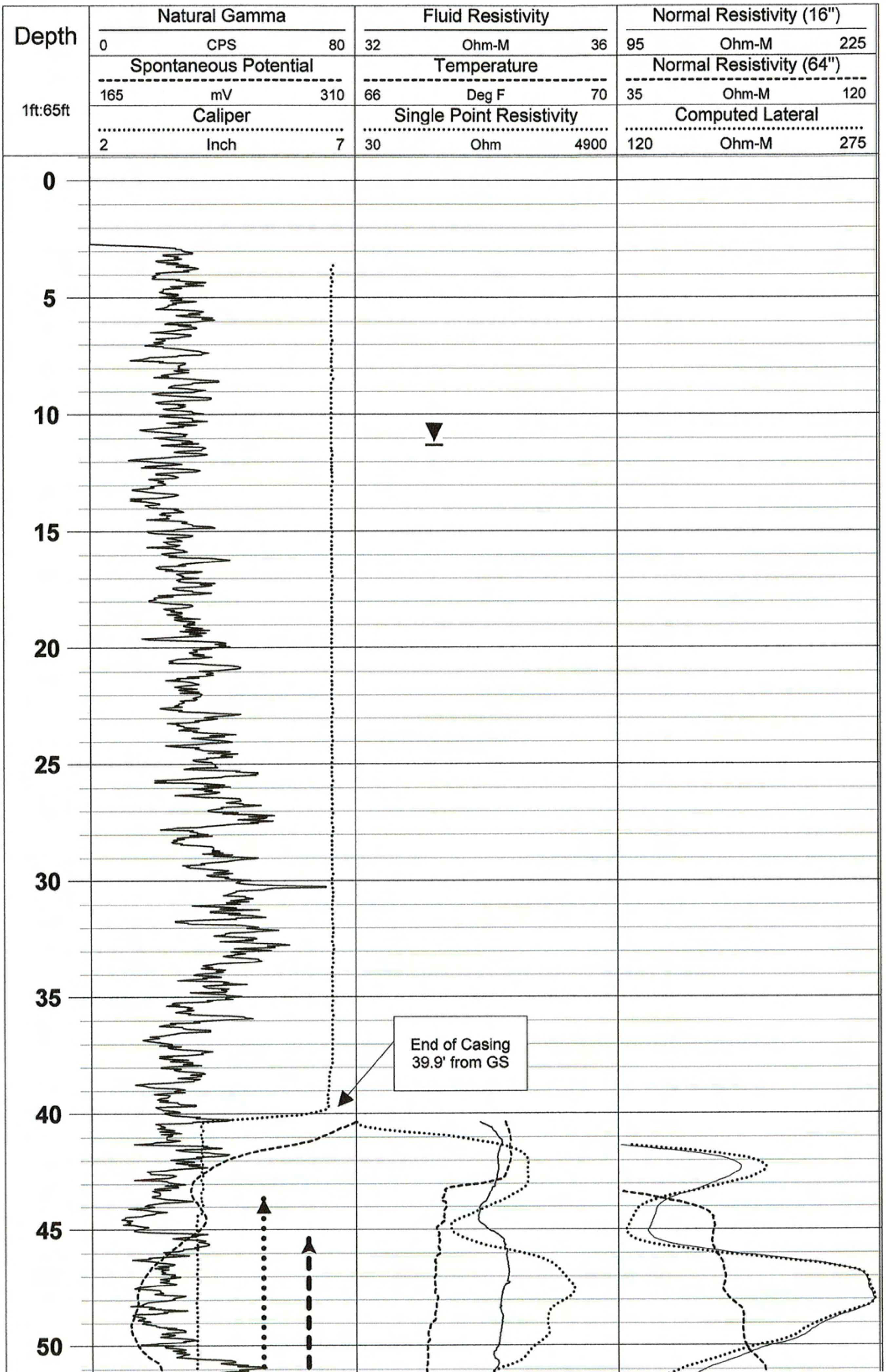
Well:	RIMW18	Log: 18 - C

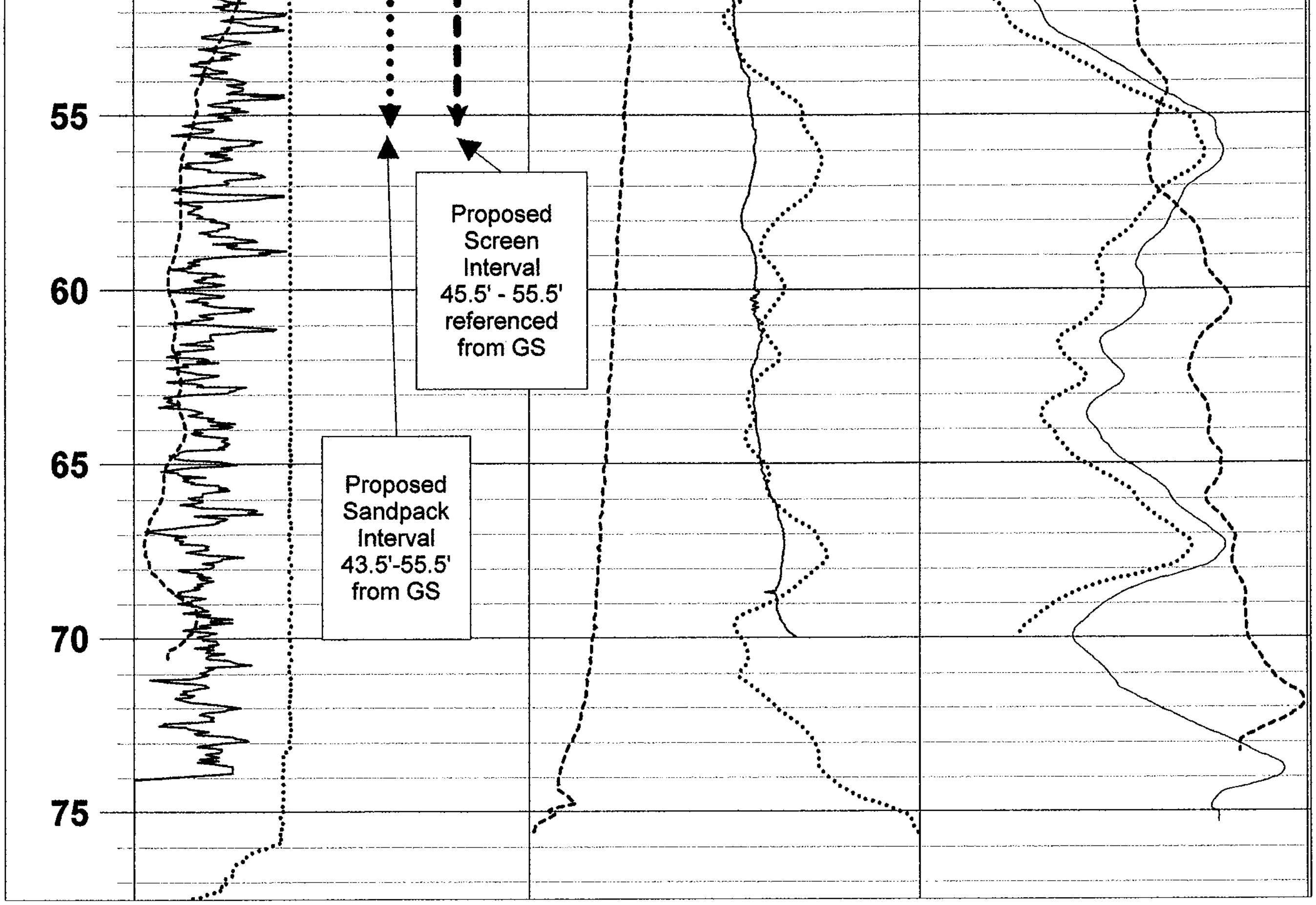
Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/15/06	Time: Caliper 09:08; multi func. 09:33	
System Configuration: Century 9065, 9041		
Water Level: 11.30'	Measured From: GS at ~ 08:45	
Outer Casing Height AGL (with cap open/removed): 1.6'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: GS	Log Speed: see notes
Log Top: 2.6'	Log Bottom: 77.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 9	
Operator: JRU	Witness: None	Other Tools Used: 2IDA; 2EMA
Well Diameter: 6"	Well Depth: 77.69'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 39.9' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88844°N	Longitude: -81.07347°W	

Notes: Caliper logged up @ 09:08; speed 19 fpm.
9041 logged up @ 09:33; speed 16 fpm.
GS references converted from a casing height of 1.6' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Depth
1ft:65ft
Natural Gamma
0 CPS 80
Spontaneous Potential
165 mV 310
Caliper
2 Inch 7
Fluid Resistivity
32 Ohm-M 36
Temperature
66 Deg F 70
Single Point Resistivity
30 Ohm 4900
Normal Resistivity (16")
95 Ohm-M 225
Normal Resistivity (64")
35 Ohm-M 120
Computed Lateral
120 Ohm-M 275
0
5
10
15
20
25
30
35
40
45
50
End of Casing
39.9' from GS


55
60
65
70
75
Proposed Screen Interval 45.5' - 55.5' referenced from GS
Proposed Sandpack Interval 43.5'-55.5' from GS

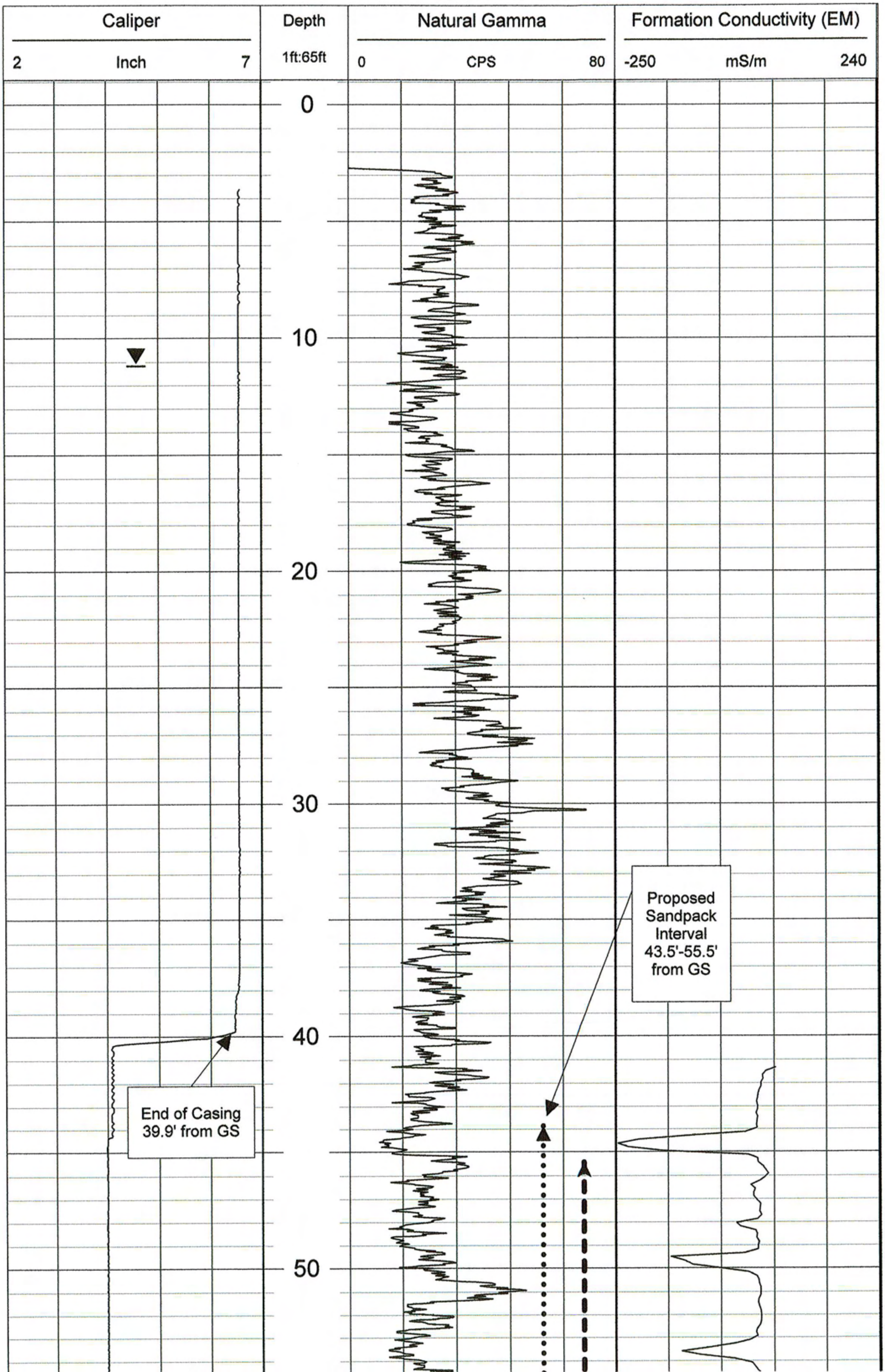
Well: RIMW18 Log: 18 - D

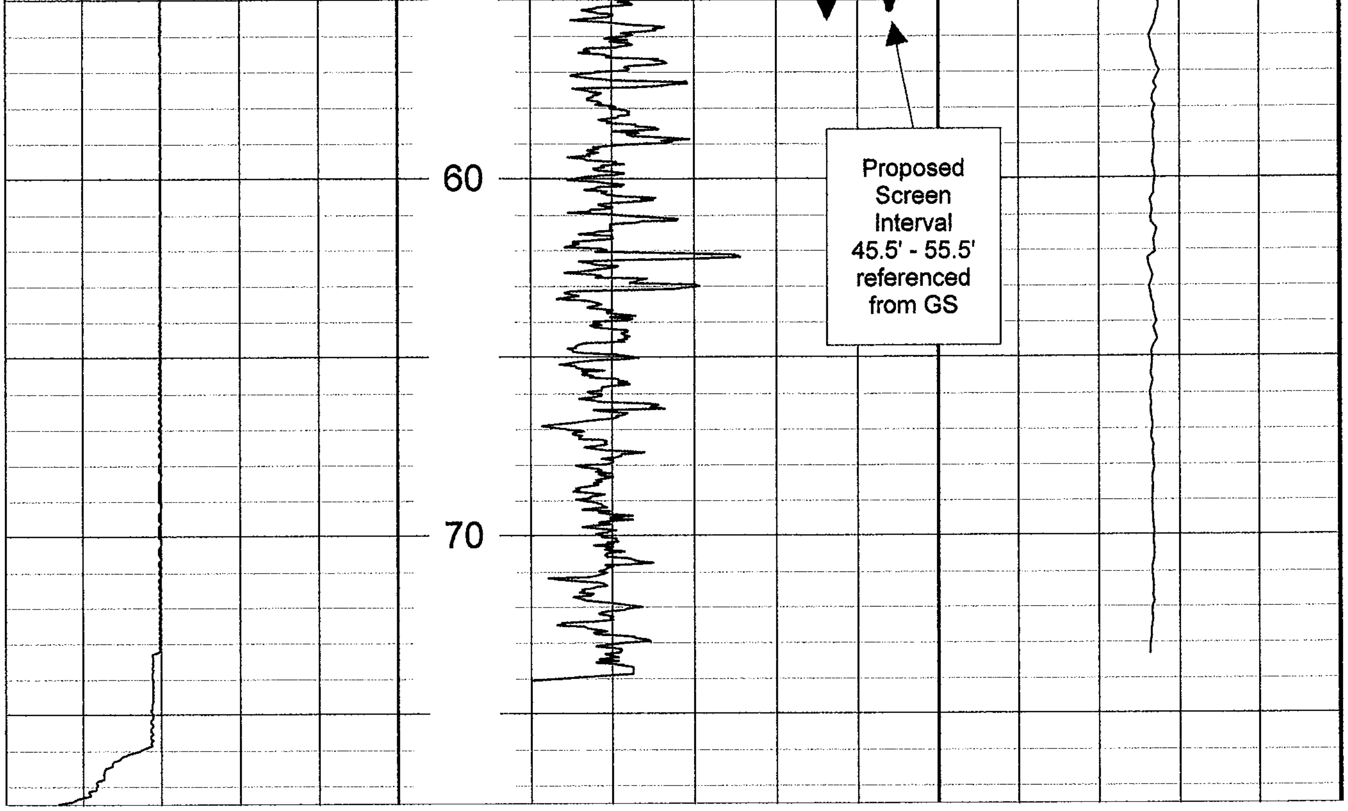
Site: PSC

City/State: Rock Hill, South Carolina		
Date: 12/15/06	Time: See notes	
System Configuration: Century 9065, 9041 (N. gamma only); Mt. Sopris 2EMA		
Water Level: 11.30'	Measured From: GS at ~ 08:45	
Outer Casing Height AGL (with cap open/removed): 1.6'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: GS	Log Speed: see notes
Log Top: 2.6'	Log Bottom: 77.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 9	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 6"	Well Depth: 77.69'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 39.9' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88844°N	Longitude: -81.07347°W	

Notes:

Caliper logged up @ 09:08; speed 19 fpm.
Natural gamma logged down @ 09:33; speed 16 fpm.
Electromagnetic conductivity logged up @ 10:43; speed 13.8 fpm
2EMA stablilized at 19 minutes.
GS references converted from a casing height of 1.6' (org. ref. pt.)
GPS values; NAD83


Caliper
2
Inch
7
Depth
1ft:65ft
Natural Gamma
0
CPS
80
Formation Conductivity (EM)
-250
mS/m
240
0
10
20
30
40
50
End of Casing
39.9' from GS
Proposed
Sandpack
Interval
43.5'-55.5'
from GS



60
70
Proposed Screen Interval 45.5' - 55.5' referenced from GS

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW19

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 19 – A

Temperature – degrees Centigrade
Fluid conductivity - μS/cm
Fluid conductivity at 20˚ C - μS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 19 – B

Temperature – degrees Centigrade
Fluid conductivity - μS/cm
Fluid conductivity at 20˚ C - μS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 19 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 19 - D

Natural gamma – cps (9041 Tool)
Caliper, 3-arm - inches
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

Well:	RIMW19	Log: 19 - A
Site:	PSC	

City/State: Rock Hill, South Carolina

Date: 12/17/06	Time: 17:30

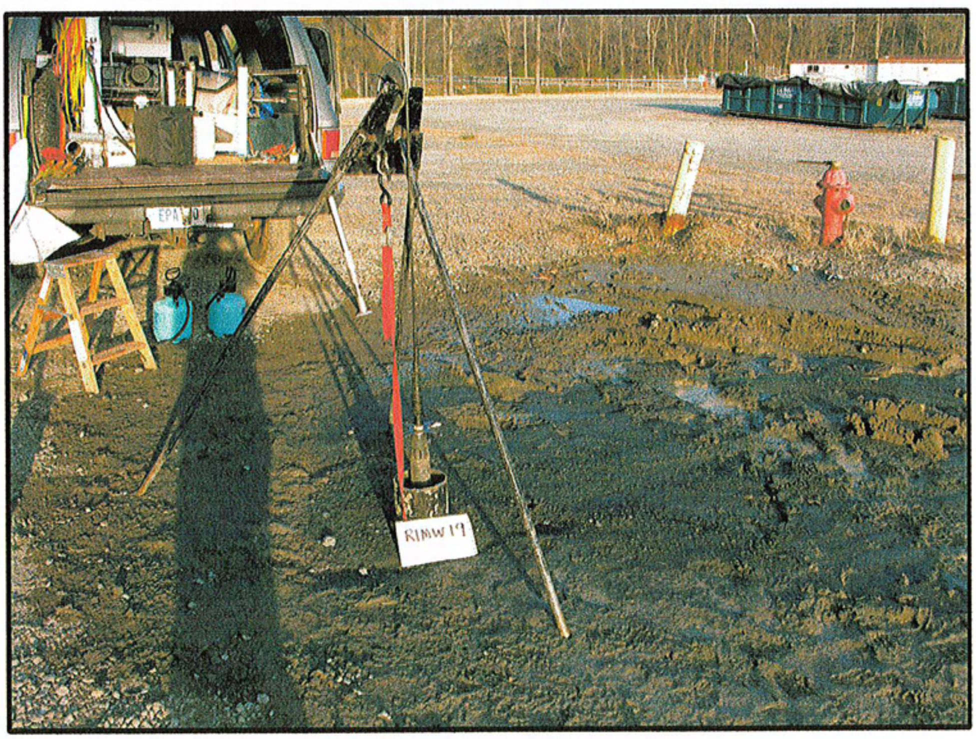
System Configuration: Mount Sopris 2IDA with ammonia option

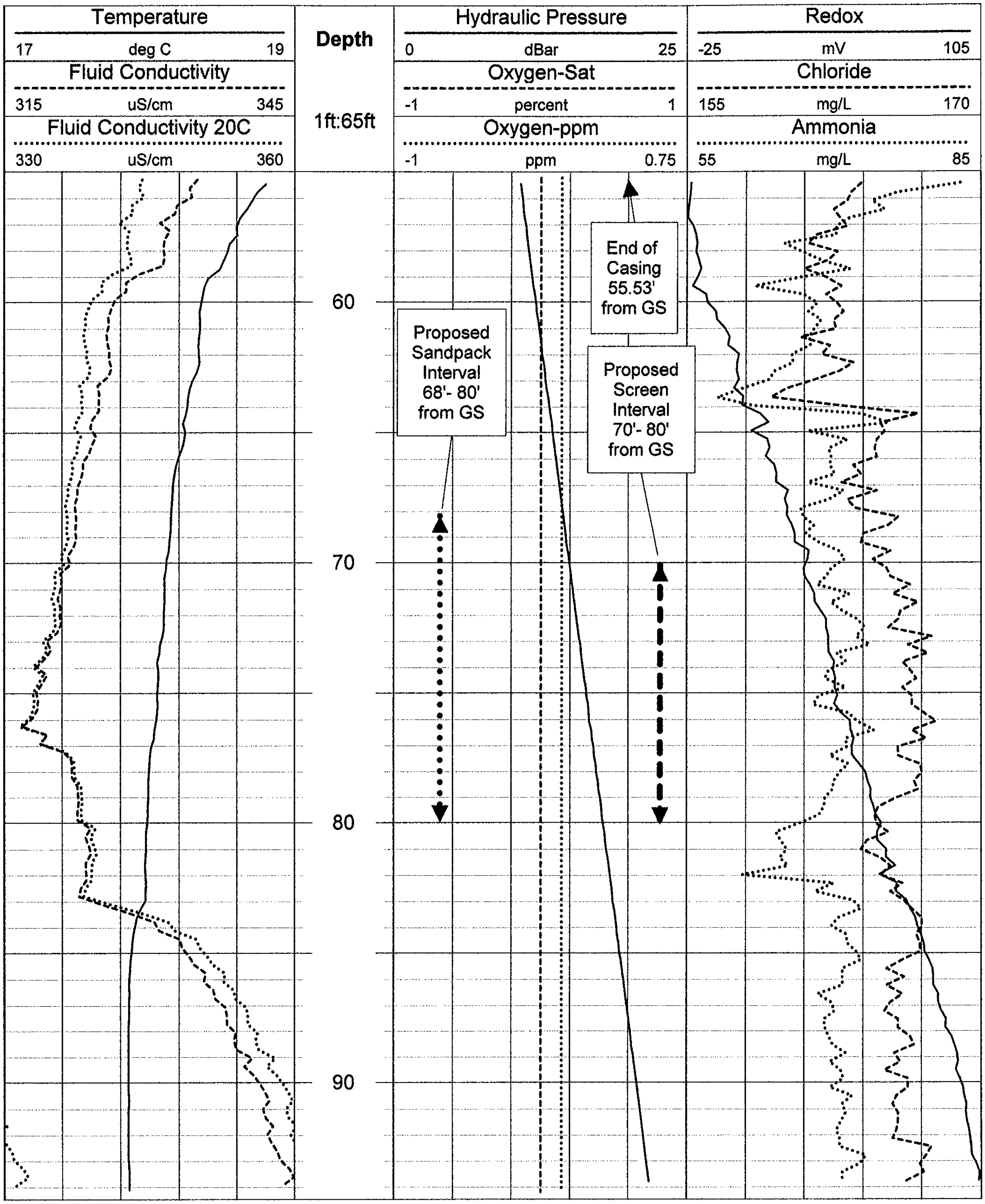
Water Level: 17.93'	Measured From: GS @ ~ 15:00

Outer Casing Height AGL (with cap open/removed): 0.67' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 14.8 fpm
Log Top: 55.53'	Log Bottom: 94.13'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 9041, 9065, 2EMA
Well Diameter: 6"	Well Depth: 95.59'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 55.43' to bottom; GS	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88887421°N	Longitude: -81.07201329°W	

Notes: GS references converted from a casing height 0.67' (org. ref. pt.)
GPS values; NAD83





Temperature
17 deg C 19
Fluid Conductivity
315 uS/cm 345
Fluid Conductivity 20C
330 uS/cm 360
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 25
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-25 mV 105
Chloride
155 mg/L 170
Ammonia
55 mg/L 85
60
70
80
90
End of Casing 55.53' from GS
Proposed Sandpack Interval 68'- 80' from GS
Proposed Screen Interval 70'- 80' from GS

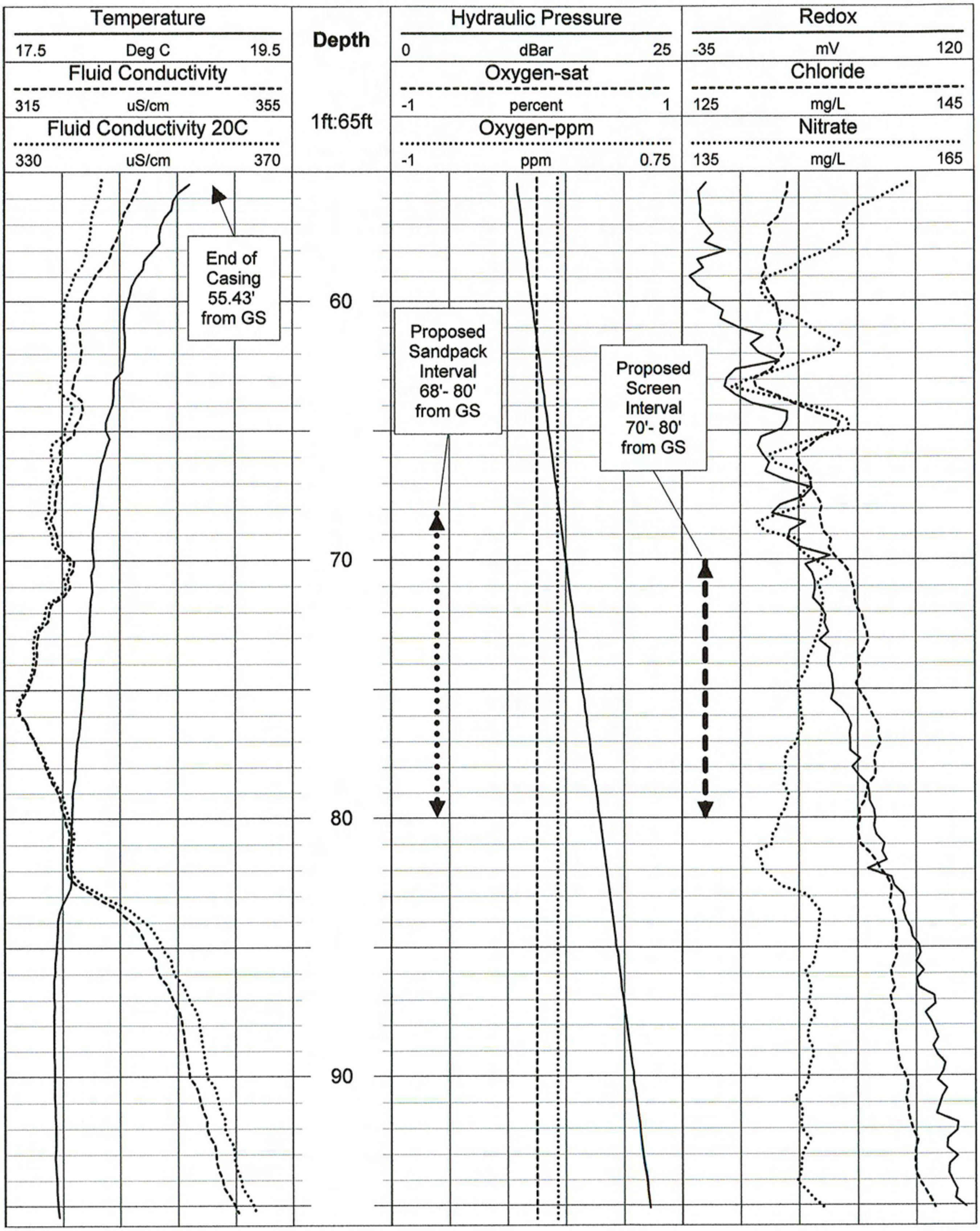
Well:	RIMW19	Log: 19 - B

Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/17/06	Time: See notes	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 17.93'	Measured From: GS @ ~ 15:00	
Outer Casing Height AGL (with cap open/removed): 0.67'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 15.7 fpm
Log Top: 56'	Log Bottom: 95.43'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used:
Well Diameter: 6"	Well Depth: 95.59'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 55.43' to bottom; GS	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88887421°N	Longitude: -81.07201329°W	

Notes:

Smoothing points: redox = 1; conductivities, nitrate, chloride = 5
2IDA logged down at approximately 17:15.
GS references converted from a casing height 0.67' (org. ref. pt.)
GPS values; NAD83



Temperature
17.5 Deg C 19.5
Fluid Conductivity
315 uS/cm 355
Fluid Conductivity 20C
330 uS/cm 370
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 25
Oxygen-sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-35 mV 120
Chloride
125 mg/L 145
Nitrate
135 mg/L 165
End of Casing 55.43' from GS
Proposed Sandpack Interval 68'- 80' from GS
Proposed Screen Interval 70'- 80' from GS
60
70
80
90

Well:	RIMW19	Log: 19 - C

Site:	PSC

City/State: Rock Hill, South Carolina

Date: 12/17/06	Time: See notes

System Configuration: Century 9065, 9041

Water Level: 17.93'	Measured From: GS @ ~ 15:00

Outer Casing Height AGL (with cap open/removed): 0.67' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A

Log Direction: See notes	Measured from: GS	Log Speed: see notes
Log Top: 3.9'	Log Bottom: 95.23'	Reference Point: GS

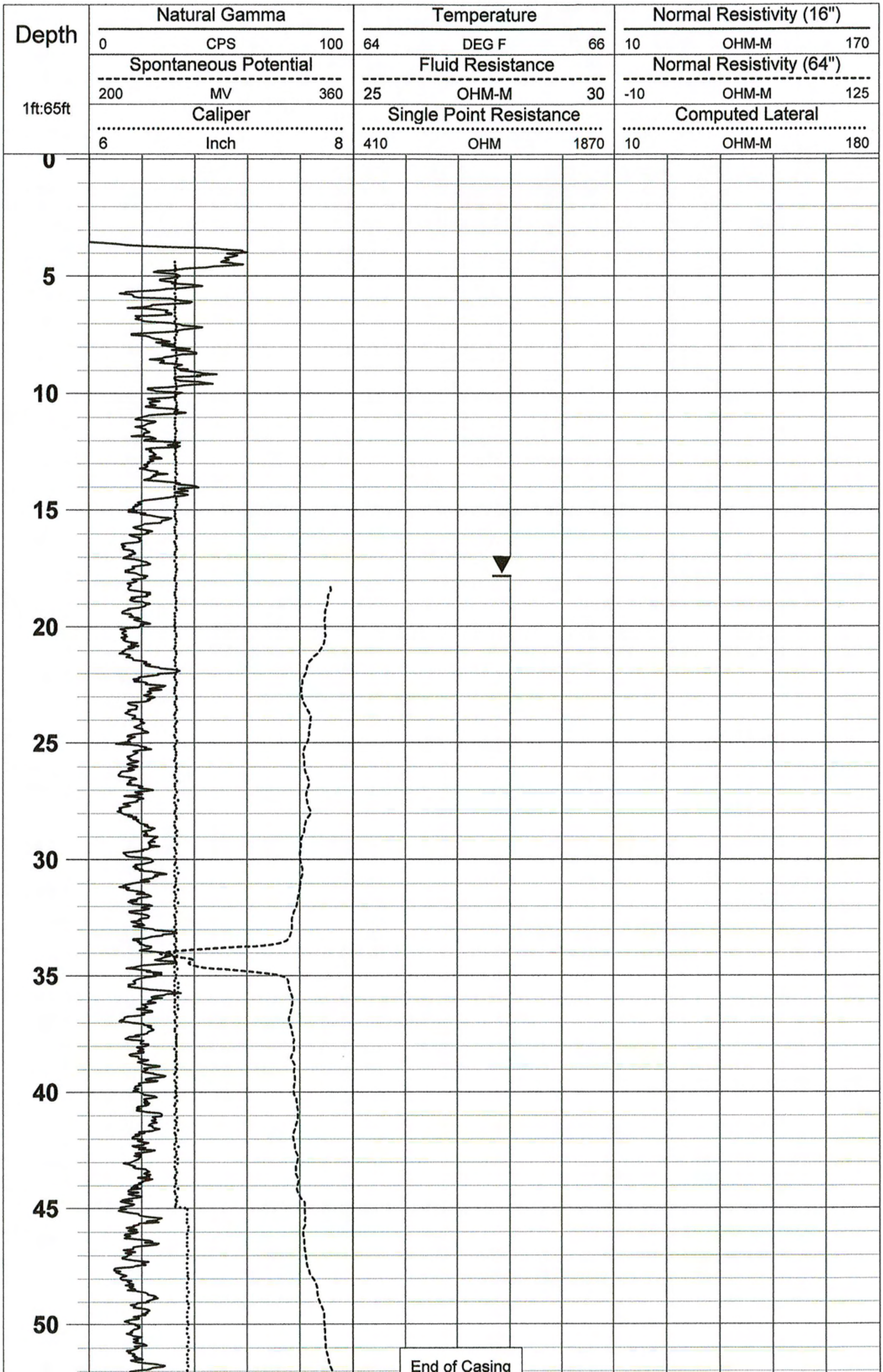
Analysis Software: WellCAD	Smoothing Points: natural gamma = 13

Operator: JRU	Witness: None	Other Tools Used: 2IDA, 2EMA
Well Diameter: 6"	Well Depth: 95.59'	Referenced From: GS

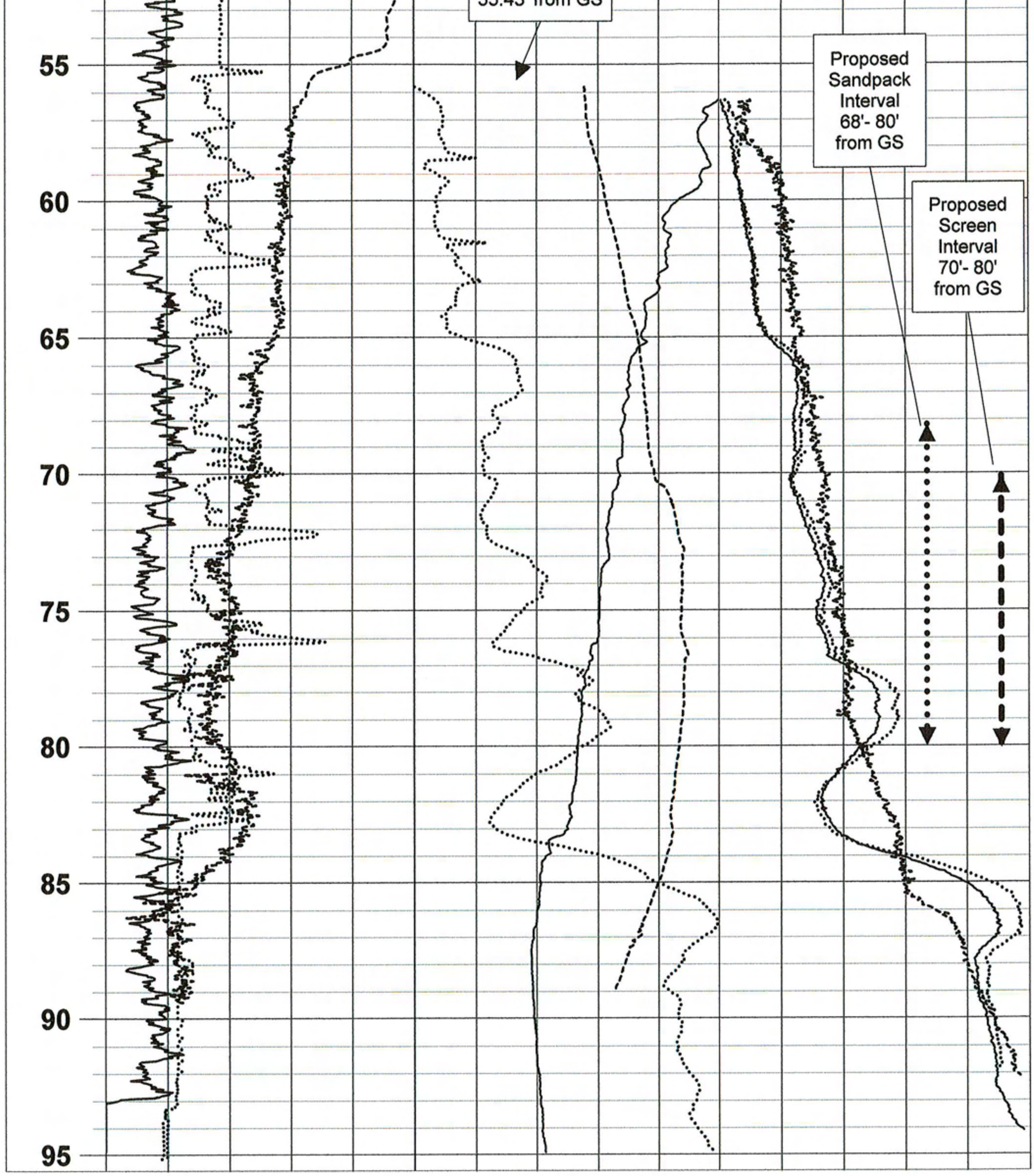
Casing Material: Steel	Non-Cased Interval: 55.43' to bottom; GS
Screen Interval: None	Screen Type: N/A
Latitude: 34.88887421°N	Longitude: -81.07201329°W

Notes: Caliper (9065) logged up at 15:57; speed 18 fpm.
Multi-function tool (9041) logged down at 16:20; speed 17 fpm.
GS references converted from a casing height 0.67' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Depth
1ft:65ft
Natural Gamma
0 CPS 100
Spontaneous Potential
200 MV 360
Caliper
6 Inch 8
Temperature
64 DEG F 66
Fluid Resistance
25 OHM-M 30
Single Point Resistance
410 OHM 1870
Normal Resistivity (16")
10 OHM-M 170
Normal Resistivity (64")
-10 OHM-M 125
Computed Lateral
10 OHM-M 180
0
5
10
15
20
25
30
35
40
45
50
End of Casing



55.45' from GS
Proposed
Sandpack
Interval
68'- 80'
from GS
Proposed
Screen
Interval
70'- 80'
from GS
55
60
65
70
75
80
85
90
95

Well:	**RIMW19**	**Log: 19 - D**

Site: **PSC**

City/State: Rock Hill, South Carolina

Date: 12/17/06	Time: See notes

System Configuration: Century 9065, 9041 (N. gamma only); Mt. Sopris 2EMA

Water Level: 17.93'	Measured From: GS @ ~ 15:00

Outer Casing Height AGL (with cap open/removed): 0.67' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A

Log Direction: See notes	Measured from: GS	Log Speed: see notes
Log Top: 3.8'	Log Bottom: 95.23'	Reference Point: GS

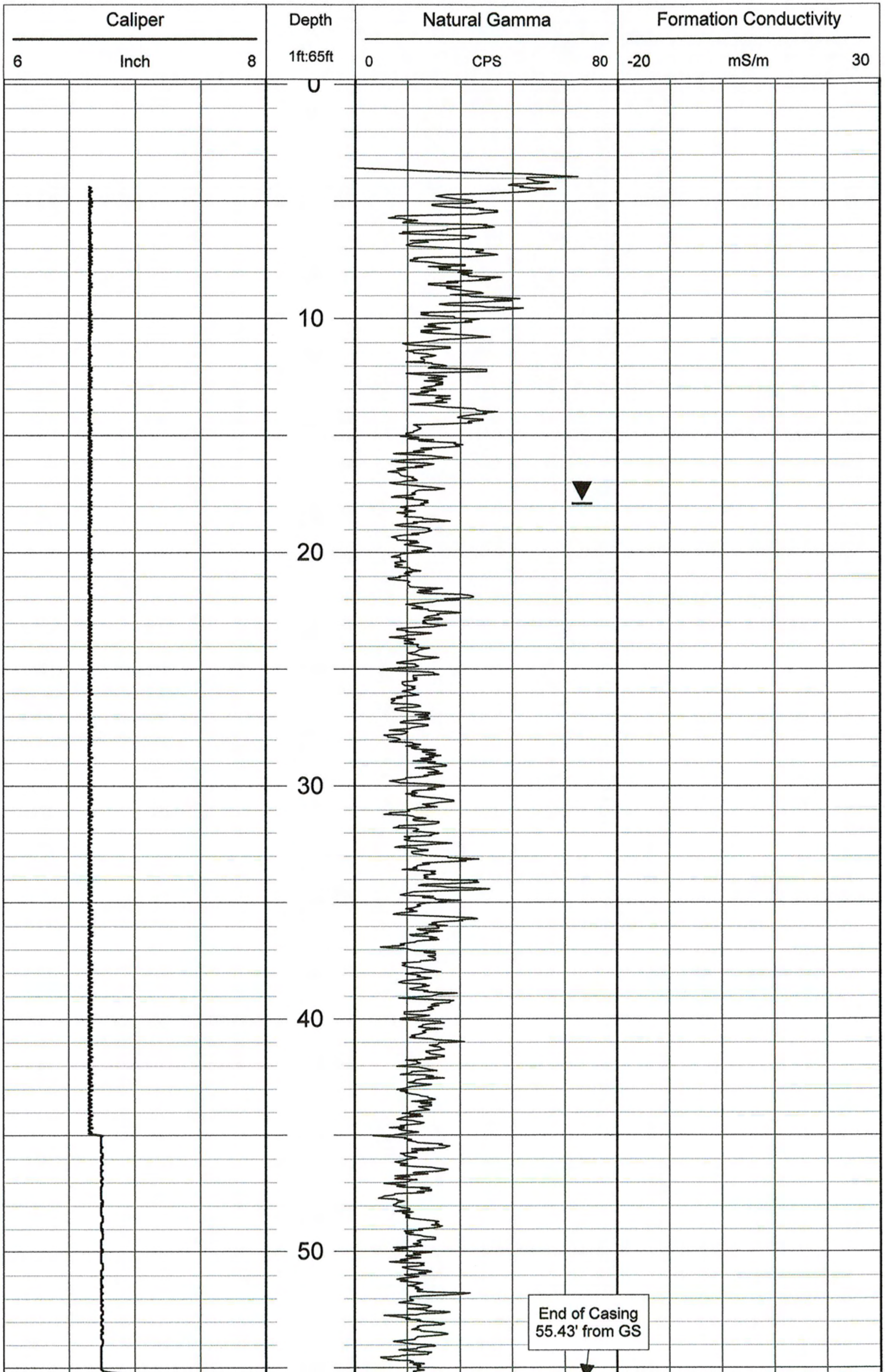
Analysis Software: WellCAD	Smoothing Points: natural gamma = 9

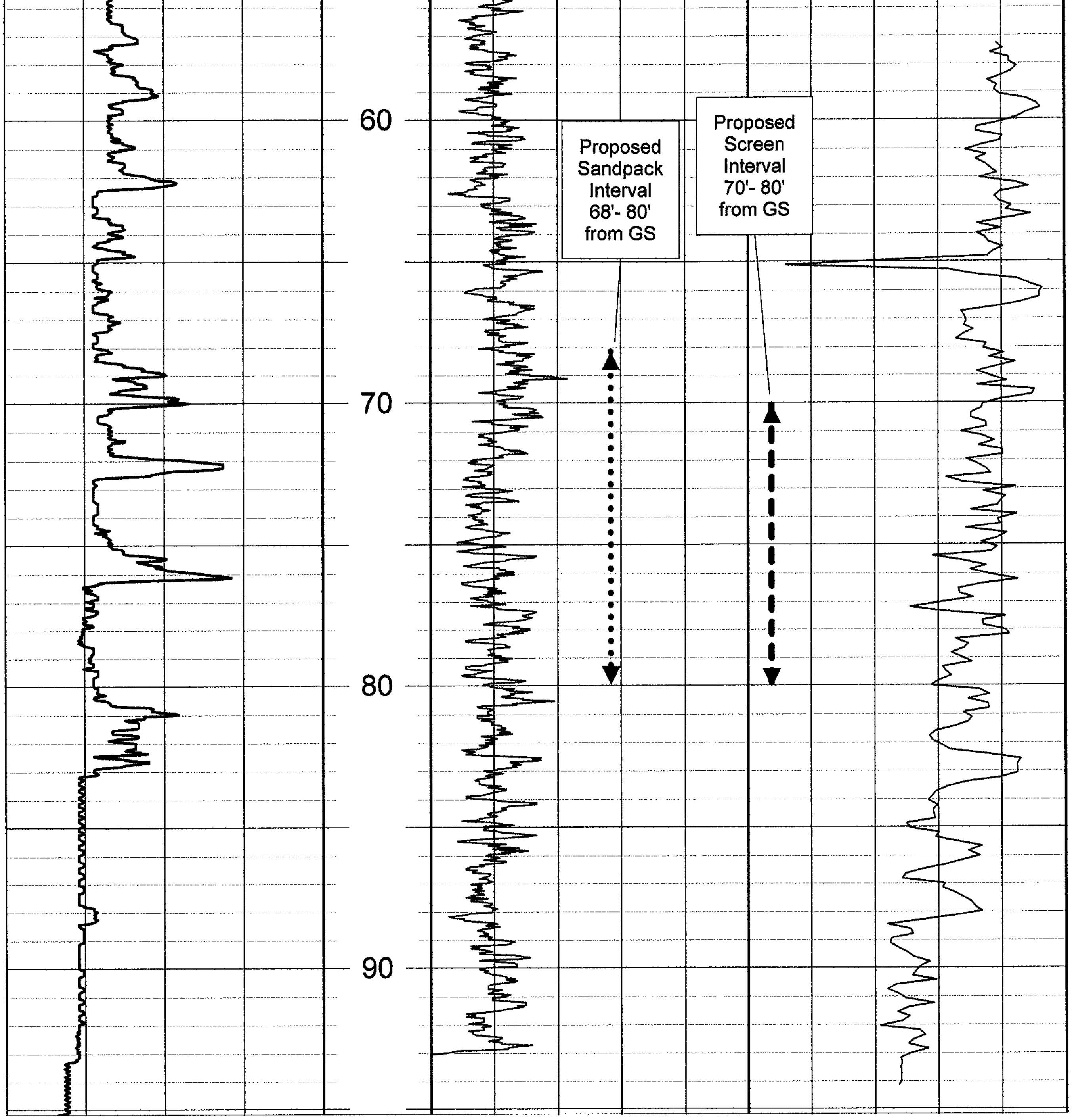
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 6"	Well Depth: 95.59'	Referenced From: GS

Casing Material: Steel	Non-Cased Interval: 55.43' to bottom; GS
Screen Interval: None	Screen Type: None
Latitude: 34.88887421°N	Longitude: -81.07201329°W

Notes:
Caliper (9065) logged up at 15:57; speed 18 fpm.
Multi-function tool (9041) logged down at 16:20; speed 17 fpm
2EMA logged up at approximately 16:50; speed 13.5 fpm.
2EMA Stabilized after 8 minutes.
GS references converted from a casing height 0.67' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Caliper
6
Inch
8
Depth
1ft:65ft
Natural Gamma
0
CPS
80
Formation Conductivity
-20
mS/m
30
0
10
20
30
40
50
End of Casing
55.43' from GS


60
70
80
90
Proposed Sandpack Interval 68'- 80' from GS
Proposed Screen Interval 70'- 80' from GS

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIPZ2

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log PZ2 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log PZ2 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log PZ2 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log PZ2 - D

Natural gamma – cps (9041 Tool)
Caliper, 3-arm - inches
Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5" diameter)

- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4" diameter)

- Natural gamma – cps

Century 9065 tool

- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration

- Temperature – degrees Centigrade
- Fluid conductivity – μS/cm
- Fluid conductivity at 20˚ C – μS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration

- Temperature – degrees Centigrade
- Fluid conductivity – μS/cm
- Fluid conductivity at 20˚ C – μS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool

- Formation conductivity – mS/m

Well:	RIPZ2	Log: PZ2-A

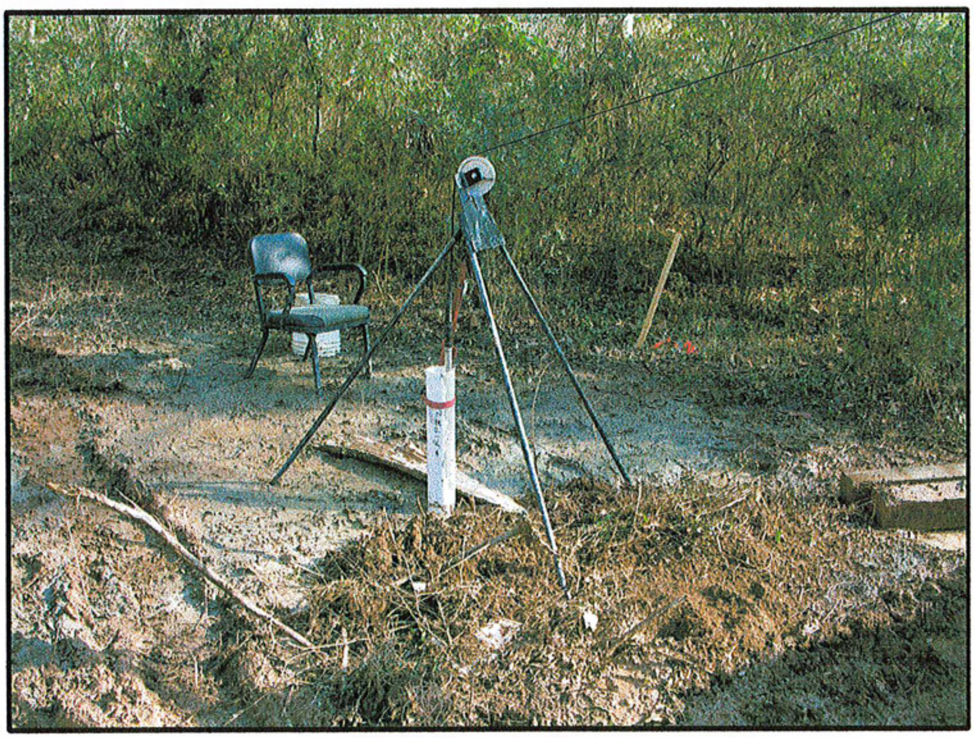
Site:	PSC

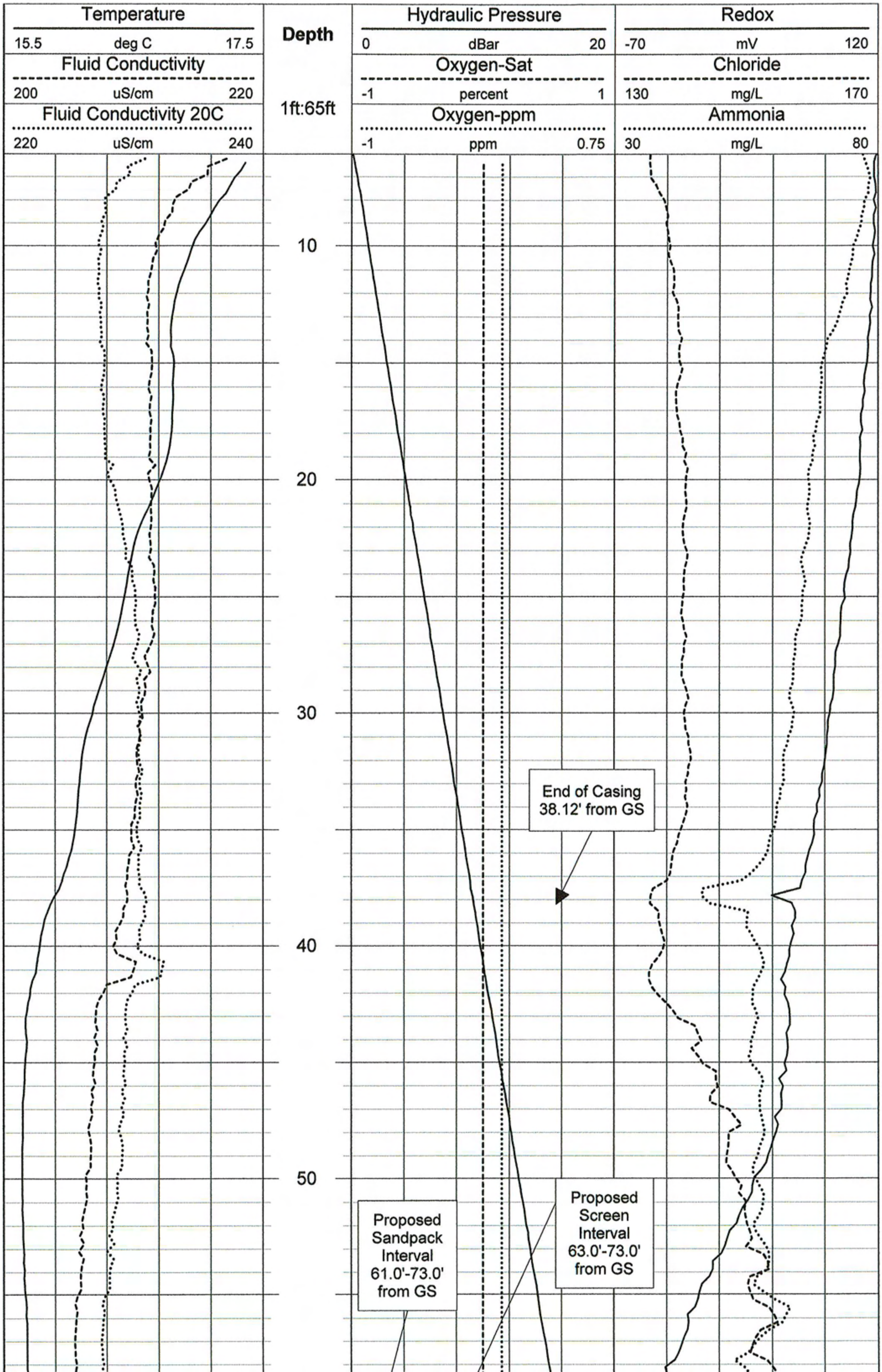
City/State: Rock Hill, South Carolina

Date: 12/17/06	Time: 13:33	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 6.79'	Measured From: GS @ ~ 11:50	
Outer Casing Height AGL (with cap open/removed): 1.88'	Type: PVC	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 14.4 fpm
Log Top: 6.42'	Log Bottom: 74.62'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9041; 9065; 2EMA
Well Diameter: 4"	Well Depth: 74.97'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: 38.12' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.887718°N	Longitude: -81.070799°W	

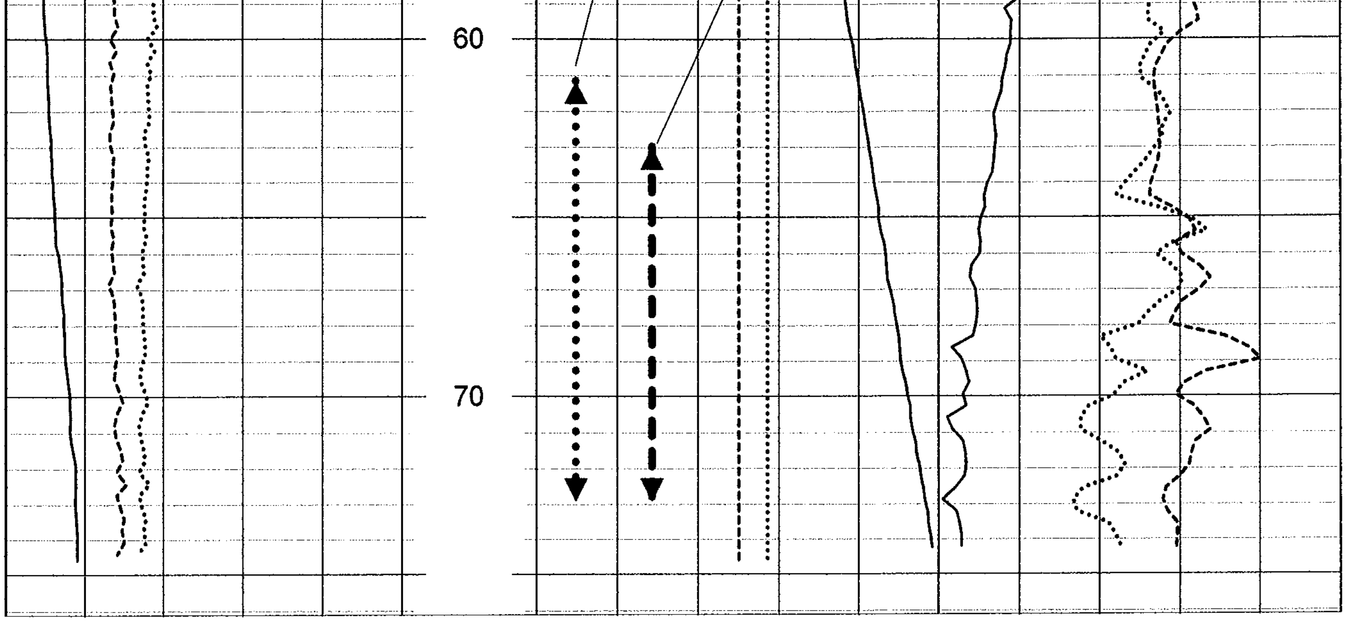
Notes:
Six well traverses were made prior to this log.
Smoothing points: redox = 1; Cl & NO3 = 3.
GS references converted from a casing height 1.88' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Temperature
15.5 deg C 17.5
Fluid Conductivity
200 uS/cm 220
Fluid Conductivity 20C
220 uS/cm 240
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-70 mV 120
Chloride
130 mg/L 170
Ammonia
30 mg/L 80
10
20
30
40
50
End of Casing 38.12' from GS
Proposed Sandpack Interval 61.0'-73.0' from GS
Proposed Screen Interval 63.0'-73.0' from GS



60
70

Well:	**RIPZ2**	Log: PZ2-B

Site:	**PSC**

City/State: Rock Hill, South Carolina

Date: 12/17/06	Time: 13:52

System Configuration: Mount Sopris 2IDA with nitrate option

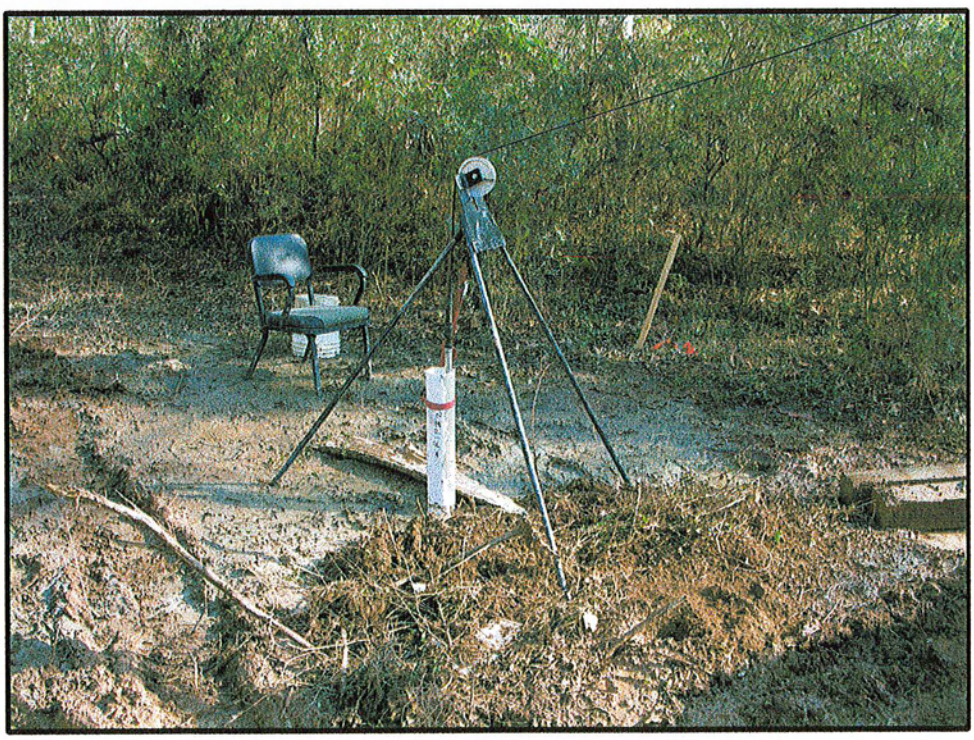
Water Level: 6.79'	Measured From: GS @ ~ 11:50

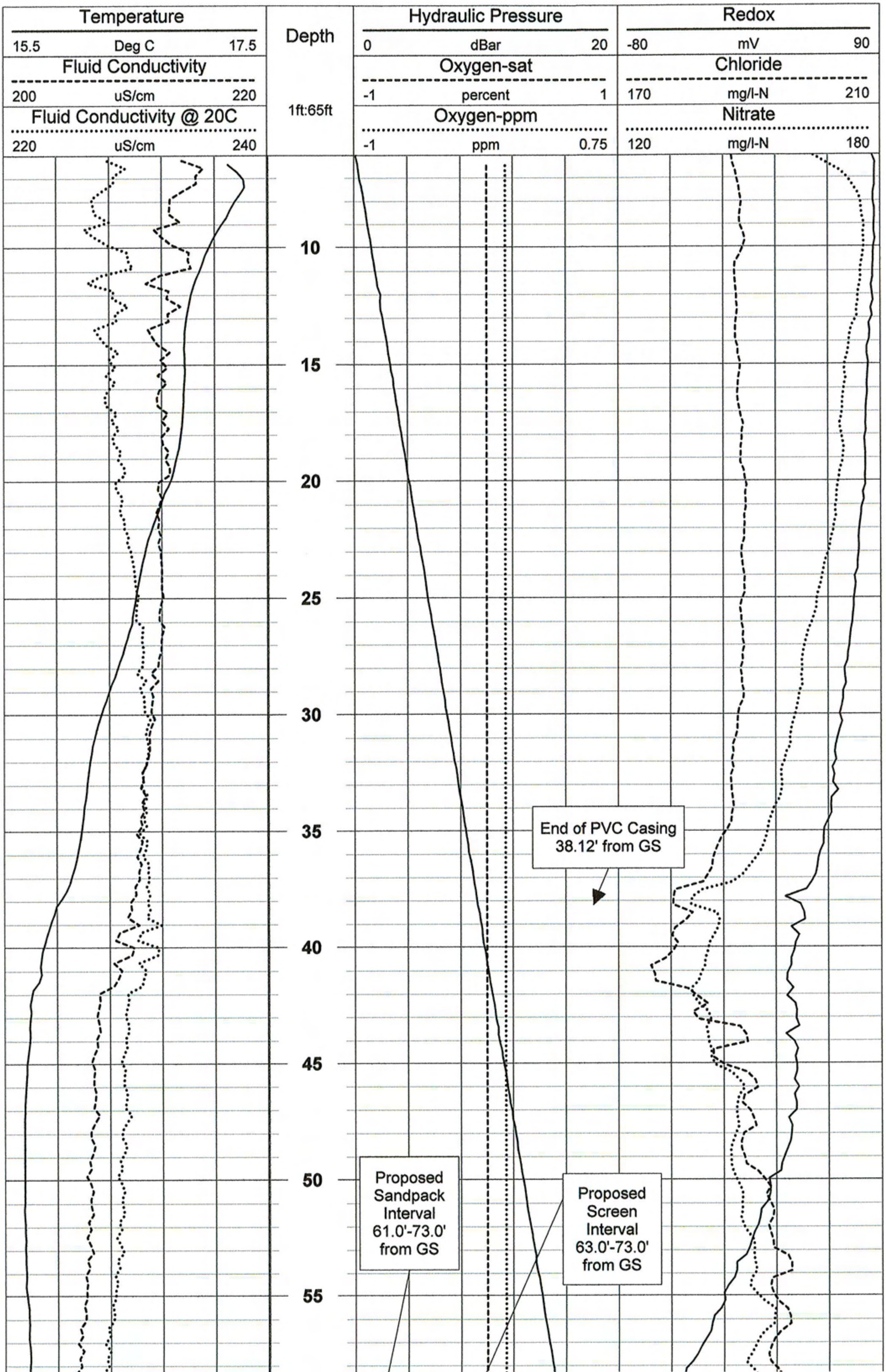
Outer Casing Height AGL (with cap open/removed): 1.88' Type: PVC

Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 13.8 fpm
Log Top: 6.42'	Log Bottom: 74.62'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 9041; 9065; 2EMA
Well Diameter: 4"	Well Depth: 74.97'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: 38.12' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.887718°N	Longitude: -81.070799°W	

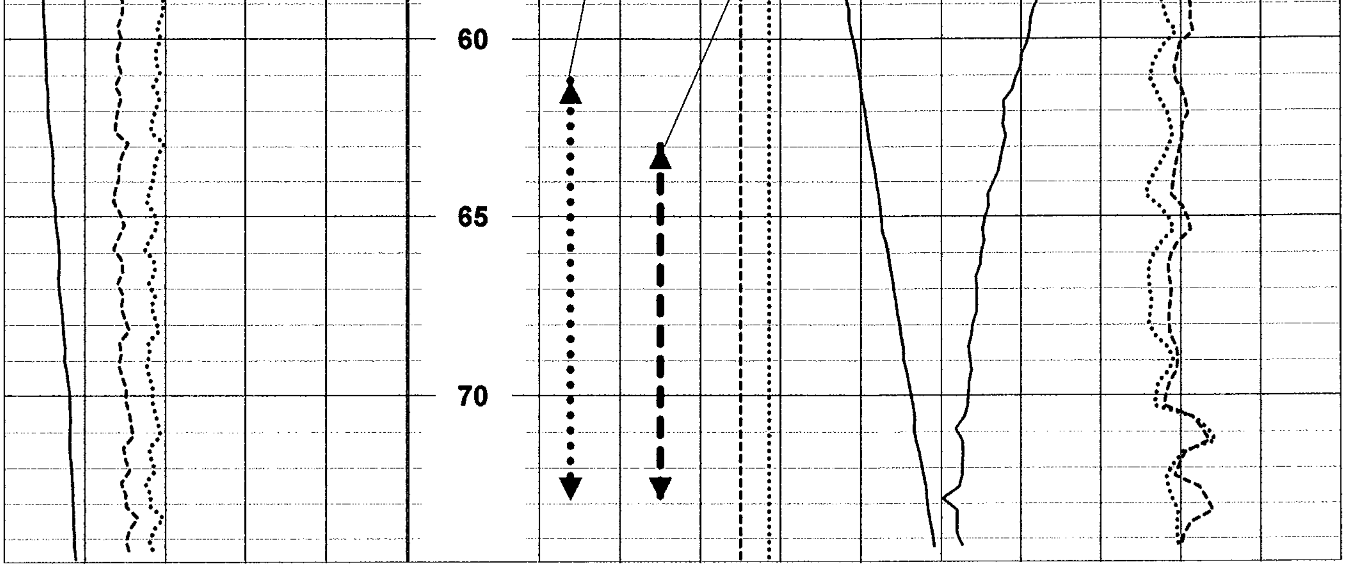
Notes: Smooting points; Cl and NO3 = 3; Redox and conductivities = 1.
GS references converted from a casing height 1.88' (org. ref. pt.)
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Temperature
15.5 Deg C 17.5
Fluid Conductivity
200 uS/cm 220
Fluid Conductivity @ 20C
220 uS/cm 240
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-80 mV 90
Chloride
170 mg/l-N 210
Nitrate
120 mg/l-N 180
10
15
20
25
30
35
40
45
50
55
End of PVC Casing 38.12' from GS
Proposed Sandpack Interval 61.0'-73.0' from GS
Proposed Screen Interval 63.0'-73.0' from GS



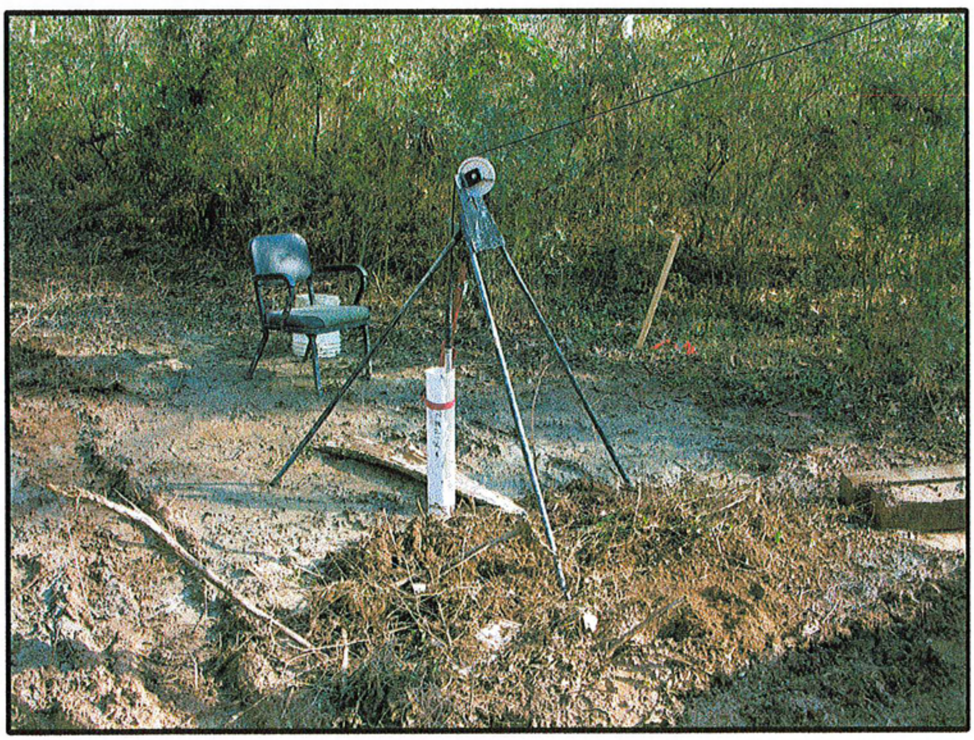
60
65
70

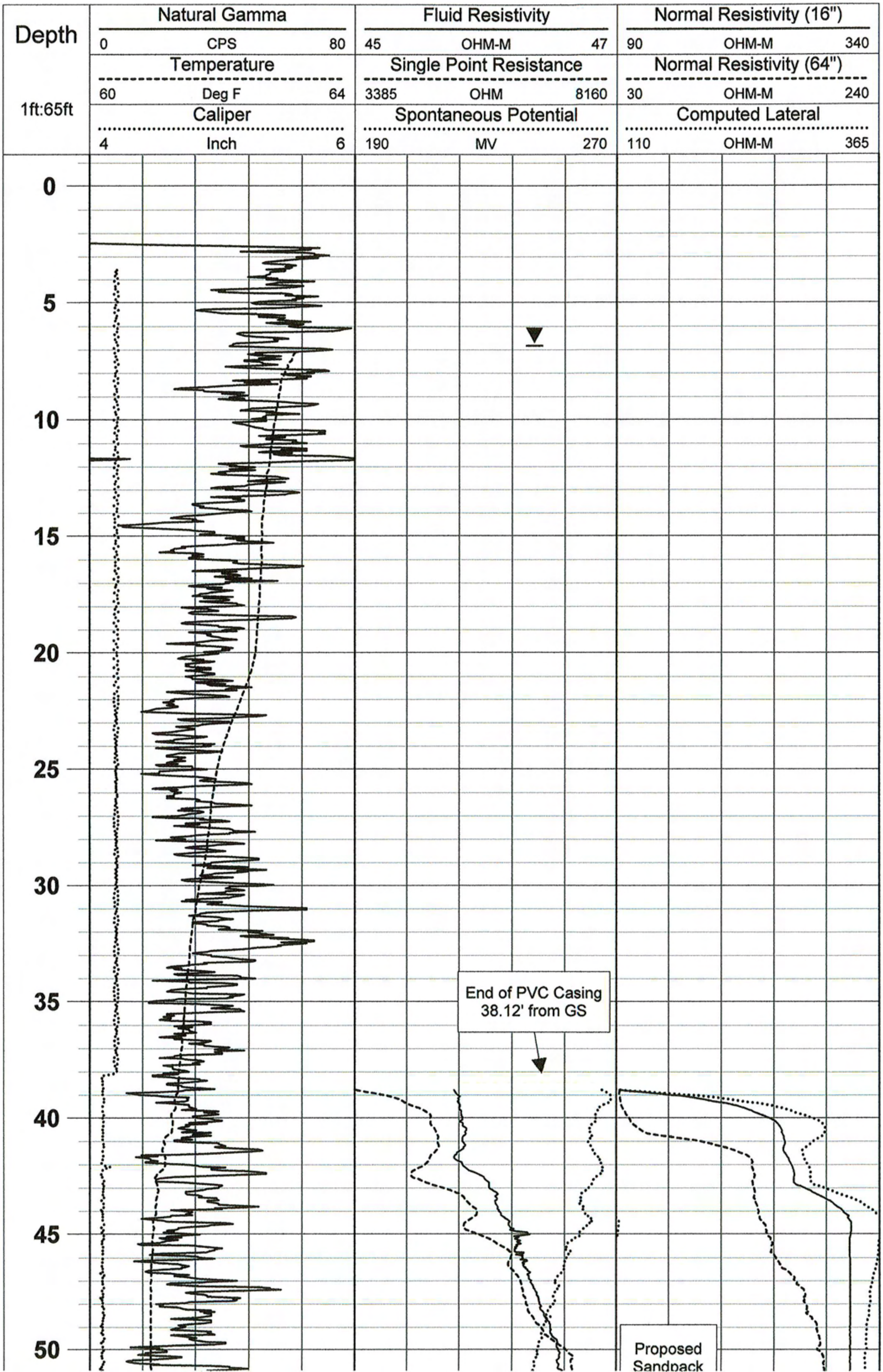
Well:	RIPZ2	Log: PZ2-C

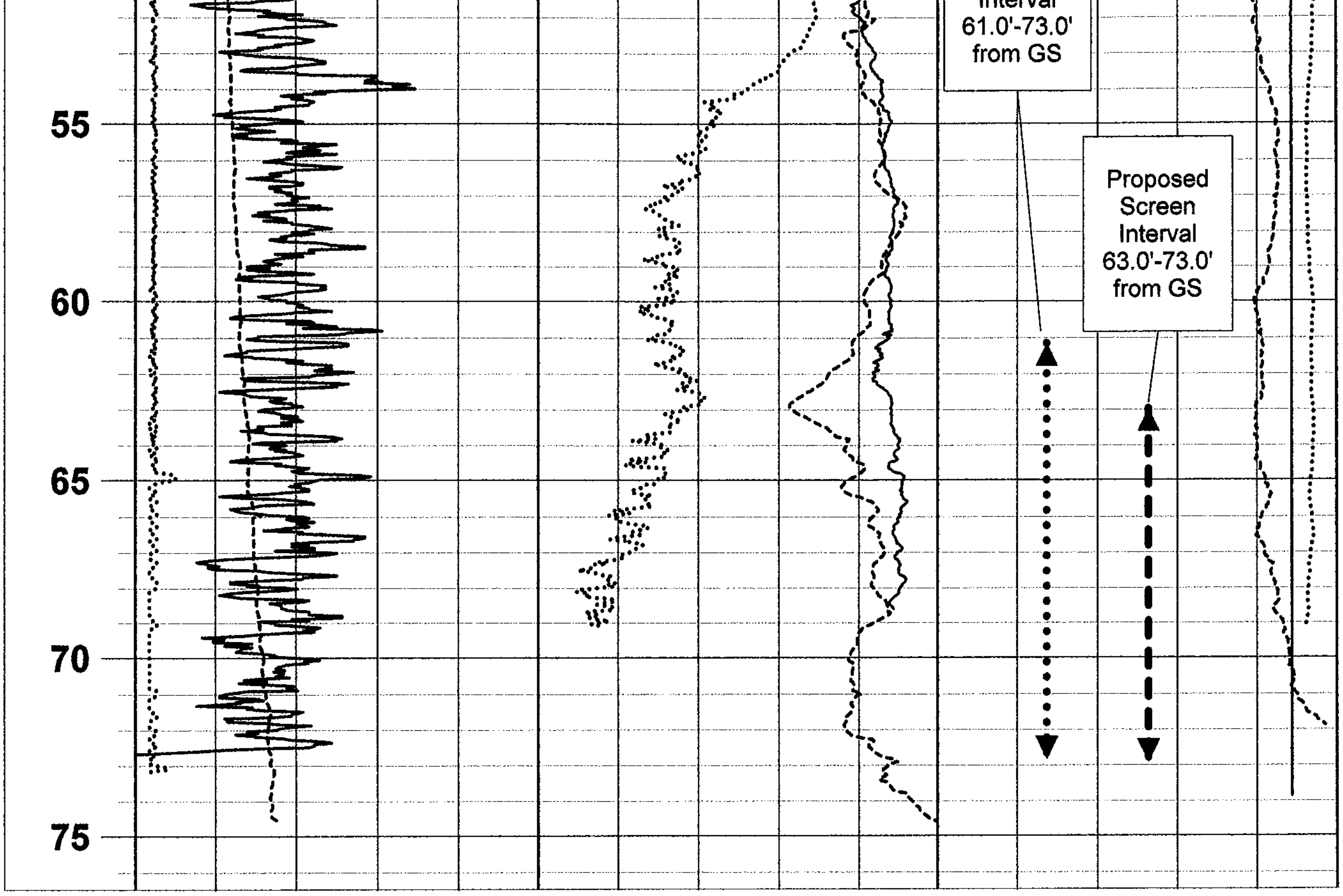
Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/17/06	Time: See notes	
System Configuration: Century 9041, 9065		
Water Level: 6.79'	Measured From: GS @ ~ 11:50	
Outer Casing Height AGL (with cap open/removed): 1.88'	Type: PVC	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: see notes	Measured from: GS	Log Speed: see notes
Log Top: 2.5'	Log Bottom: 74.6'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: natural gamma = 9	
Operator: JRU	Witness: None	Other Tools Used: Idronaut, 2EMA
Well Diameter: 4"	Well Depth: 74.97'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: 38.12' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.887718°N	Longitude: -81.070799°W	

Notes: Caliper logged up @ 12:05; speed 17 fpm.
9041 logged up at 12:36; speed 17 fpm.
GS references converted from a casing height 1.88' (org. ref. pt.)
GPS values; NAD83




Depth
1ft:65ft
Natural Gamma
0 CPS 80
Temperature
60 Deg F 64
Caliper
4 Inch 6
Fluid Resistivity
45 OHM-M 47
Single Point Resistance
3385 OHM 8160
Spontaneous Potential
190 MV 270
Normal Resistivity (16")
90 OHM-M 340
Normal Resistivity (64")
30 OHM-M 240
Computed Lateral
110 OHM-M 365
0
5
10
15
20
25
30
35
40
45
50
End of PVC Casing
38.12' from GS
Proposed
Sandpack



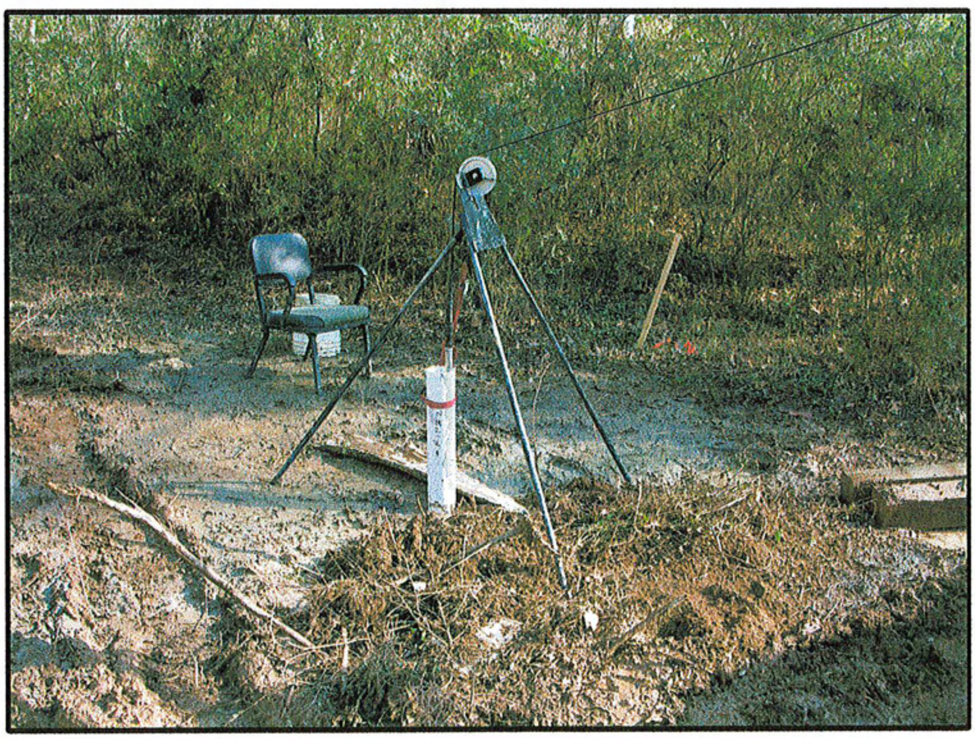
55
60
65
70
75
Interval
61.0'-73.0'
from GS
Proposed
Screen
Interval
63.0'-73.0'
from GS

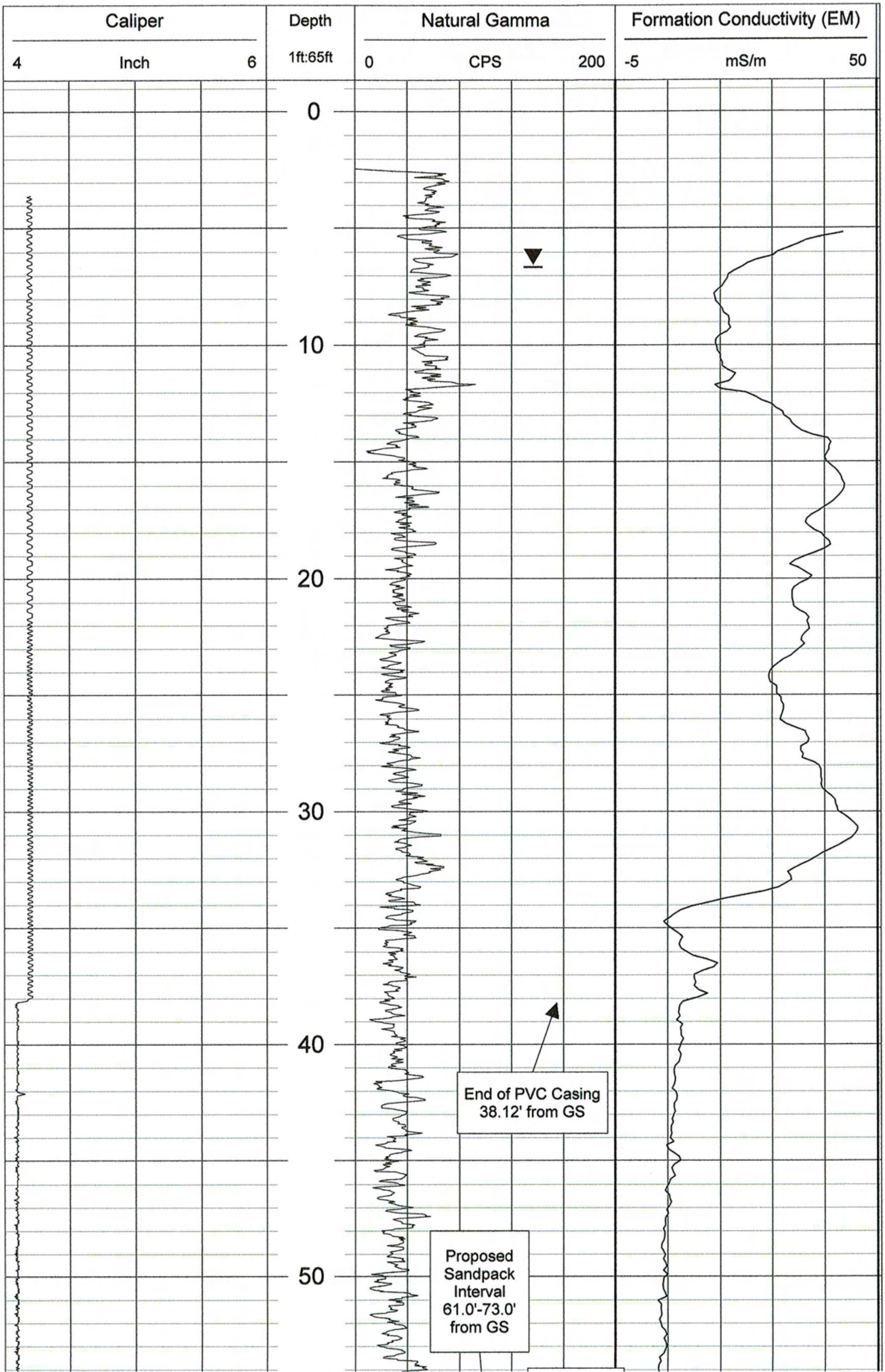
Well:	RIPZ2	Log: PZ2-D

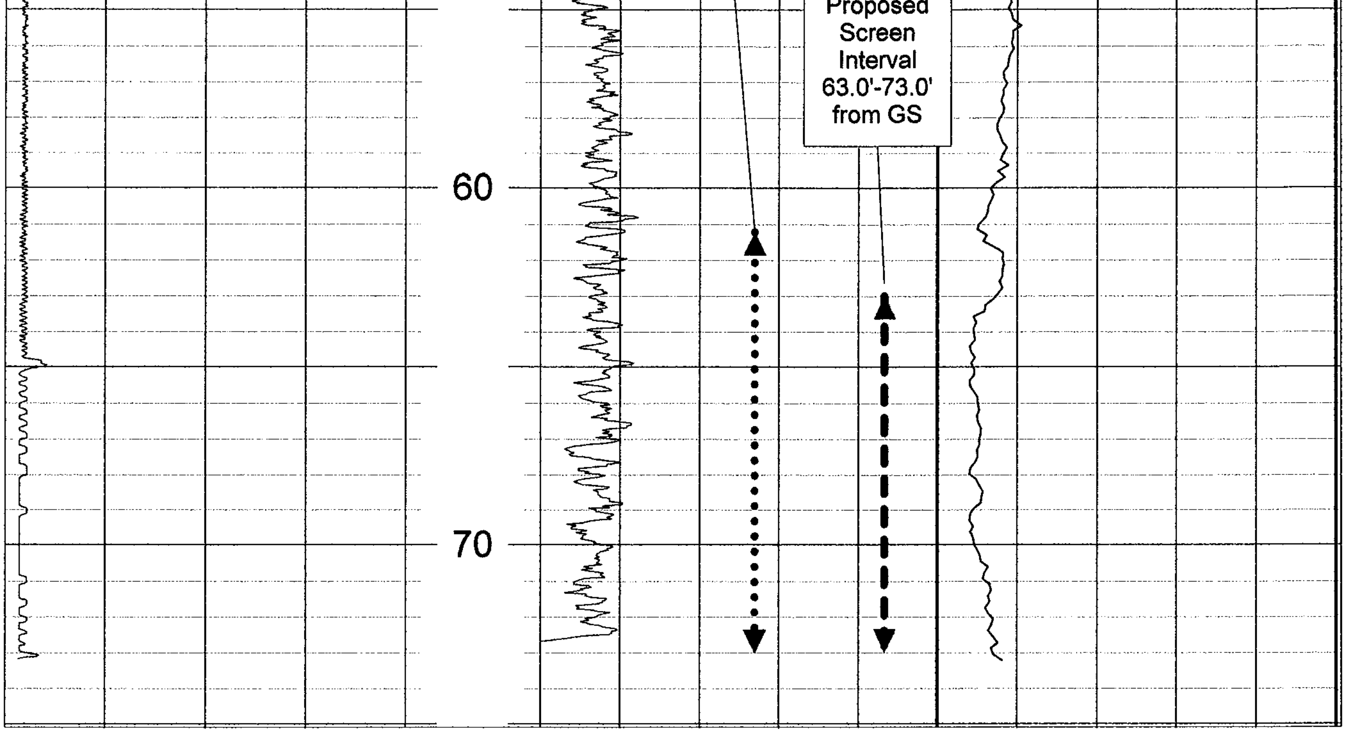
Site:	PSC

City/State: Rock Hill, South Carolina		
Date: 12/17/06	Time: See notes	
System Configuration: Century 9041 (N. gamma only), 9065, Mt. Sopris 2EMA		
Water Level: 6.79'	Measured From: GS @ ~ 11:50	
Outer Casing Height AGL (with cap open/removed): 1.88'	Type: PVC	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: see notes	Measured from: GS	Log Speed: see notes
Log Top: 2.5'	Log Bottom: 73.2'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: See notes	
Operator: JRU	Witness: None	Other Tools Used: Idronaut
Well Diameter: 4"	Well Depth: 74.97'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: 38.12' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.887718°N	Longitude: -81.070799°W	

Notes:
Caliper logged up @ 12:05; speed 17 fpm.
2EMA logged up @ 13:21; speed 13.5 fpm.
Natural gamma logged down @ 12:36; speed 17 fpm.
2EMA stabilized after 16 minutes.
GS references converted from a casing height 1.88' (org. ref. pt.)
GPS values; NAD83




Caliper
4
Inch
6
Depth
1ft:65ft
Natural Gamma
0
CPS
200
Formation Conductivity (EM)
-5
mS/m
50
0
10
20
30
40
50
End of PVC Casing
38.12' from GS
Proposed
Sandpack
Interval
61.0'-73.0'
from GS



Proposed
Screen
Interval
63.0'-73.0'
from GS
60
70

PSC Site
December 13 -18, 2006
Rock Hill, South Carolina

Geophysical Logs

Well Logs for W1

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log W1 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log W1 – B

Formation conductivity – mS/m

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool (2.5” diameter)
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9060 tool (1.4” diameter)
- Natural gamma – cps

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

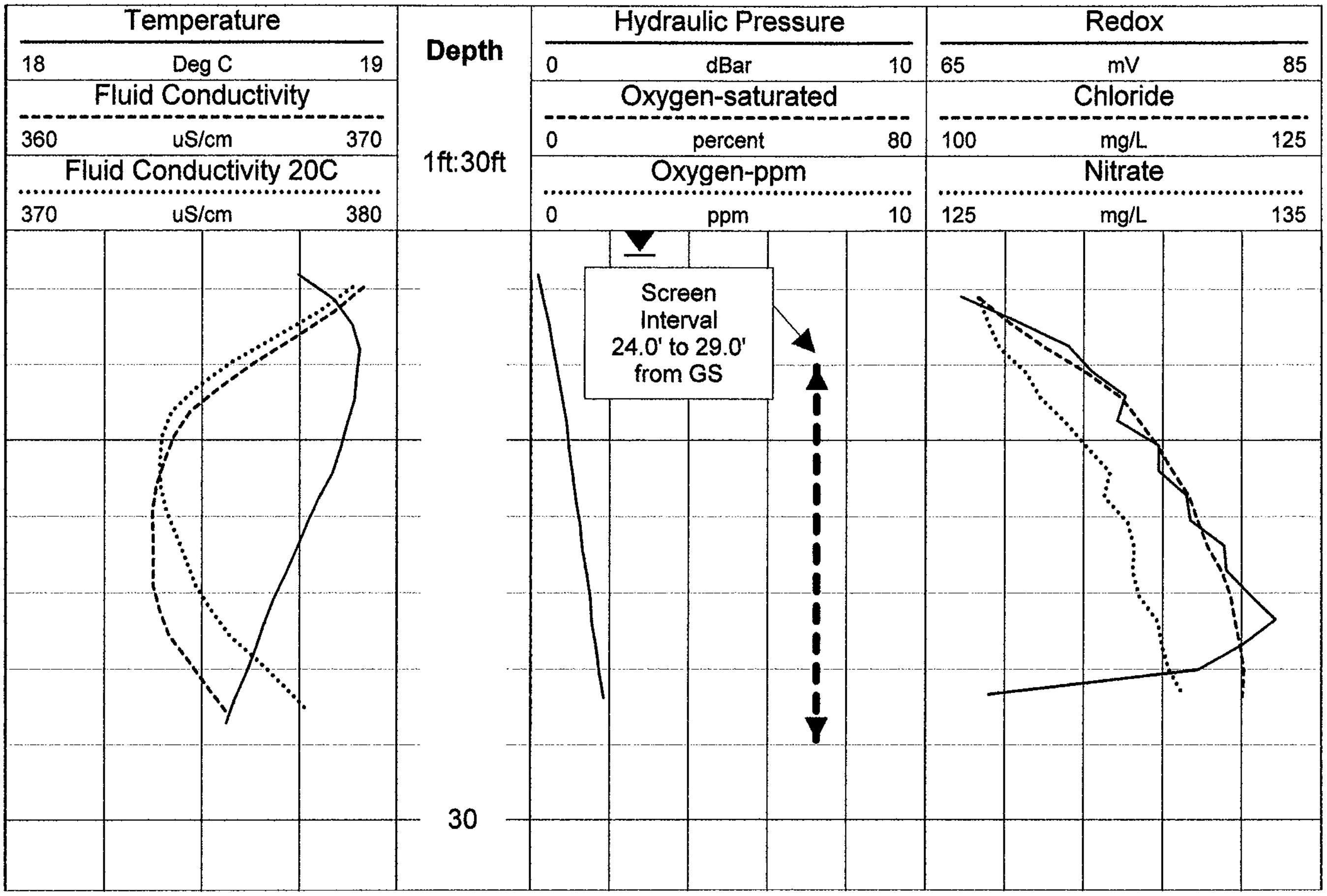
Well:	**W1**	Log: W1-A

Site:	**PSC**

City/State: Rock Hill, South Carolina

Date: 12/16/06	Time: 11:07	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 22.57'	Measured From: GS @ ~ 11:00	
Outer Casing Height AGL (with cap open/removed): 2.77'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: -0.24	Casing Type: PVC	
Log Direction: Down	Measured from: GS	Log Speed: 12.8 fpm
Log Top: 22.87'	Log Bottom: 28.77'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: see notes	
Operator: JRU	Witness: None	Other Tools Used: 2EMA
Well Diameter: 4"	Well Depth: 29.32'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: N/A	
Screen Interval: 24.0' to 29.0'; GS	Screen Type: Unknown	
Latitude: 34.88917554° N	Longitude: -81.07304471° W	

Notes: Power lines over head. GPS values; NAD83
This log was the first traverse
Screen interval data obtained from previous well construction documents.
Smoothing; redox = 1; conductivities, nitrate, chloride = 5.
GS references converted from a TIC height of 2.53' (org. ref. pt.)


Temperature
18 Deg C 19
Fluid Conductivity
360 uS/cm 370
Fluid Conductivity 20C
370 uS/cm 380
Depth
1ft:30ft
Hydraulic Pressure
0 dBar 10
Oxygen-saturated
0 percent 80
Oxygen-ppm
0 ppm 10
Redox
65 mV 85
Chloride
100 mg/L 125
Nitrate
125 mg/L 135
Screen Interval 24.0' to 29.0' from GS
30

Well: W1 Log: W1-B

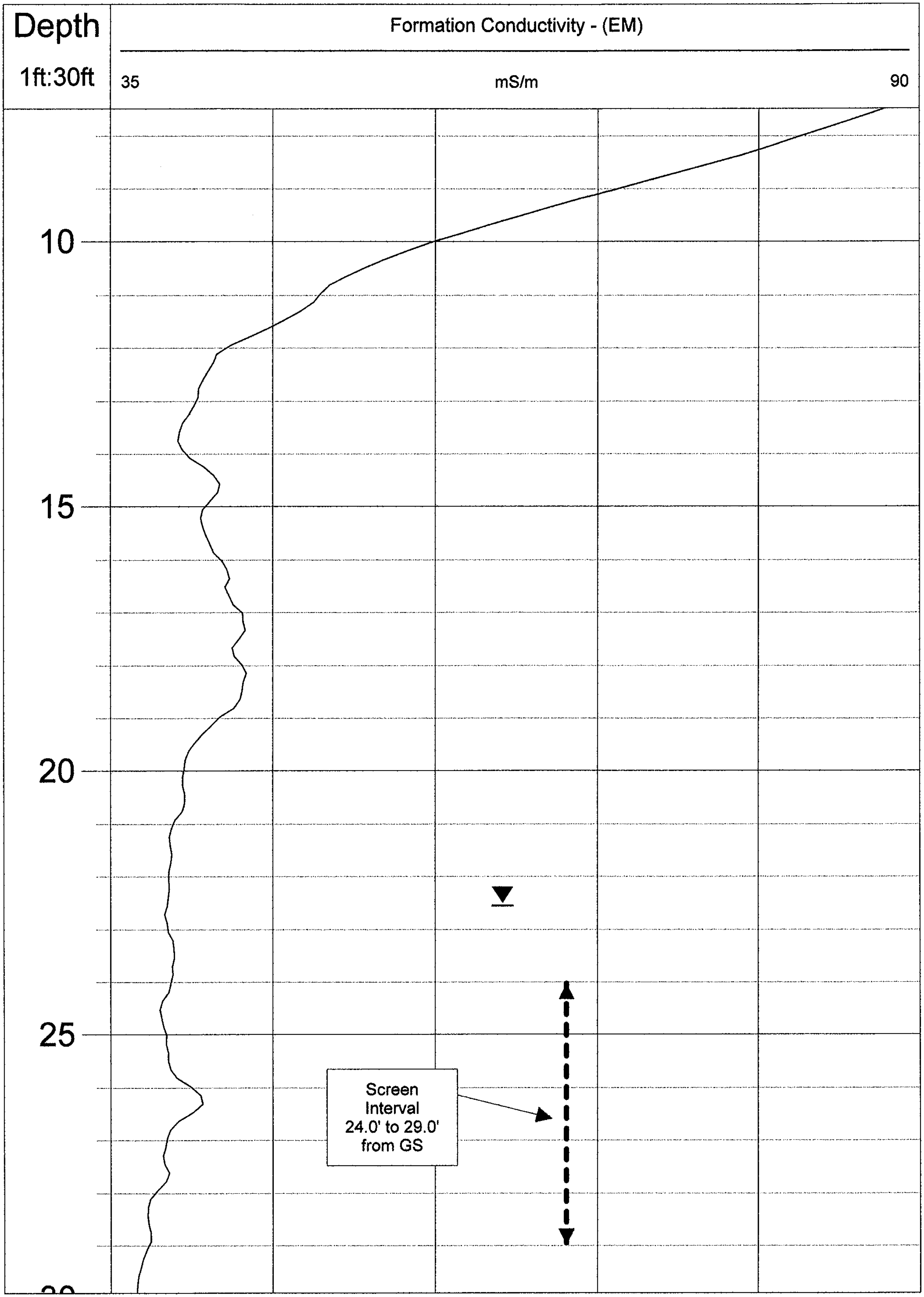
Site: PSC

City/State: Rock Hill, South Carolina		
Date: 12/16/06	Time: 11:38	
System Configuration: Mount Sopris 2EMA		
Water Level: 22.57'	Measured From: GS @ ~ 11:00	
Outer Casing Height AGL (with cap open/removed): 2.77'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: -0.24	Casing Type: PVC	
Log Direction: Down	Measured from: GS	Log Speed: 16.7 fpm
Log Top: 7.5'	Log Bottom: 22.37'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: 2	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 4"	Well Depth: 29.32'	Referenced From: GS
Casing Material: PVC	Non-Cased Interval: N/A	
Screen Interval: 24.0' to 29.0'; GS	Screen Type: Unknown	
Latitude: 34.88917554° N	Longitude: -81.07304471° W	

Notes:

Screen interval data obtained from previous well construction documents.
Power lines over head. GPS values; NAD83
2EMA stabilized after 18 minutes.
2EMA logged down since up traverse was not started at the bottom.
GS references converted from a TIC height of 2.53' (org. ref. pt.)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Depth
1ft:30ft
Formation Conductivity - (EM)
35
mS/m
90
10
15
20
25
Screen
Interval
24.0' to 29.0'
from GS

PSC Site
August 22 – 28, 2007
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW 20

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 20 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 20 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 20 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 20 - D

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m
Optical televiewer – color digital image

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

Mount Sopris ALT OBI-40-2 Tool
- Optical televiewer – color digital image

Well: RIMW 20 Log: 20-A

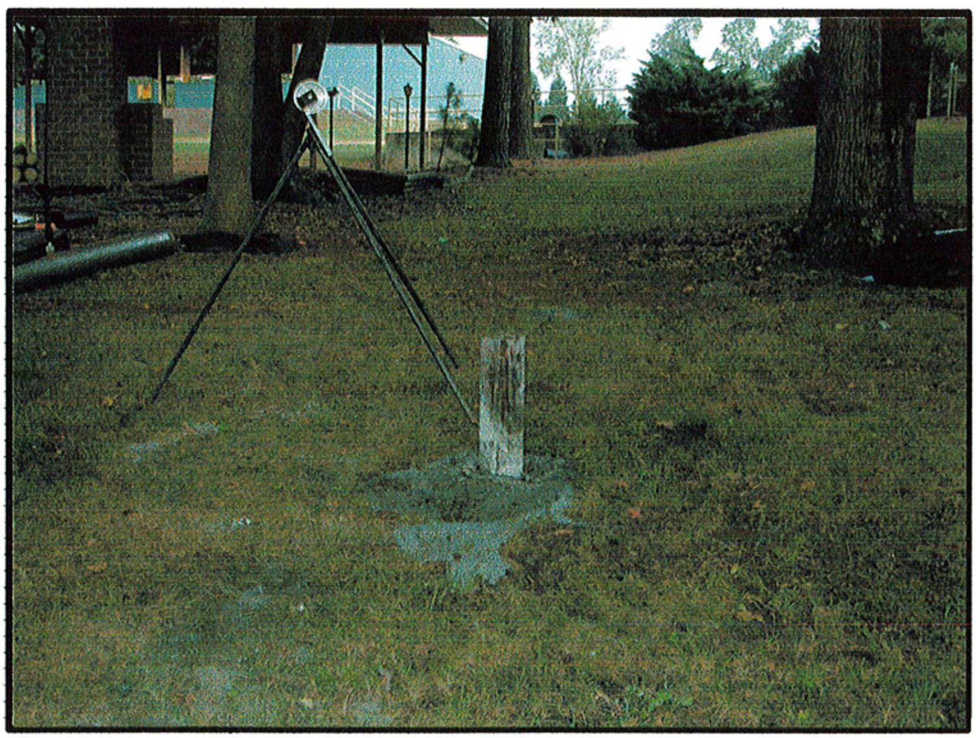
Site: PSC

City/State: Rock Hill, South Carolina		
Date: 8/24/07	Time: 09:30	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 9.47'	Measured From: GS at ~ 07:40 on 8/24	
Outer Casing Height AGL (with cap open/removed): 1.62'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: down	Measured from: Ground Surface	Log Speed: 16 fpm
Log Top: 15.9'	Log Bottom: 128.1'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"	Well Depth: 128.15'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 98.3' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88959760° N	Longitude: -81.07119817° W	

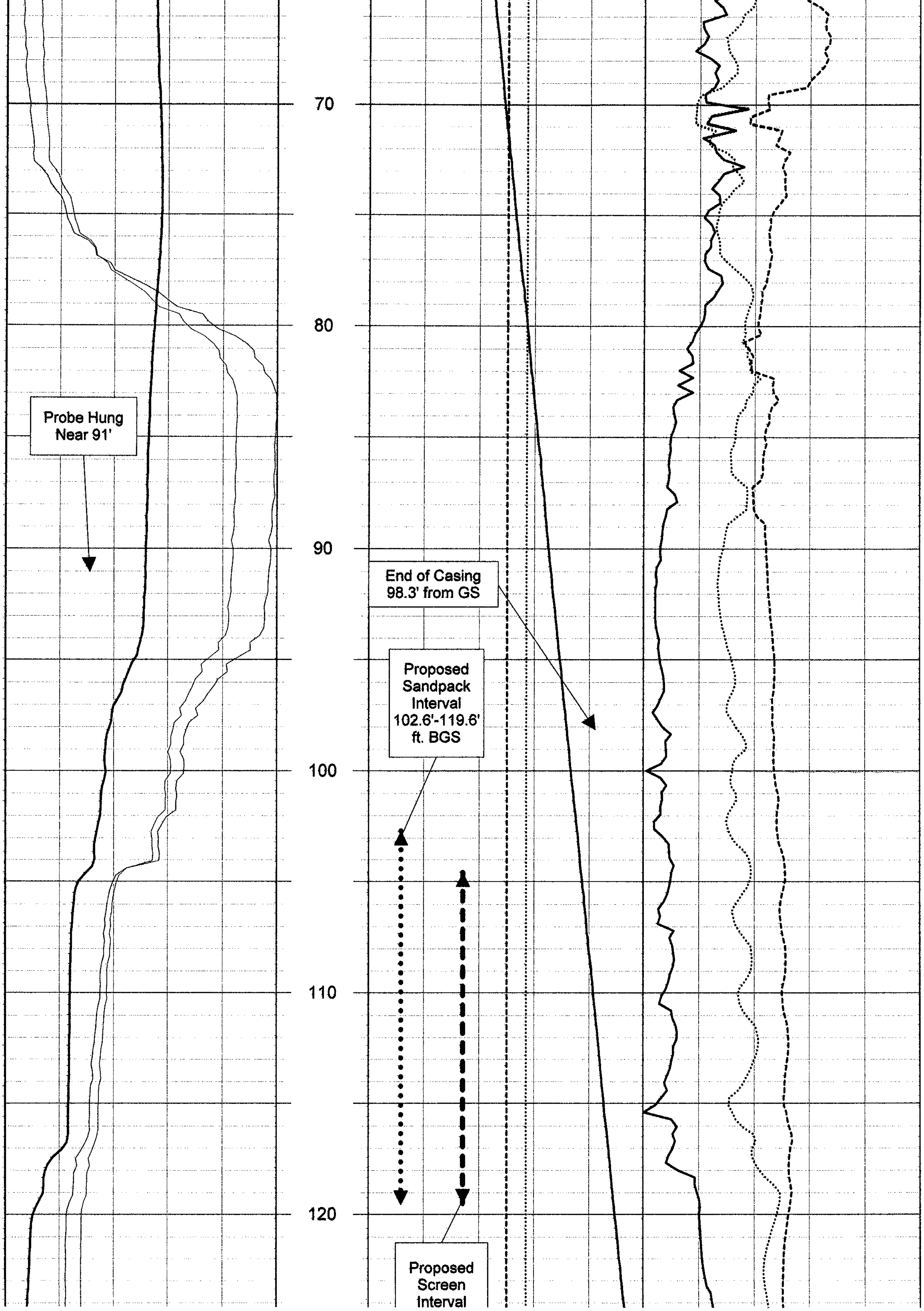
Notes: GPS values; NAD83

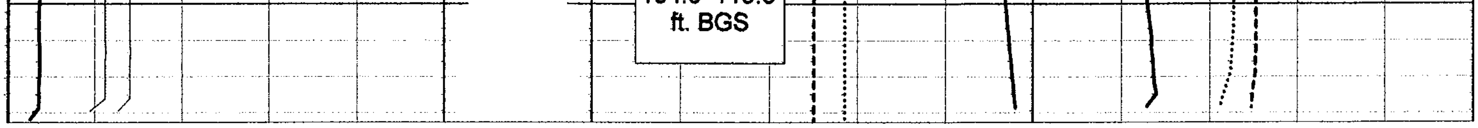
* fluid conductivity data collected at mS/cm but displayed at uS/cm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY




Temperature
18 deg C 28
-Fluid Conductivity-
259 uS/cm* 2760
-Fluid Conductivity 20C-
0 uS/cm* 3000
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 35
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-25 mV 105
Chloride
85 mg/L 160
Ammonia
50 mg/L 135
20
30
40
50
60


70
80
Probe Hung Near 91'
90
End of Casing 98.3' from GS
Proposed Sandpack Interval 102.6'-119.6' ft. BGS
100
110
120
Proposed Screen Interval


ft. BGS

Well:	**RIMW 20**	**Log: 20-B**

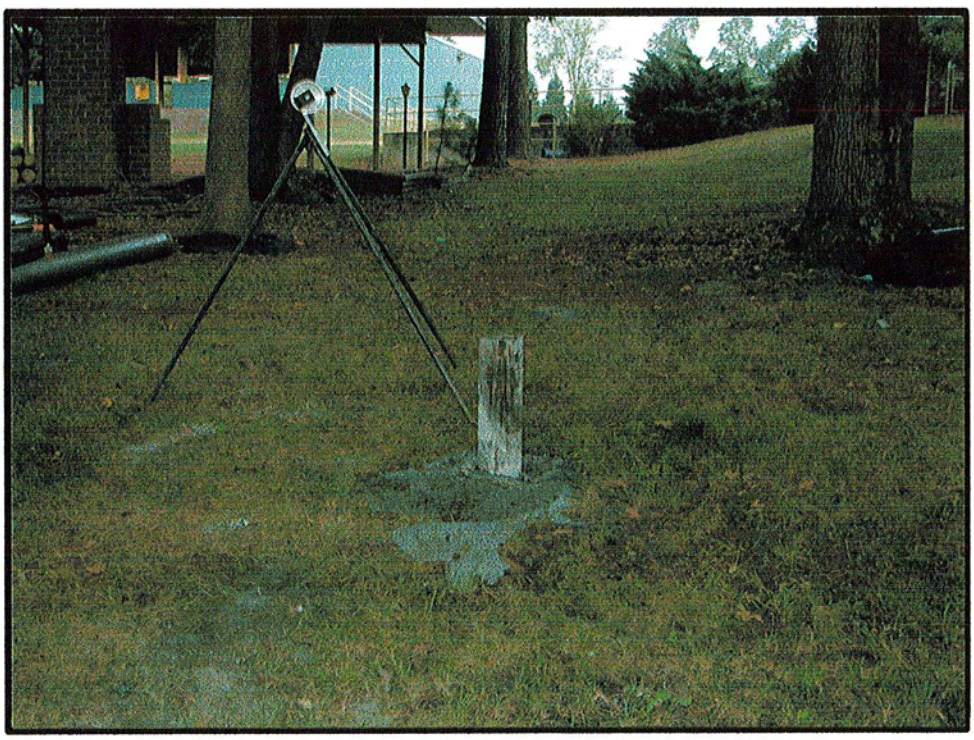
Site: PSC

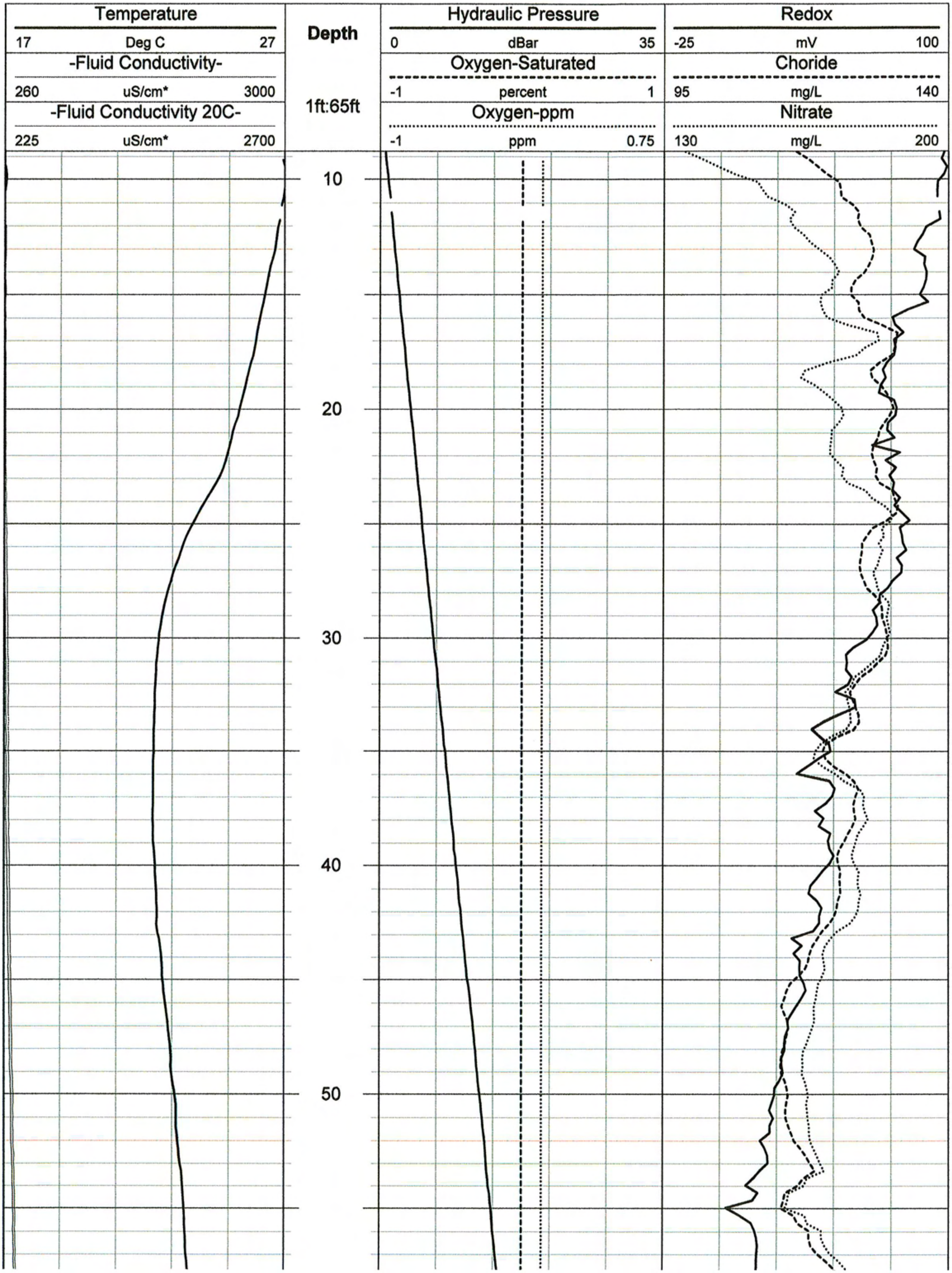
City/State: Rock Hill, South Carolina		
Date: 8/24/07	Time: 08:20	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 9.47'	Measured From: GS at ~ 07:40 on 8/24	
Outer Casing Height AGL (with cap open/removed): 1.62'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: down	Measured from: Ground Surface	Log Speed: 15 fpm
Log Top: 8.8'	Log Bottom: 127.8	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1; Cl, NO3 = 5	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"	Well Depth: 128.15'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 98.3' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88959760° N	Longitude: -81.07119817° W	

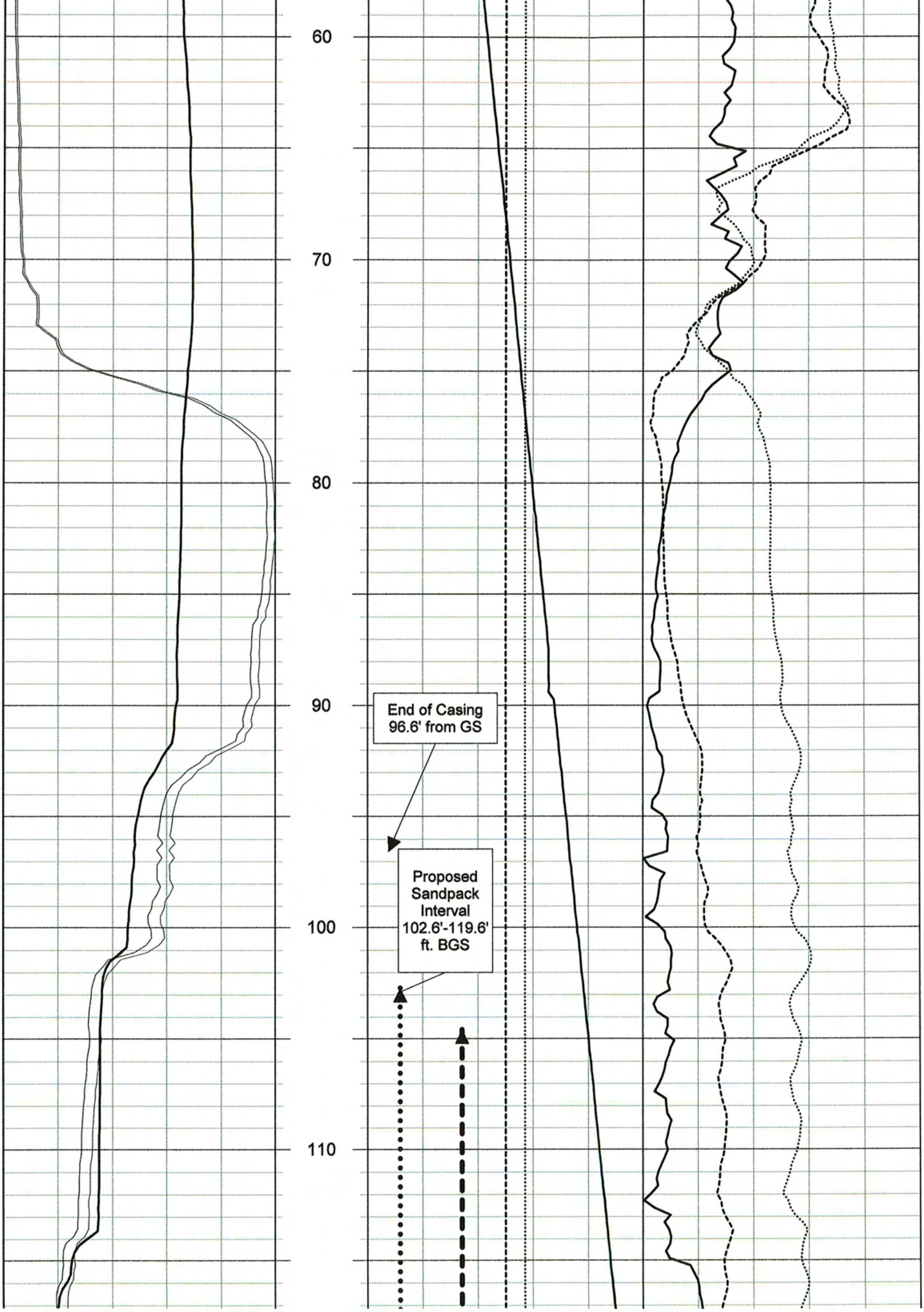
Notes: GPS values; NAD83

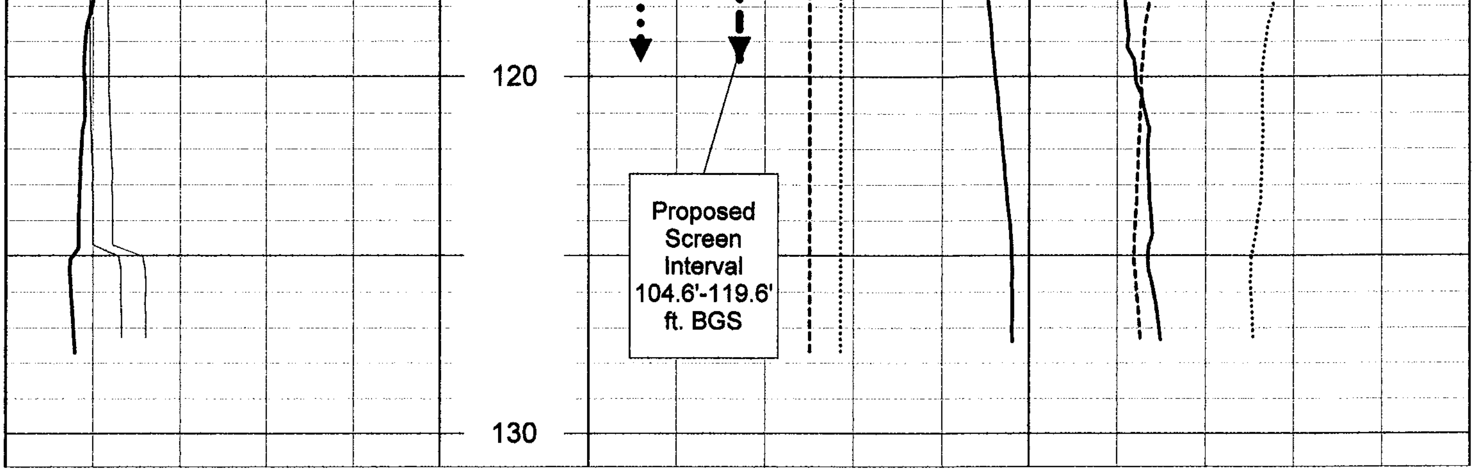
* fluid conductivity data collected at mS/cm but displayed at uS/cm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY




Temperature
17 Deg C 27
-Fluid Conductivity-
260 uS/cm* 3000
-Fluid Conductivity 20C-
225 uS/cm* 2700
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 35
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-25 mV 100
Choride
95 mg/L 140
Nitrate
130 mg/L 200
10
20
30
40
50


60
70
80
90
100
110
End of Casing
96.6' from GS
Proposed
Sandpack
Interval
102.6'-119.6'
ft. BGS

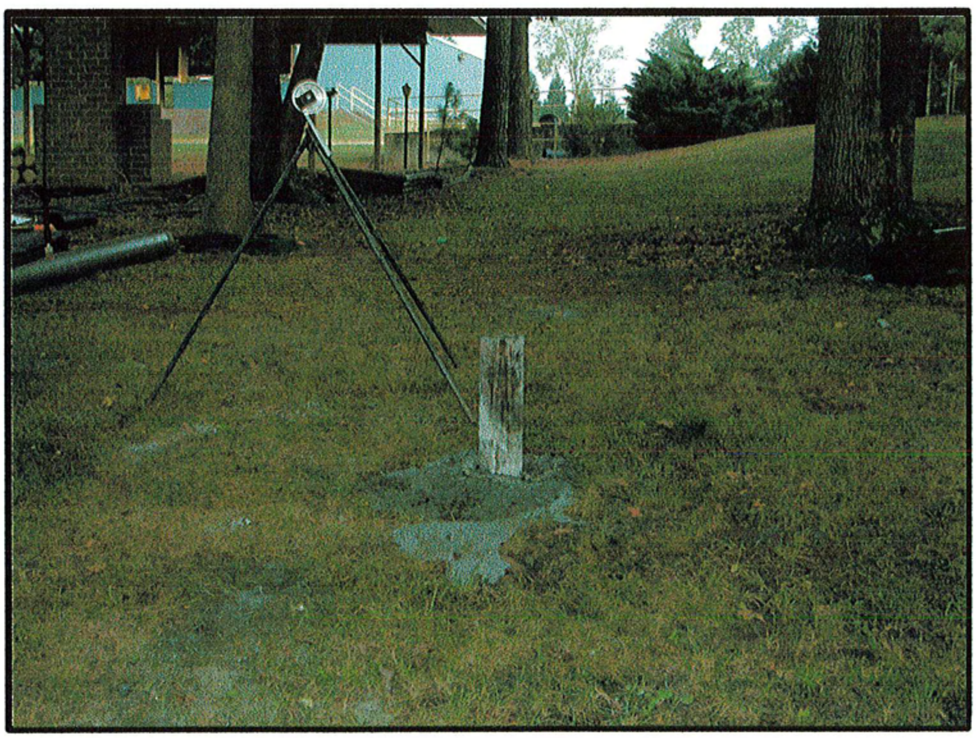

120
130
Proposed
Screen
Interval
104.6'-119.6'
ft. BGS

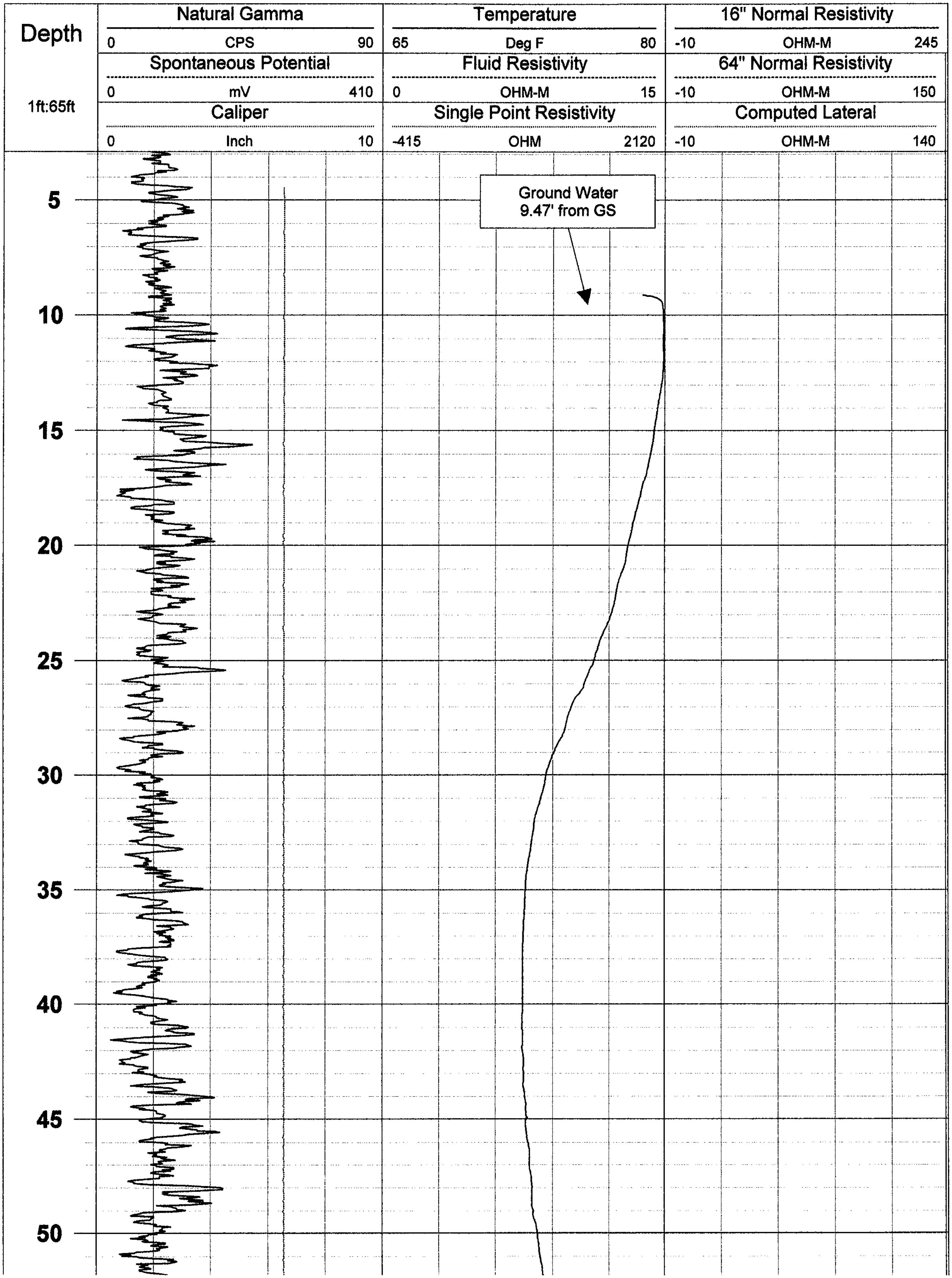
Well: RIMW 20 Log: 20-C

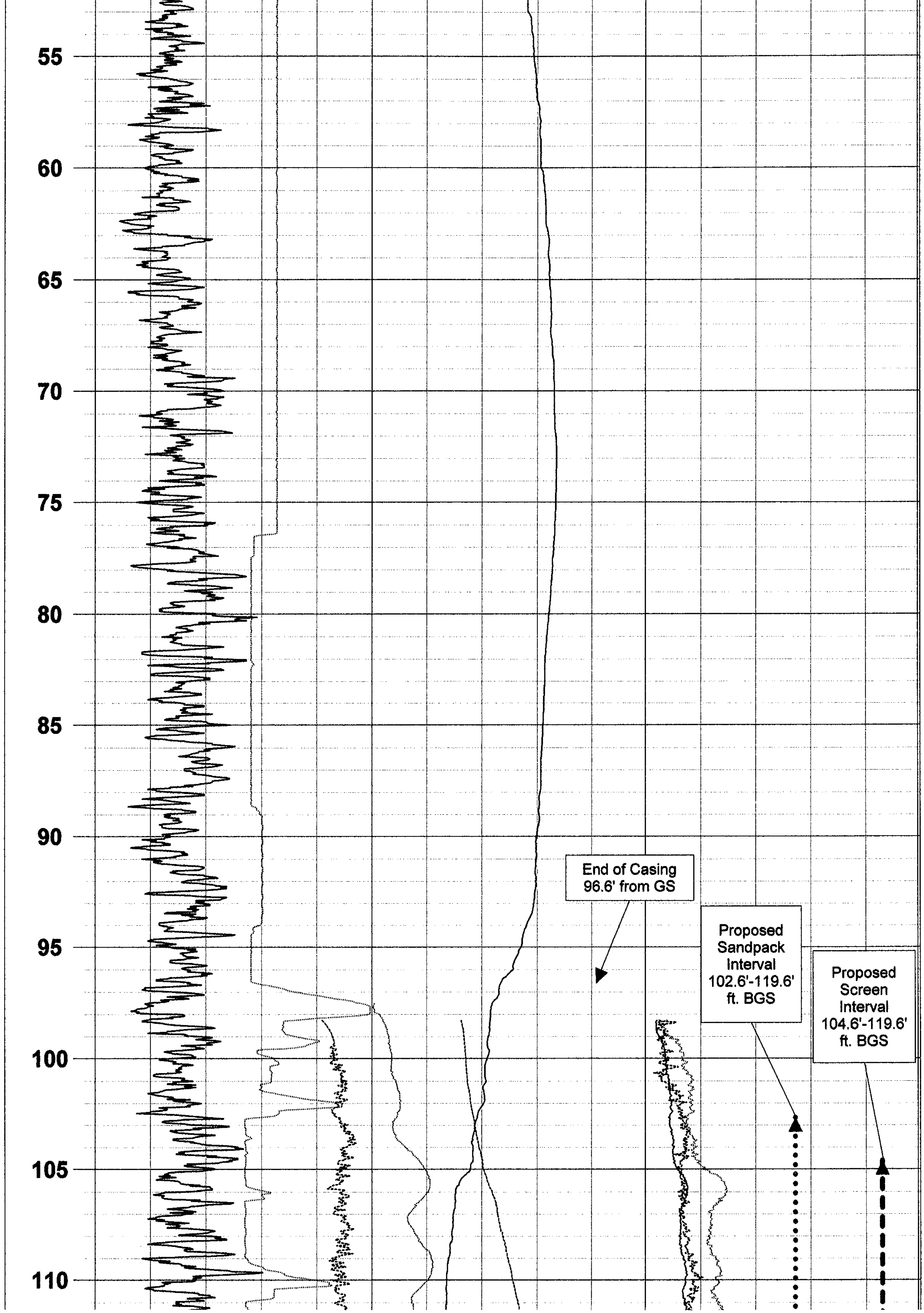
Site: PSC

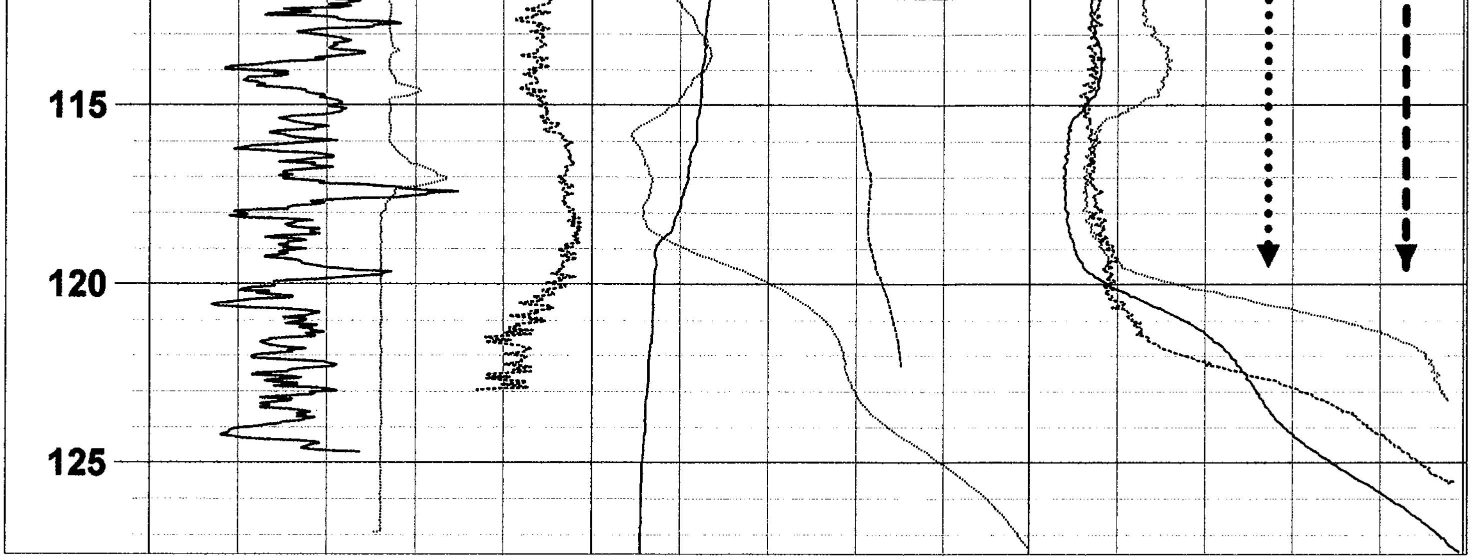
City/State: Rock Hill, South Carolina		
Date: 8/24/07	Time: See Notes	
System Configuration: Century 9041 & 9065		
Water Level: 9.47'	Measured From: GS at ~ 07:40 on 8/24	
Outer Casing Height AGL (with cap open/removed): 1.62' Type: Steel		
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: down	Measured from: Ground Surface	Log Speed: see notes
Log Top: 2.9'	Log Bottom: 127.6'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; OBI
Well Diameter: 6"	Well Depth: 128.15'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 98.3' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88959760° N	Longitude: -81.07119817° W	

Notes: GPS values; NAD83
Caliper logged up at 09:45 on 8/24; speed 16 fpm
9041 logged down at 10:45 on 8/24; speed 16 fpm




Depth
1ft:65ft
Natural Gamma
0 CPS 90
Spontaneous Potential
0 mV 410
Caliper
0 Inch 10
Temperature
65 Deg F 80
Fluid Resistivity
0 OHM-M 15
Single Point Resistivity
-415 OHM 2120
16" Normal Resistivity
-10 OHM-M 245
64" Normal Resistivity
-10 OHM-M 150
Computed Lateral
-10 OHM-M 140
Ground Water
9.47' from GS
5
10
15
20
25
30
35
40
45
50


55
60
65
70
75
80
85
90
95
100
105
110
End of Casing
96.6' from GS
Proposed
Sandpack
Interval
102.6'-119.6'
ft. BGS
Proposed
Screen
Interval
104.6'-119.6'
ft. BGS


115
120
125

Well:	RIMW 20	Log: 20-D

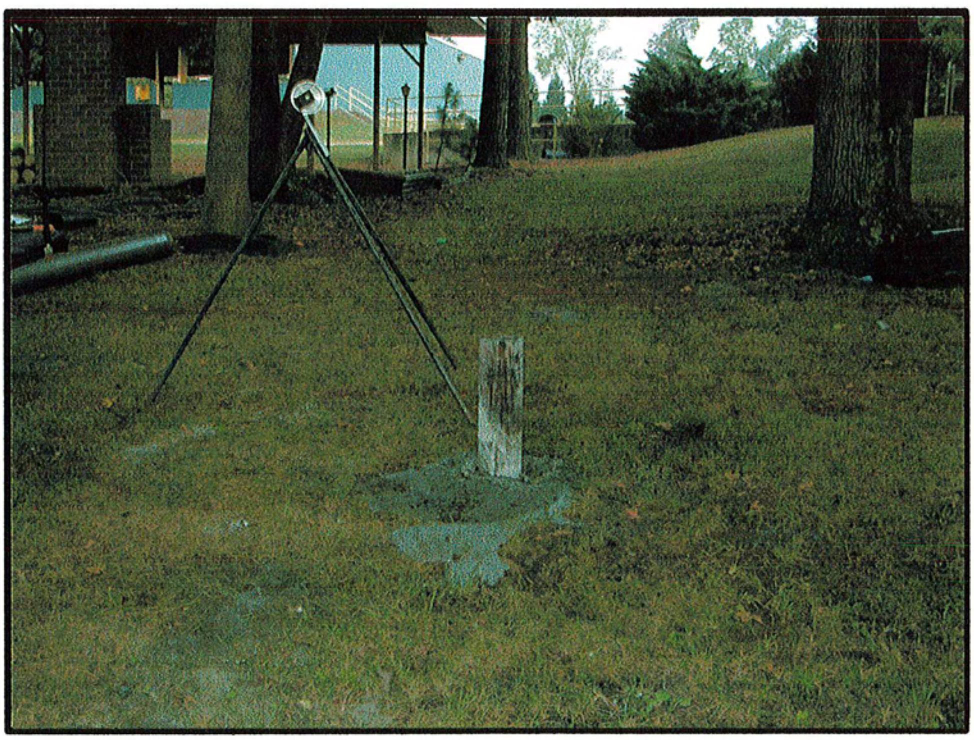
Site: PSC

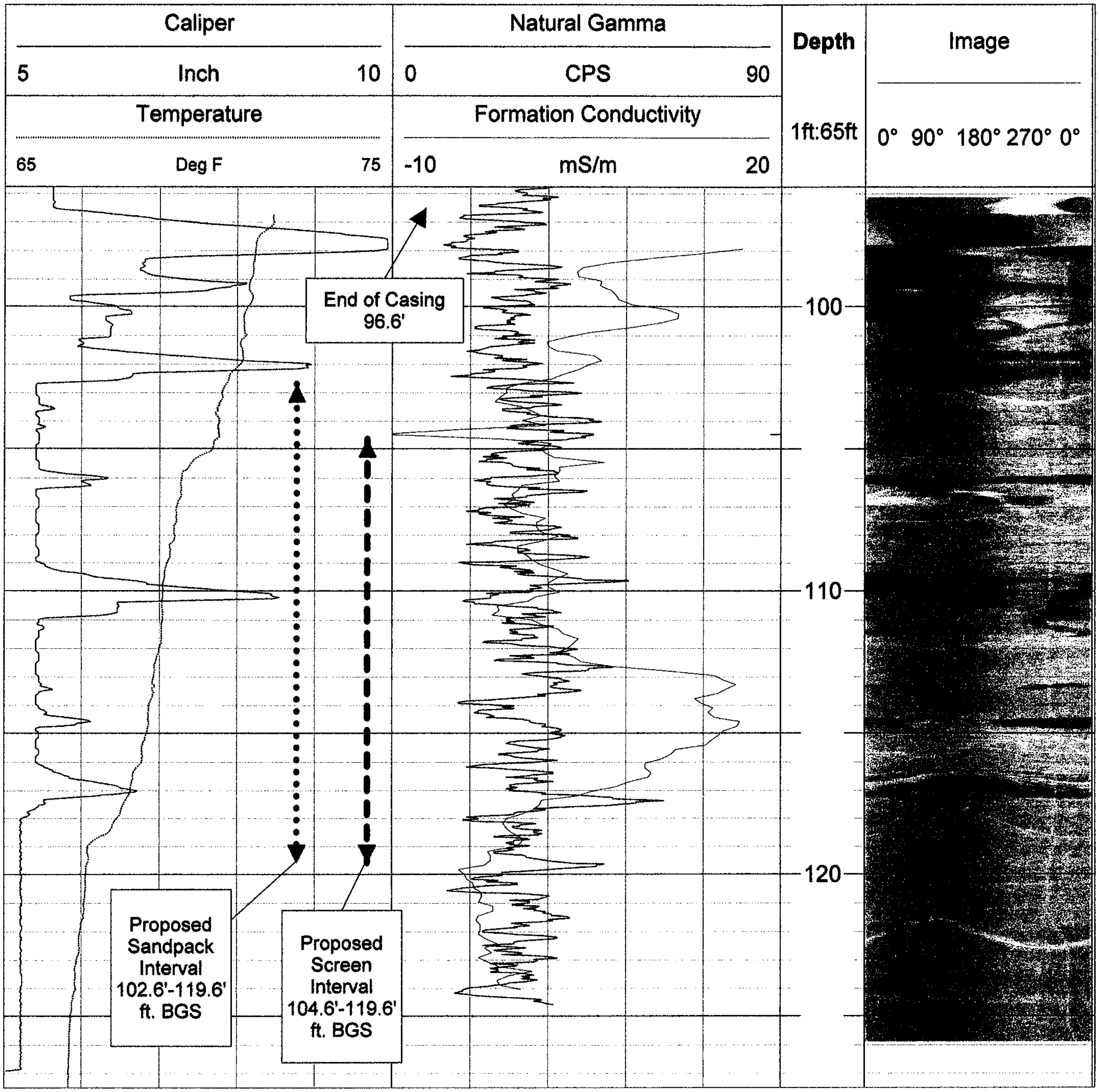
City/State: Rock Hill, South Carolina

Date: 8/24 & 28/07	Time: See notes	
System Configuration: Century & Mount Sopris		
Water Level: 9.47'	Measured From: GS at ~ 07:40 on 8/24	
Outer Casing Height AGL (with cap open/removed): 1.62' Type: Steel		
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: down	Measured from: Ground Surface	Log Speed: see notes
Log Top: 95.8'	Log Bottom: 127.0	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 6"	Well Depth: 128.15'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 98.3' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88959760° N	Longitude: -81.07119817° W	

Notes:
GPS values; NAD83
Formation conductivity logged up at 08:45 on 8/24; speed 15 fpm
Caliper logged up at 09:45 on 8/24; speed 16 fpm
9041 logged down at 10:45 on 8/24; speed 16 fpm
Optical televiewer logged down at 12:30 on 8/28; speed 2.1 fpm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Caliper
5
Inch
10
Natural Gamma
0
CPS
90
Depth
Image
Temperature
65
Deg F
75
Formation Conductivity
-10
mS/m
20
1ft:65ft
0° 90° 180° 270° 0°
End of Casing
96.6'
100
110
120
Proposed Sandpack Interval 102.6'-119.6' ft. BGS
Proposed Screen Interval 104.6'-119.6' ft. BGS

PSC Site
August 22 – 28, 2007
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW 21

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 21 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 21 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 21 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 21 - D

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m
Optical televiewer – color digital image

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity – Ohm/M
Computed lateral resistivity – Ohm/M

Century 9065 tool

Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool

Formation conductivity – mS/m

Mount Sopris ALT OBI-40-2 Tool

Optical televiewer – color digital image

Well: RIMW 21 Log: 21 - A

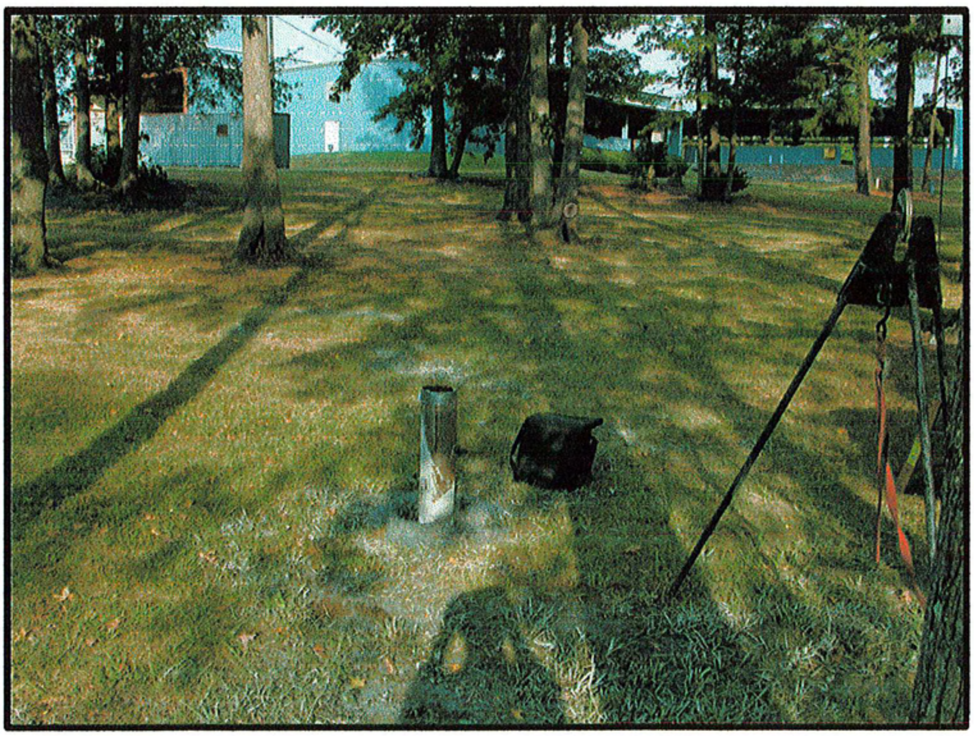
Site: PSC

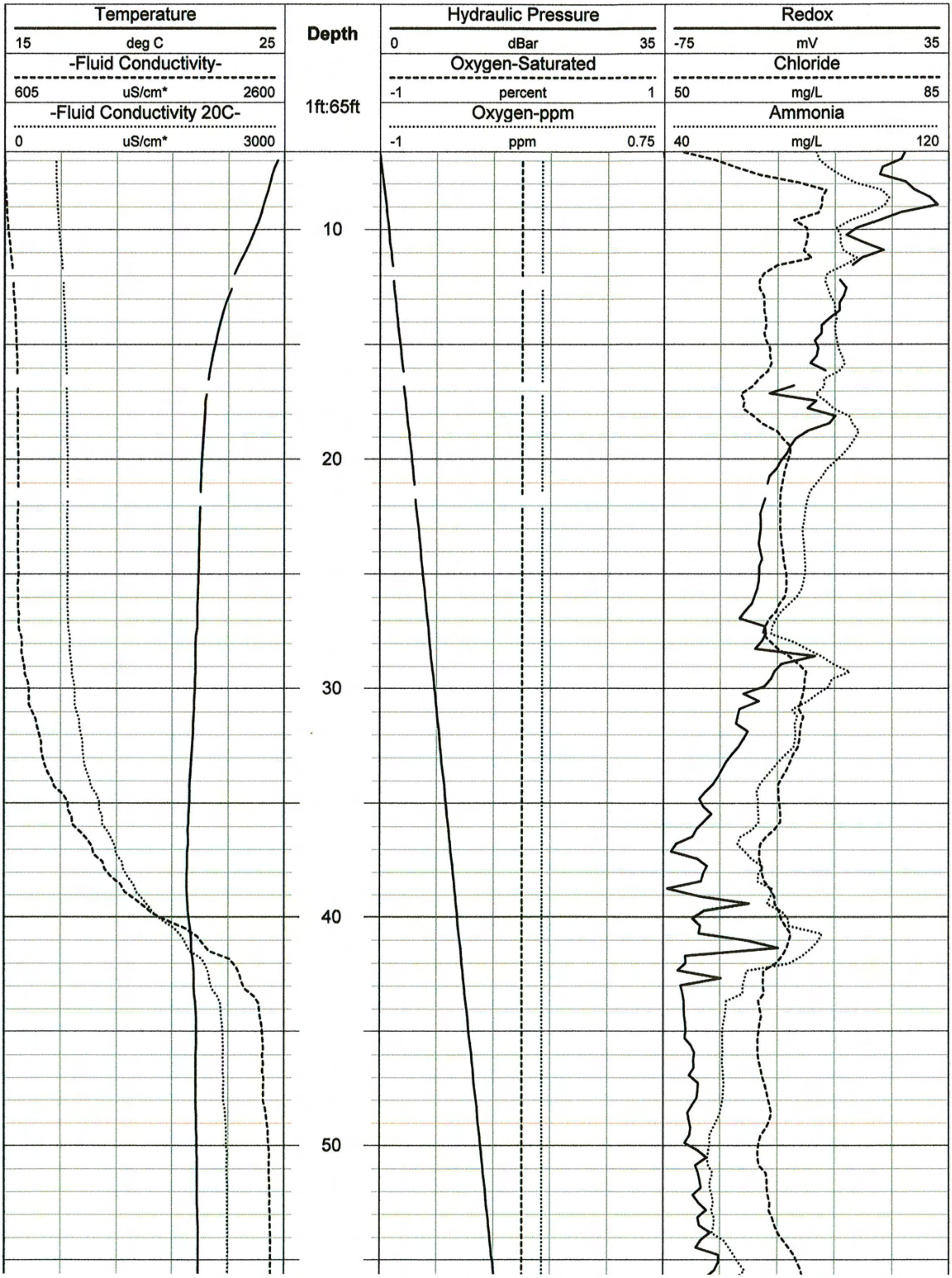
City/State: Rock Hill, South Carolina	
Date: 8/25/07	Time: 09:40
System Configuration: Mount Sopris 2IDA with ammonia option	
Water Level: 6.35'	Measured From: GS at ~ 09:40 8/25
Outer Casing Height AGL (with cap open/removed): 8.15'	Type: Steel
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A
Log Direction: down	Measured from: Ground Surface; Log Speed: 15.4 fpm
Log Top: 7'; Log Bottom: 100.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1; Cl, NH4 = 5
Operator: JRU; Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"; Well Depth: 101.14'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 70.6' to bottom
Screen Interval: None	Screen Type: N/A
Latitude: 34.88930735° N	Longitude: -81.07101464° W

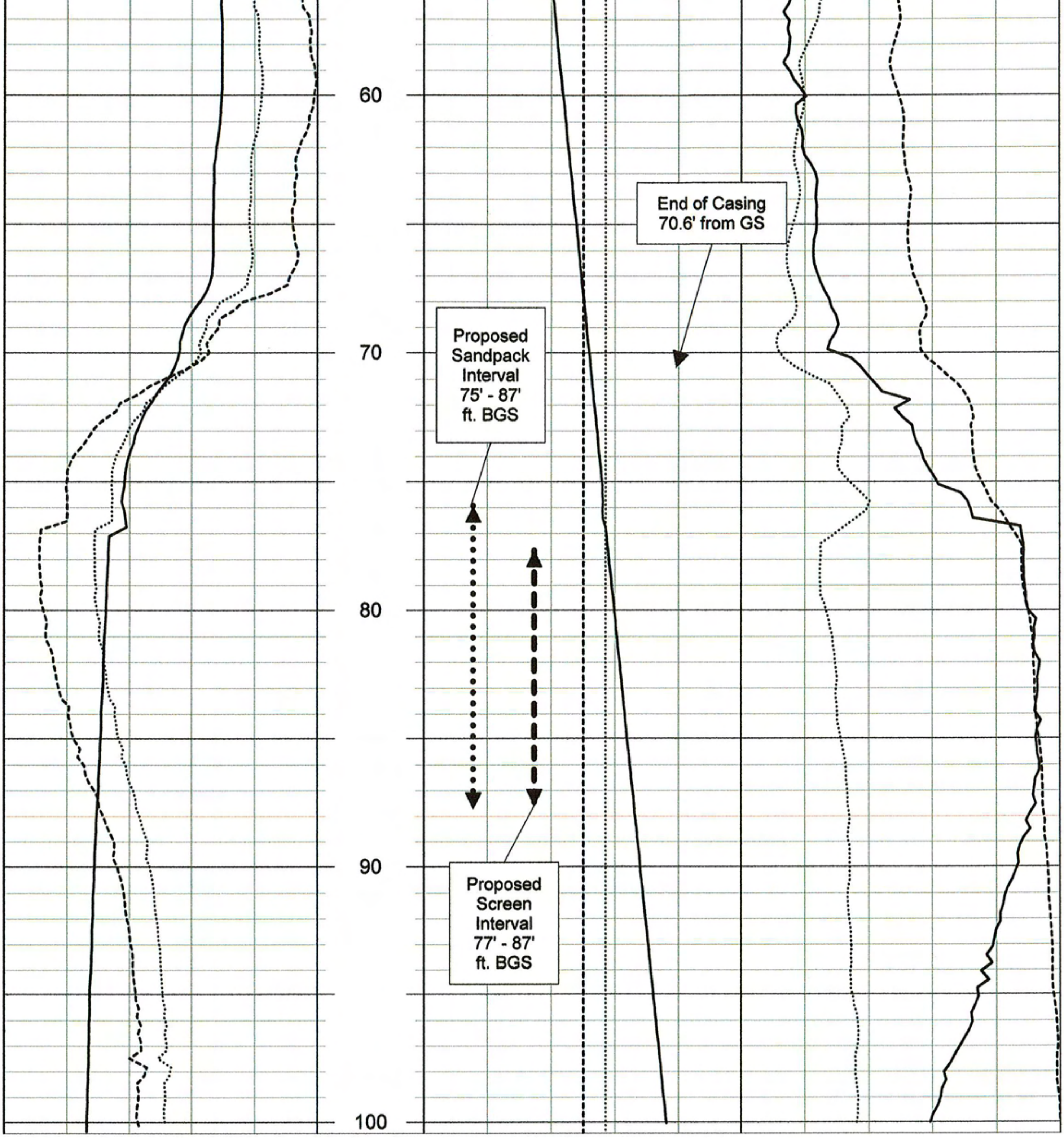
Notes: GPS values; NAD83

* fluid conductivity data collected at mS/cm but displayed as uScm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY




Temperature
15 deg C 25
-Fluid Conductivity-
605 uS/cm* 2600
-Fluid Conductivity 20C-
0 uS/cm* 3000
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 35
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-75 mV 35
Chloride
50 mg/L 85
Ammonia
40 mg/L 120
10
20
30
40
50


60
70
80
90
100
End of Casing
70.6' from GS
Proposed
Sandpack
Interval
75' - 87'
ft. BGS
Proposed
Screen
Interval
77' - 87'
ft. BGS

Well:	**RIMW 21**	**Log: 21 - B**
Site:	**PSC**	

City/State: Rock Hill, South Carolina

Date: 8/25/07	Time: 09:40

System Configuration: Mount Sopris 2IDA with nitrate option

Water Level: 6.35'	Measured From: GS at ~ 09:05 8/25

Outer Casing Height AGL (with cap open/removed): 8.15' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A

Log Direction: down	Measured from: Ground Surface	Log Speed: 11.5 fpm
Log Top: 8.6'	Log Bottom: 100.5'	Reference Point: GS

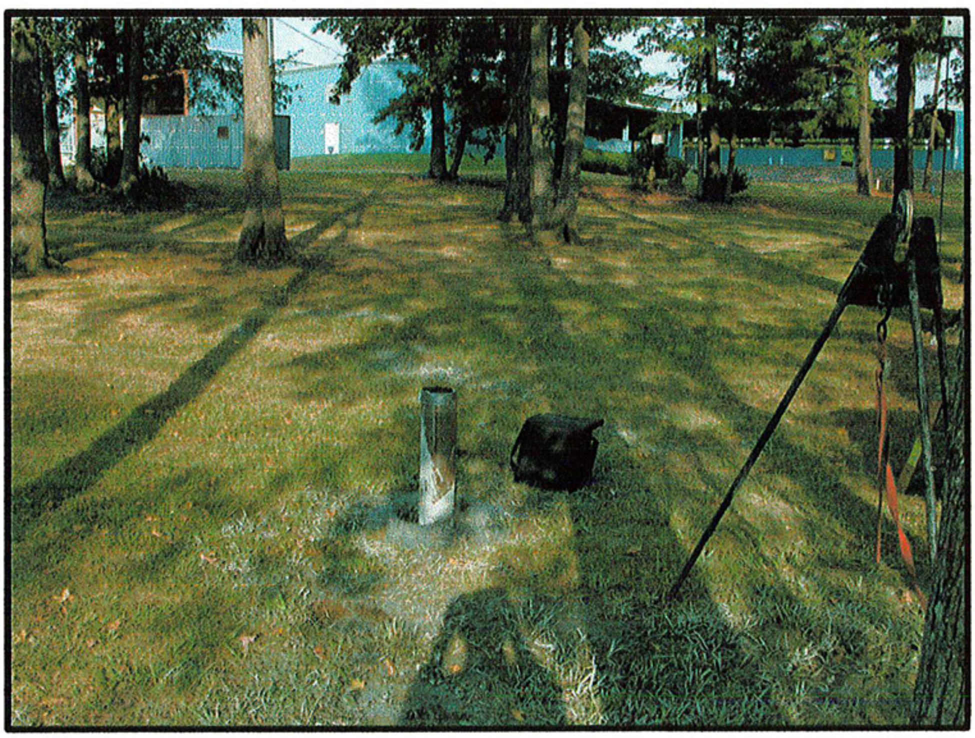
Analysis Software: WellCAD	Smoothing Points: Redox = 1; Cl, NO3 = 5

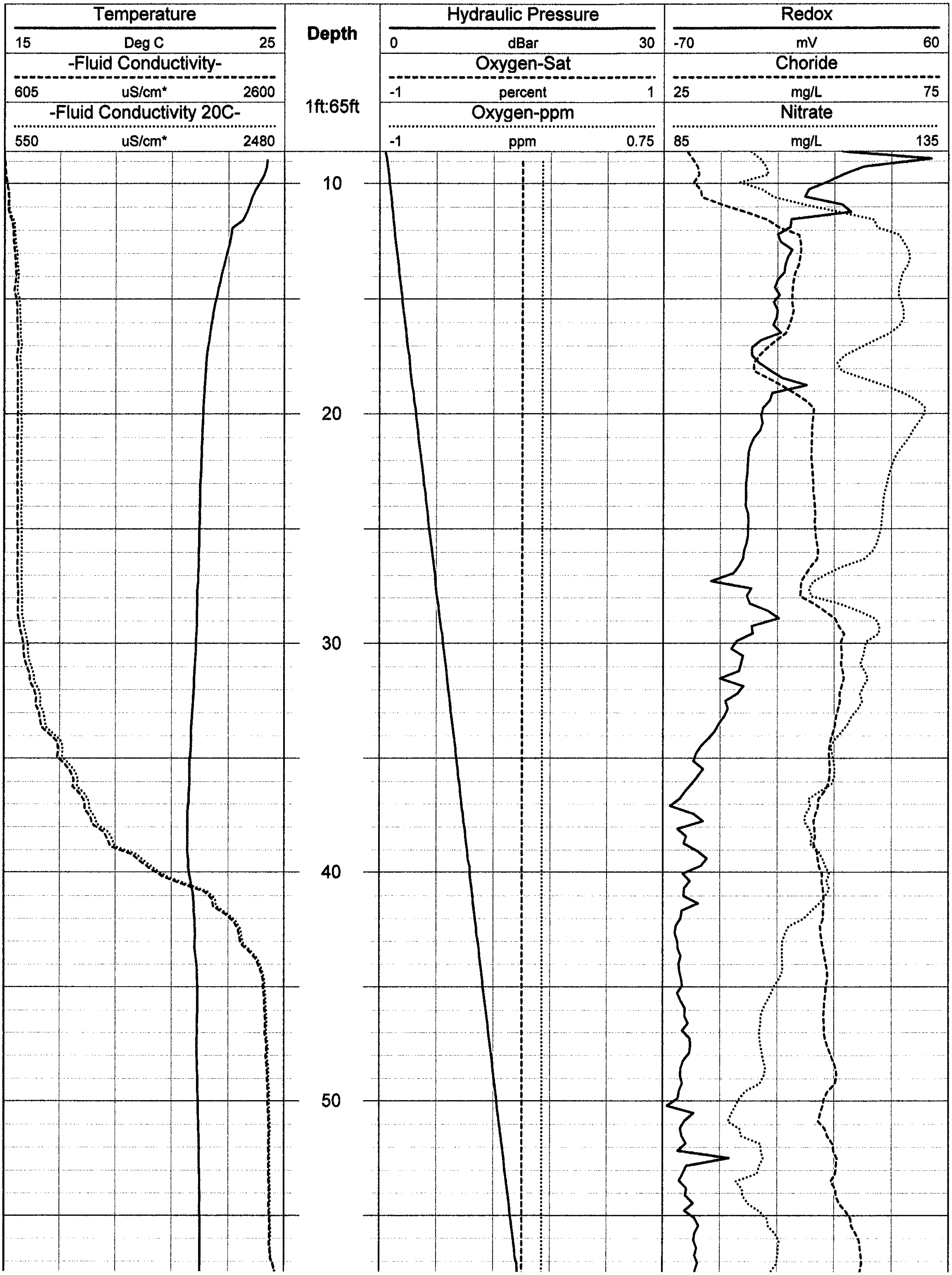
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"	Well Depth: 101.14'	Referenced From: GS

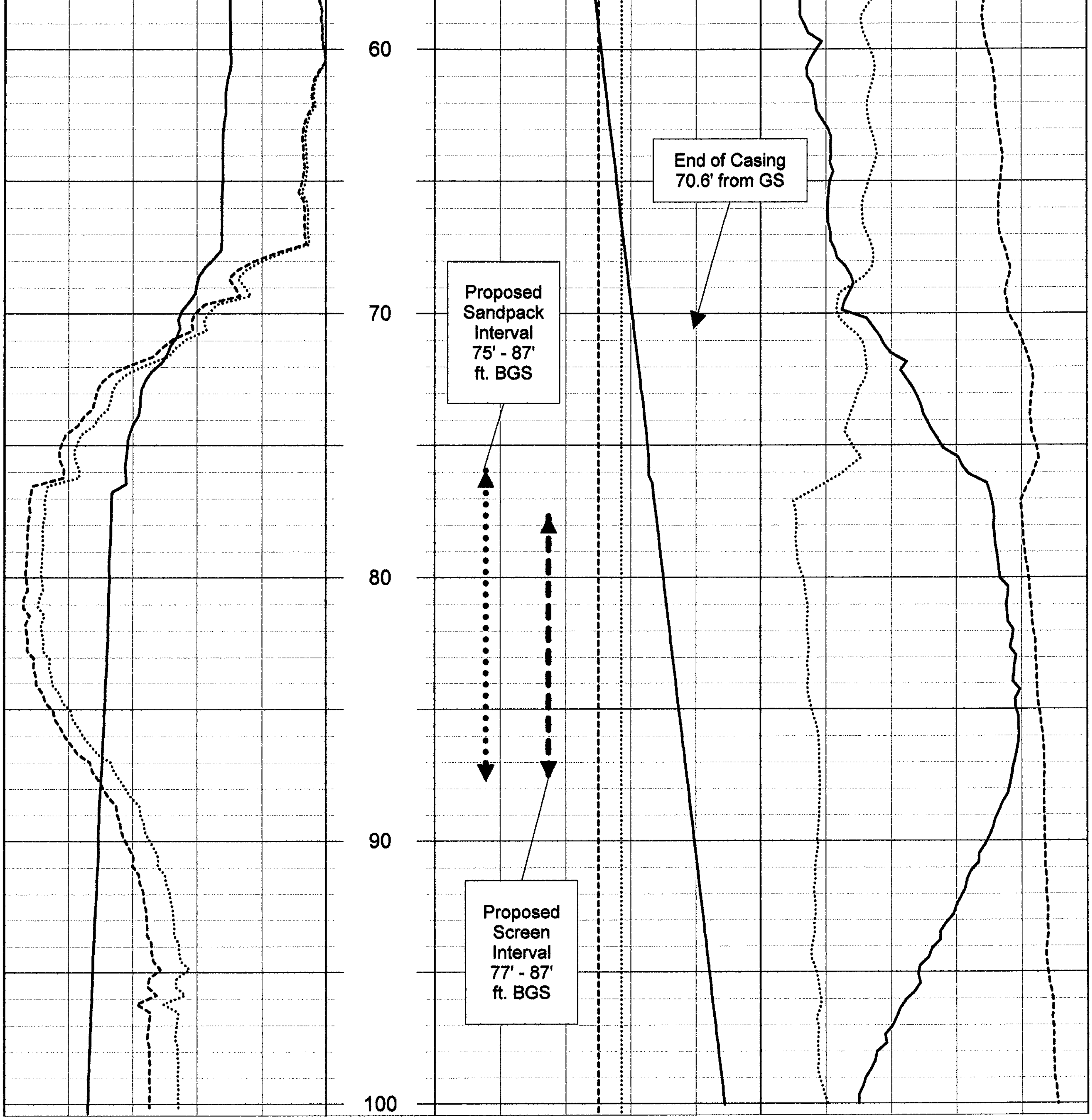
Casing Material: Steel	Non-Cased Interval: 70.6' to bottom
Screen Interval: None	Screen Type: N/A
Latitude: 34.88930735° N	Longitude: -81.07101464° W

Notes: GPS values; NAD83

* fluid conductivity data collected at mS/cm but displayed as uS/cm




Temperature
15 Deg C 25
-Fluid Conductivity-
605 uS/cm* 2600
-Fluid Conductivity 20C-
550 uS/cm* 2480
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 30
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-70 mV 60
Choride
25 mg/L 75
Nitrate
85 mg/L 135
10
20
30
40
50


60
70
80
90
100
End of Casing
70.6' from GS
Proposed
Sandpack
Interval
75' - 87'
ft. BGS
Proposed
Screen
Interval
77' - 87'
ft. BGS

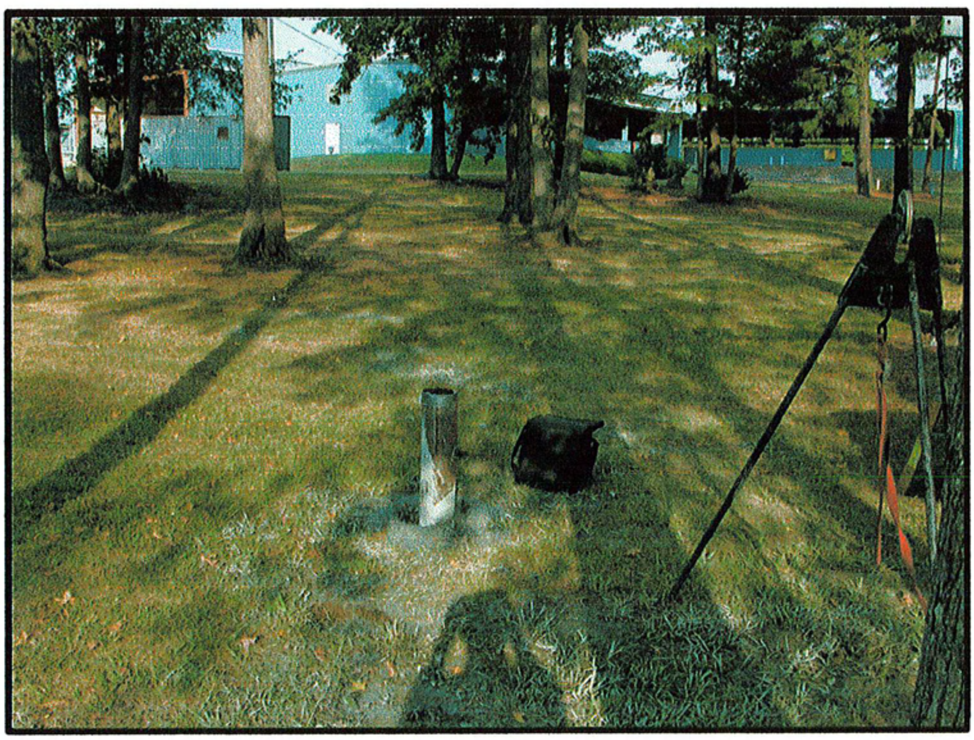
Well: RIMW 21 Log: 21-C

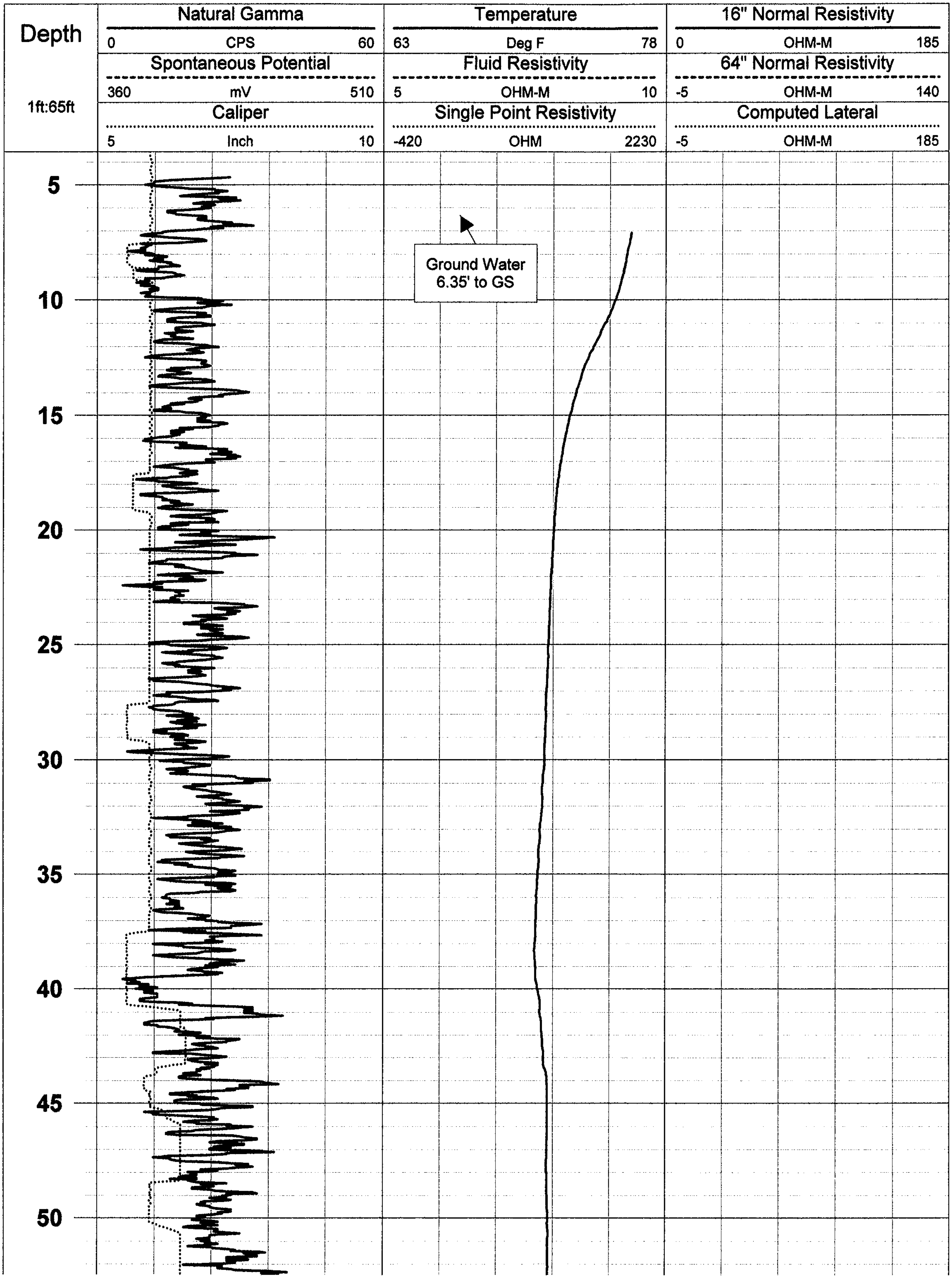
Site: PSC

City/State: Rock Hill, South Carolina		
Date: 8/25/07	Time: See notes	
System Configuration: Century		
Water Level: 6.35'	Measured From: GS at ~ 09:40 on 8/25	
Outer Casing Height AGL (with cap open/removed): 8.15' Type: Steel		
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: Ground Surface	Log Speed: see notes
Log Top: 3.6'	Log Bottom: 100.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; OTV
Well Diameter: 6"	Well Depth: 101.14'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 70.6' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88930735° N	Longitude: -81.07101464° W	

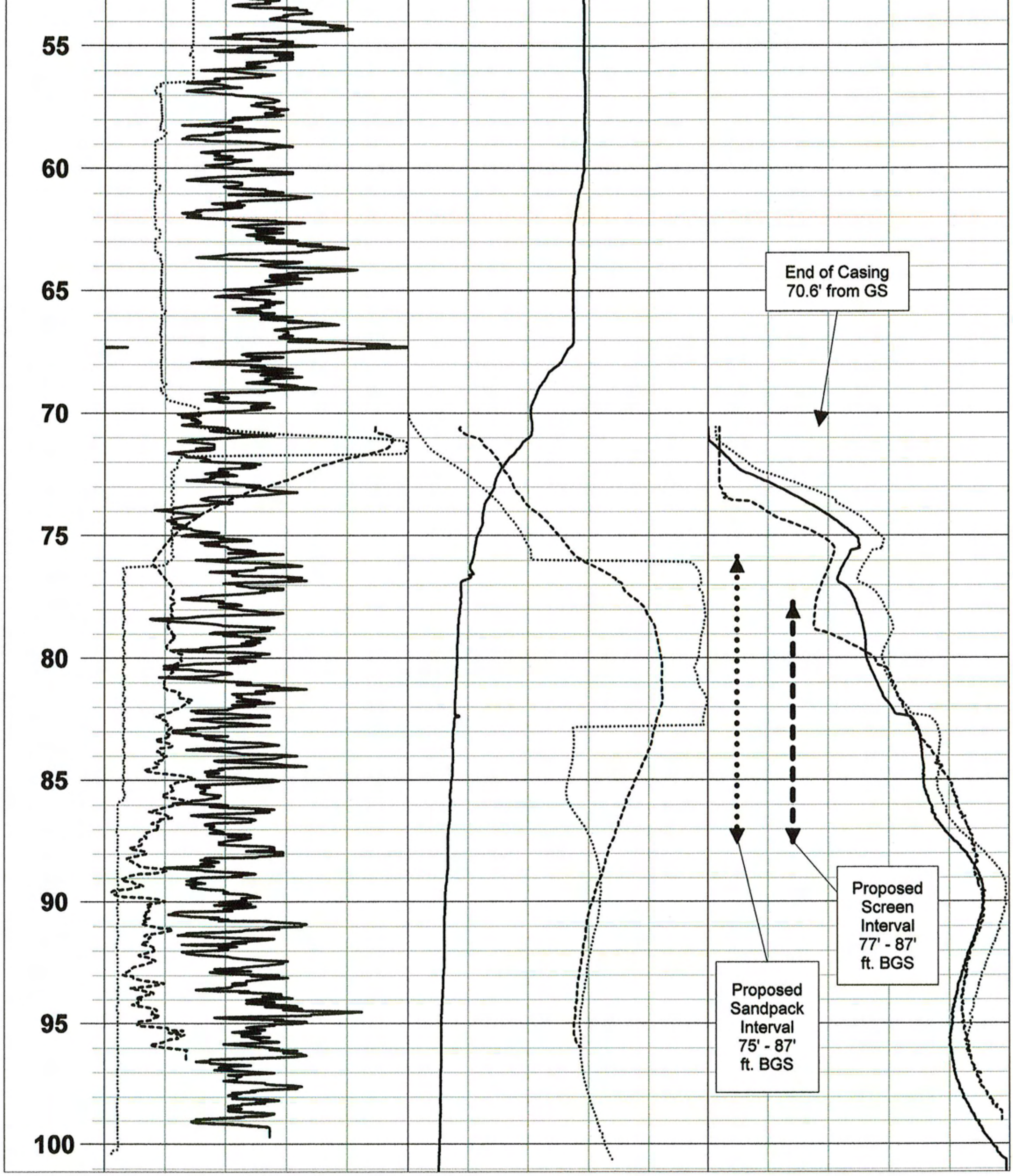
Notes: GPS values; NAD83
Caliper logged up at 10:30 on 8/25; speed 16 fpm
9041 logged down at 11:30 on 8/25; speed 17 fpm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Depth
1ft:65ft
Natural Gamma
0 CPS 60
Spontaneous Potential
360 mV 510
Caliper
5 Inch 10
Temperature
63 Deg F 78
Fluid Resistivity
5 OHM-M 10
Single Point Resistivity
-420 OHM 2230
16" Normal Resistivity
0 OHM-M 185
64" Normal Resistivity
-5 OHM-M 140
Computed Lateral
-5 OHM-M 185
Ground Water
6.35' to GS
5
10
15
20
25
30
35
40
45
50


55
60
65
70
75
80
85
90
95
100
End of Casing
70.6' from GS
Proposed
Screen
Interval
77' - 87'
ft. BGS
Proposed
Sandpack
Interval
75' - 87'
ft. BGS

Well:	RIMW 21	Log: 21-D

Site: PSC

City/State: Rock Hill, South Carolina

Date: 8/25 & 27/07 | Time: See notes

System Configuration: Mount Sopris & Century

Water Level: 6.35' | Measured From: GS at ~ 09:40 on 8/25

Outer Casing Height AGL (with cap open/removed): 8.15' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: None | Casing Type: N/A

Log Direction: See notes | Measured from: Ground Surface | Log Speed: see notes

Log Top: 69' | Log Bottom: 100.5' | Reference Point: GS

Analysis Software: WellCAD | Smoothing Points: Natural Gamma = 11

Operator: JRU | Witness: None | Other Tools Used: 2IDA

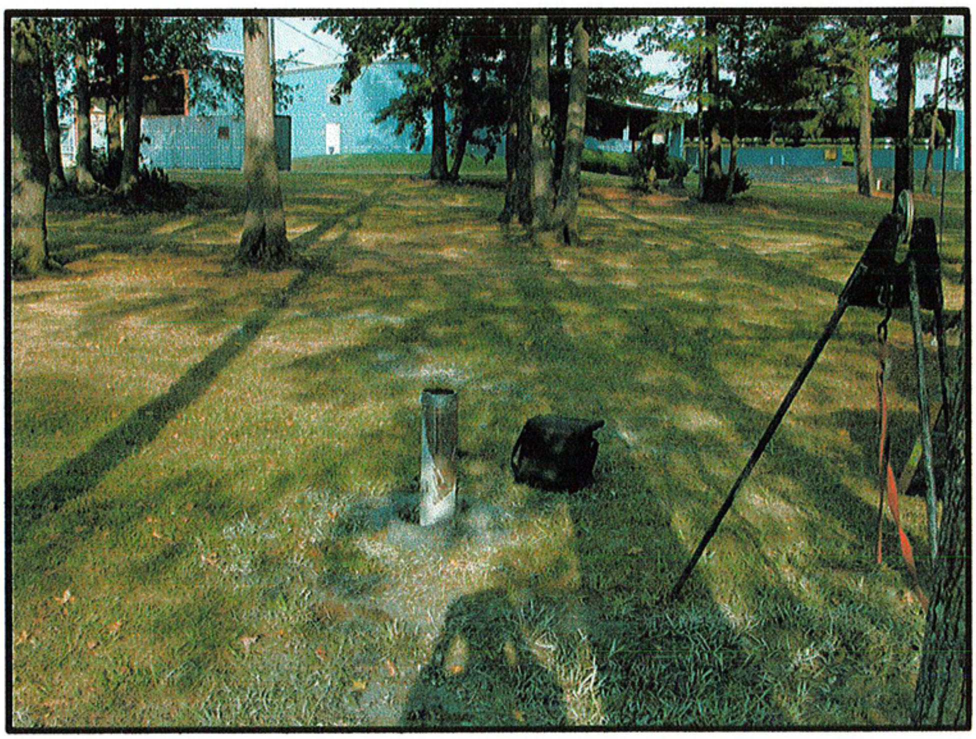
Well Diameter: 6" | Well Depth: 101.14' | Referenced From: GS

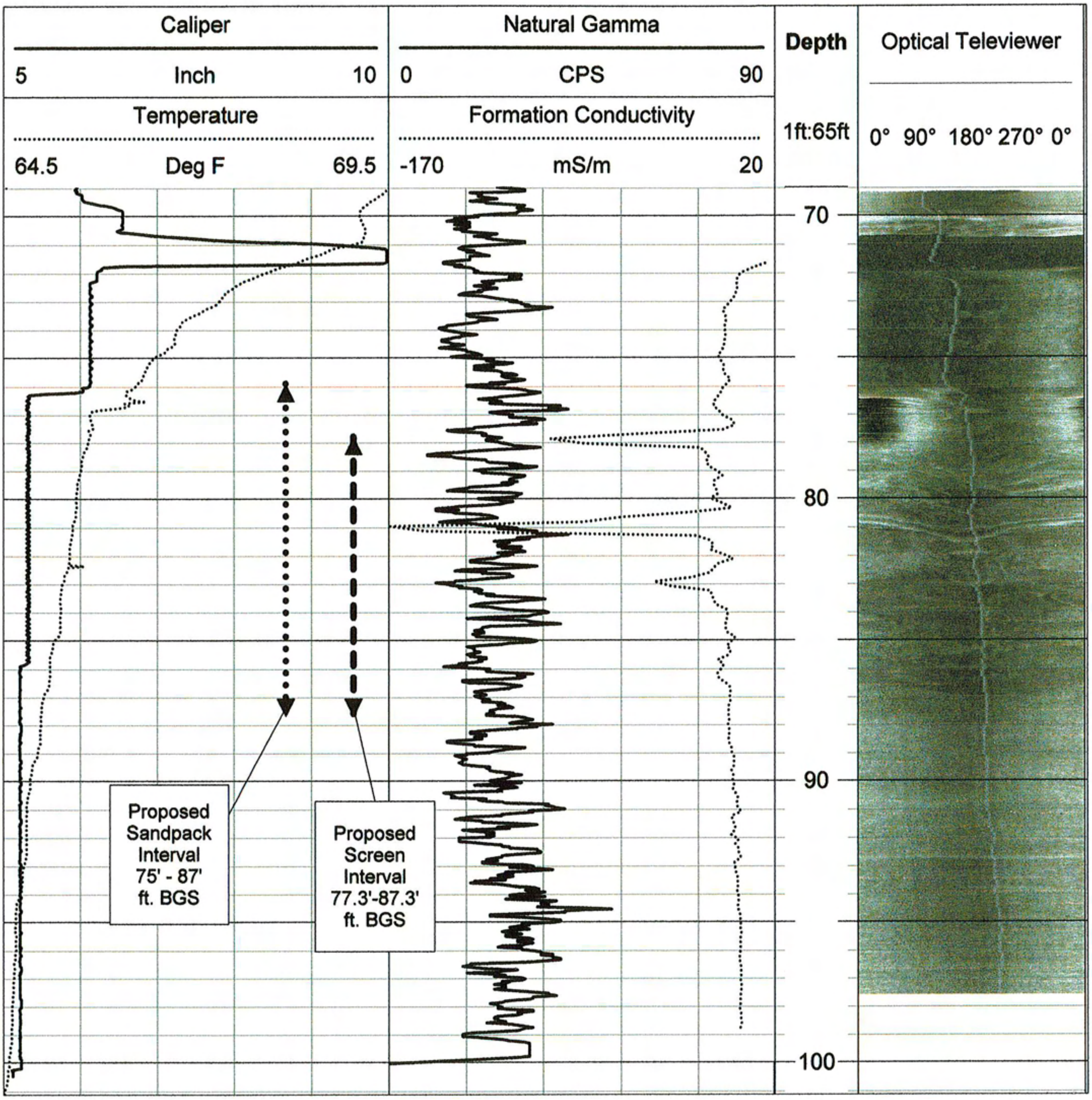
Casing Material: Steel | Non-Cased Interval: 70.6' to bottom

Screen Interval: None | Screen Type: N/A

Latitude: 34.88930735° N | Longitude: -81.07101464° W

Notes: GPS values; NAD83
Formation conductivity logged up at 10:20 on 8/25; speed 13.5 fpm
Caliper logged up at 10:30 on 8/25; speed 16 fpm
9041 logged down at 11:30 on 8/25; speed 17 fpm
Optical televiewer logged down at 14:35on 8/27; speed 2.2 fpm




Caliper
5
Inch
10
Temperature
64.5
Deg F
69.5
Natural Gamma
0
CPS
90
Formation Conductivity
-170
mS/m
20
Depth
1ft:65ft
70
80
90
100
Optical Televiewer
0° 90° 180° 270° 0°
Proposed Sandpack Interval 75' - 87' ft. BGS
Proposed Screen Interval 77.3'-87.3' ft. BGS

PSC Site
August 22 – 28, 2007
Rock Hill, South Carolina

Well Logs for RIMW 22

Geophysical Logs

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 22 - A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 22 - B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 22 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 22 - D

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m
Optical televiewer – color digital image

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity – Ohm/M
Computed lateral resistivity – Ohm/M

Century 9065 tool

Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool

Ground conductivity - ppt

Mount Sopris ALT OBI-40 Tool

Optical televiewer – color digital image

Well:	**RIMW 22**	**Log: 22-A**
Site:	**PSC**	

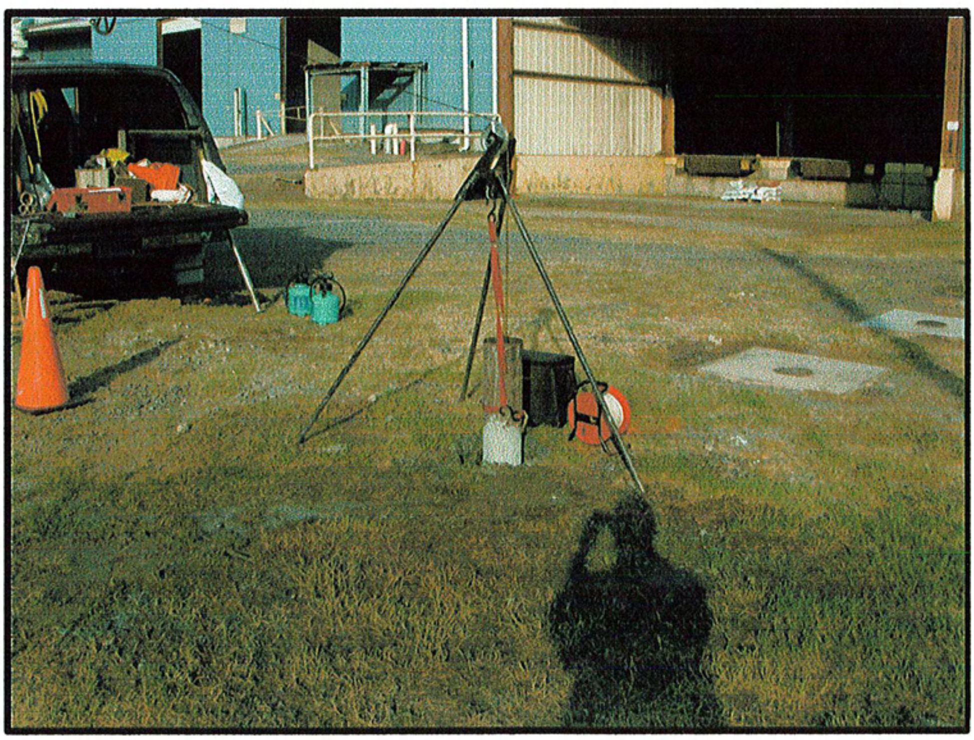
City/State: Rock Hill, South Carolina

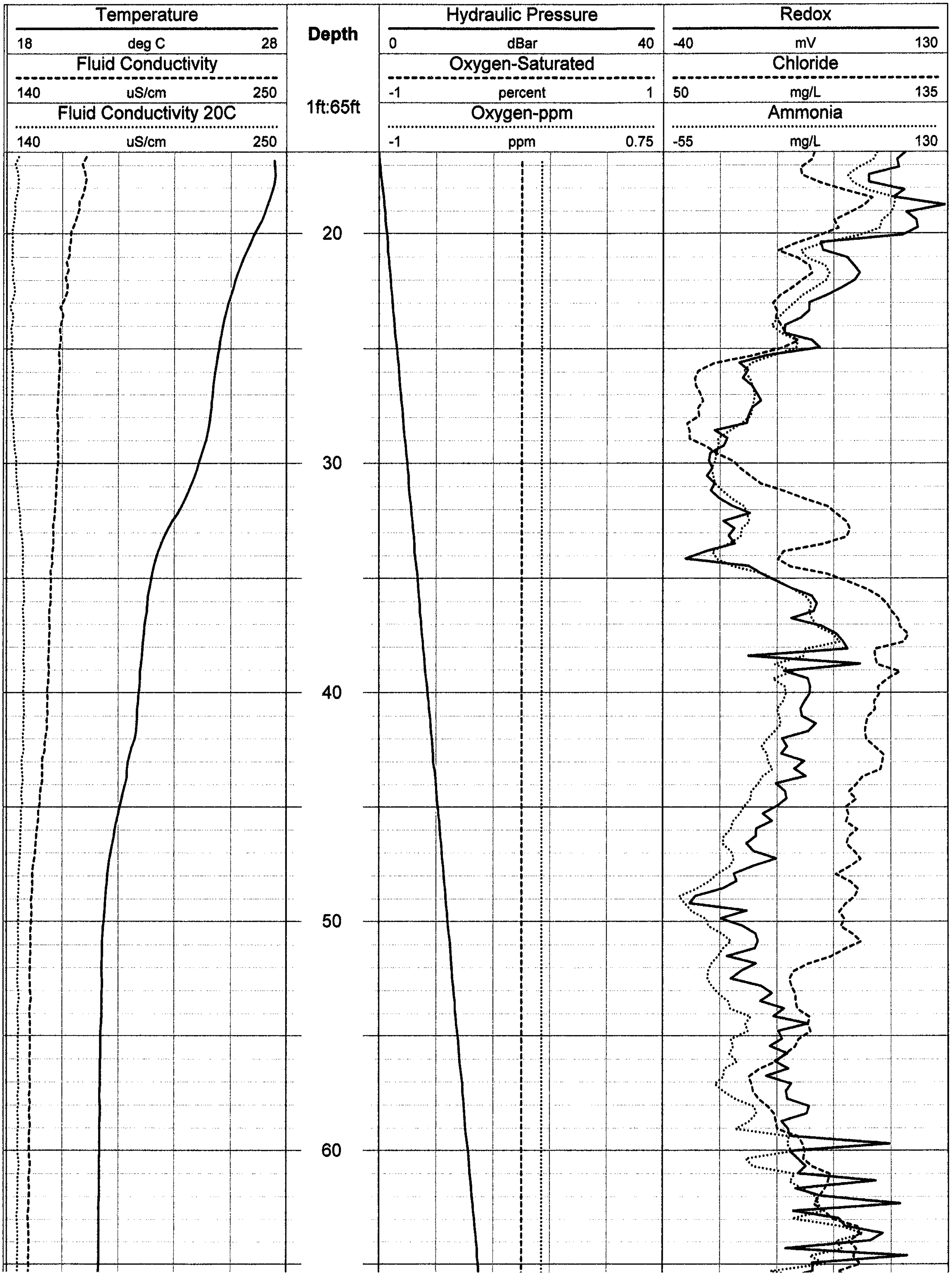
Date: 8/22/07	Time: 07:25	
System Configuration: Mount Sopris: 2IDA with ammonia sensor option		
Water Level: 16.06'	Measured From: GS at ~ 07:15 08/22	
Outer Casing Height AGL (with cap open/removed): 1.65'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 12 fpm
Log Top: 16.7'	Log Bottom: 143.4'	Reference Point: Ground Surface
Analysis Software: WellCAD	Smoothing Points: Redox=1; Cl & NH4 = 3	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&86; OTV
Well Diameter: 6.25"	Well Depth: 145.55'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 116.2' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88911822° N	Longitude: -81.07154162° W	

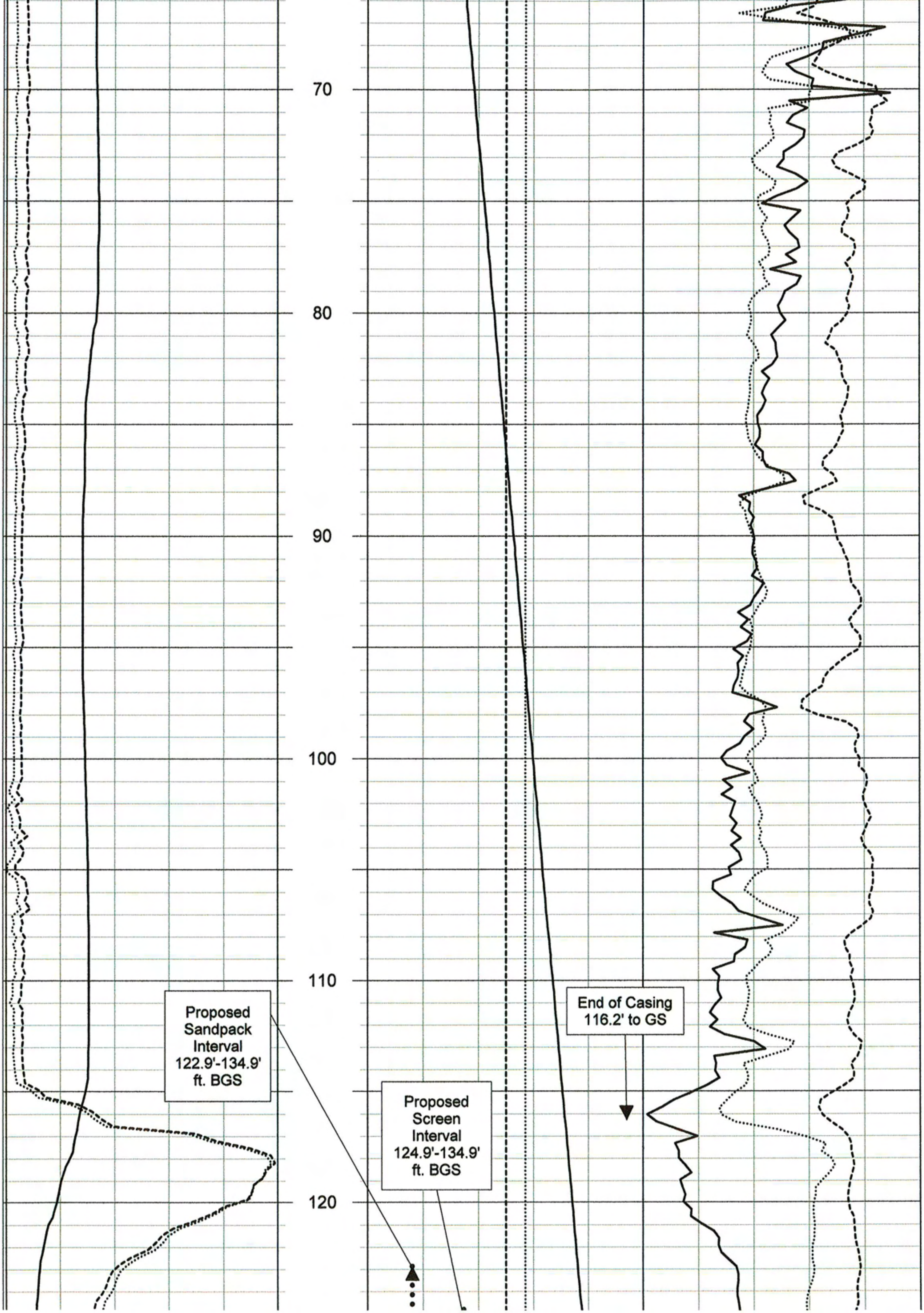
Notes: GPS: NAD83

Logged from TOC but converted data to measure from GS

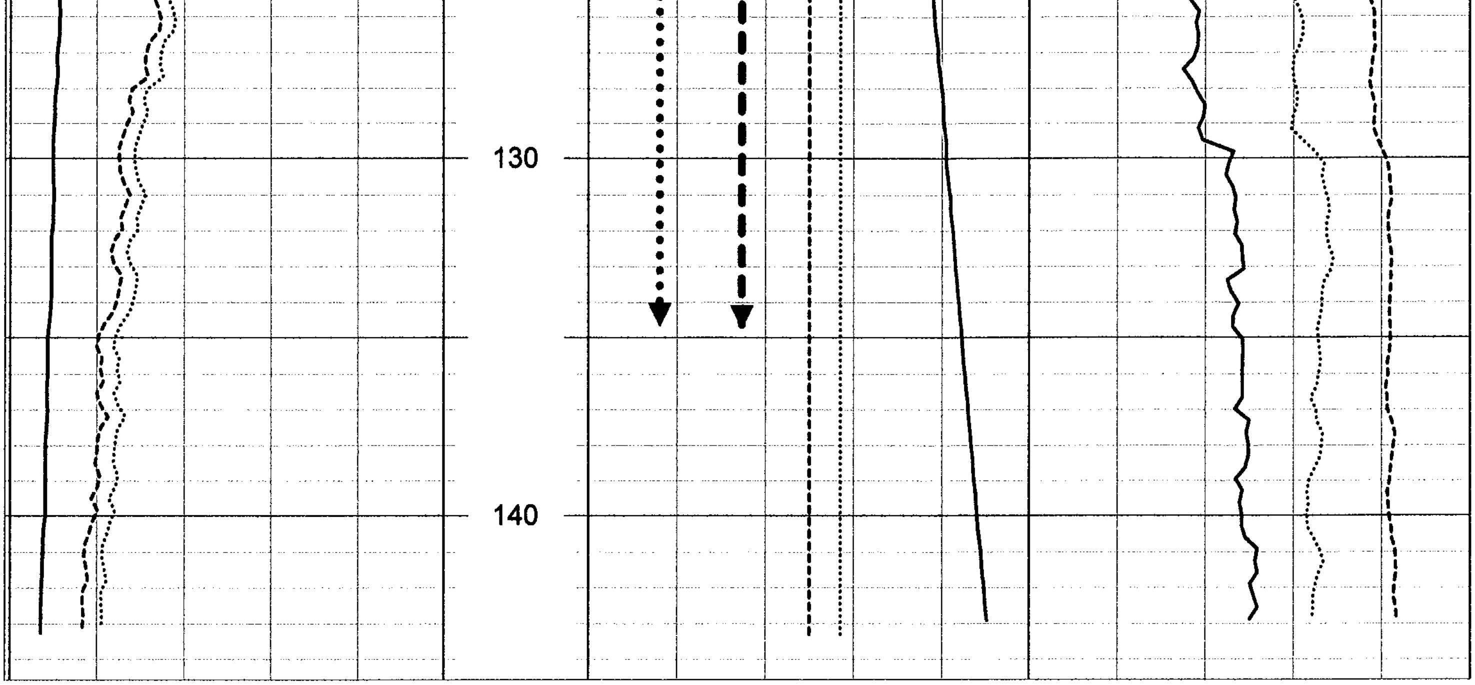
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY




Temperature
18 deg C 28
Fluid Conductivity
140 uS/cm 250
Fluid Conductivity 20C
140 uS/cm 250
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 40
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-40 mV 130
Chloride
50 mg/L 135
Ammonia
-55 mg/L 130
20
30
40
50
60

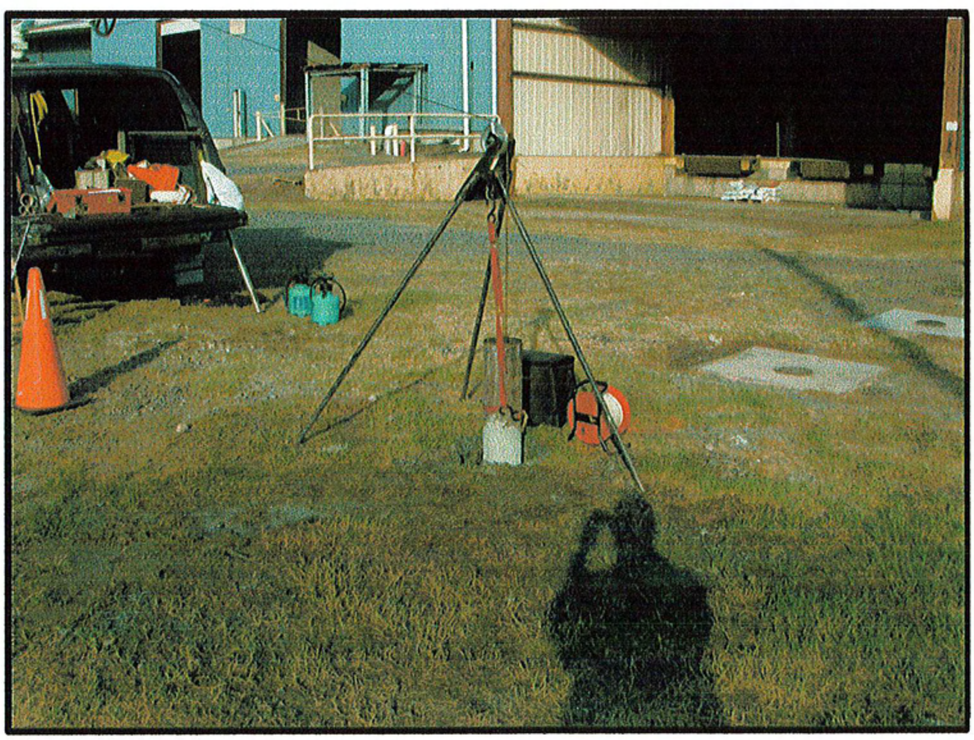


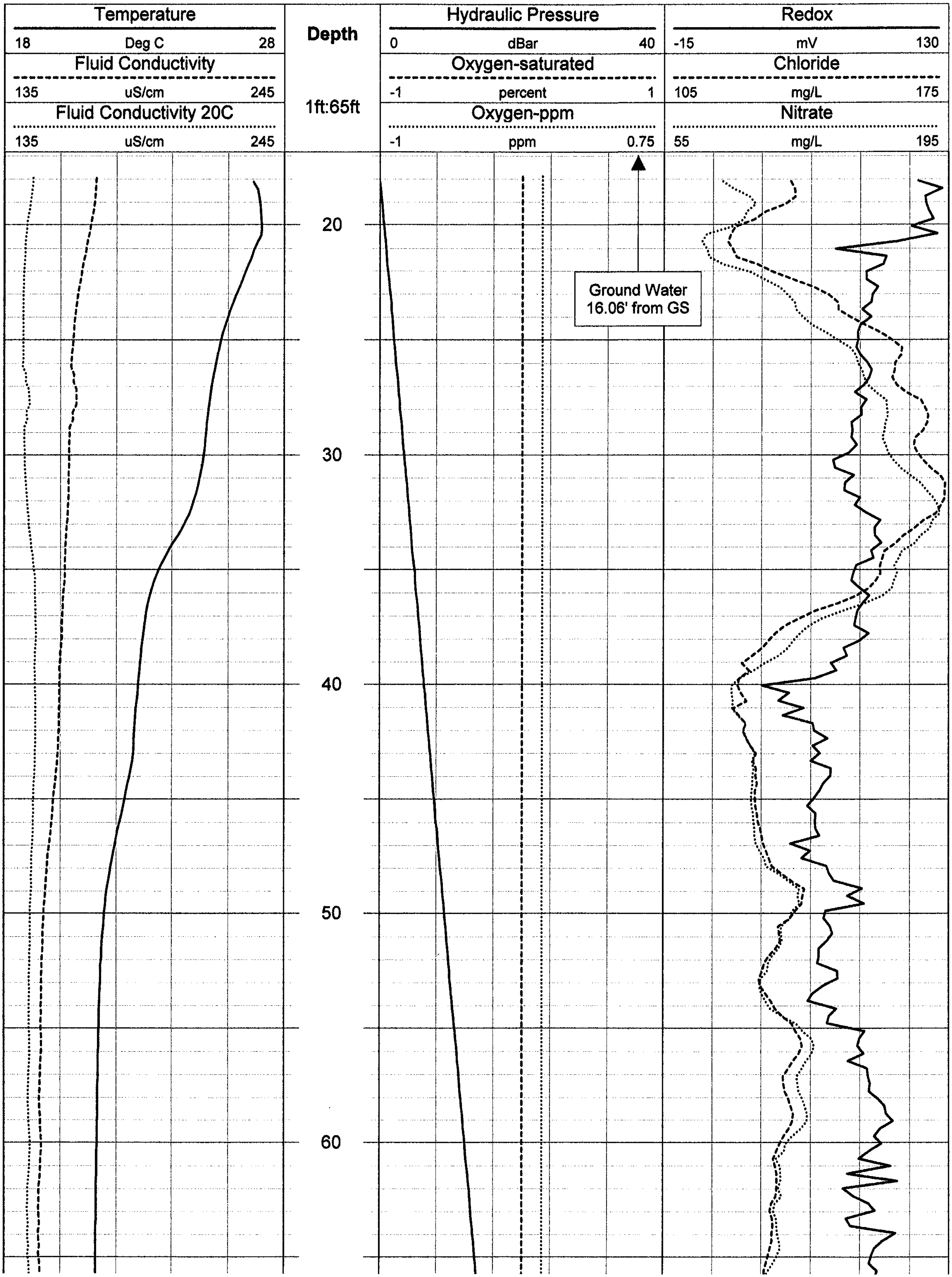
70
80
90
100
110
120
Proposed Sandpack Interval 122.9'-134.9' ft. BGS
End of Casing 116.2' to GS
Proposed Screen Interval 124.9'-134.9' ft. BGS



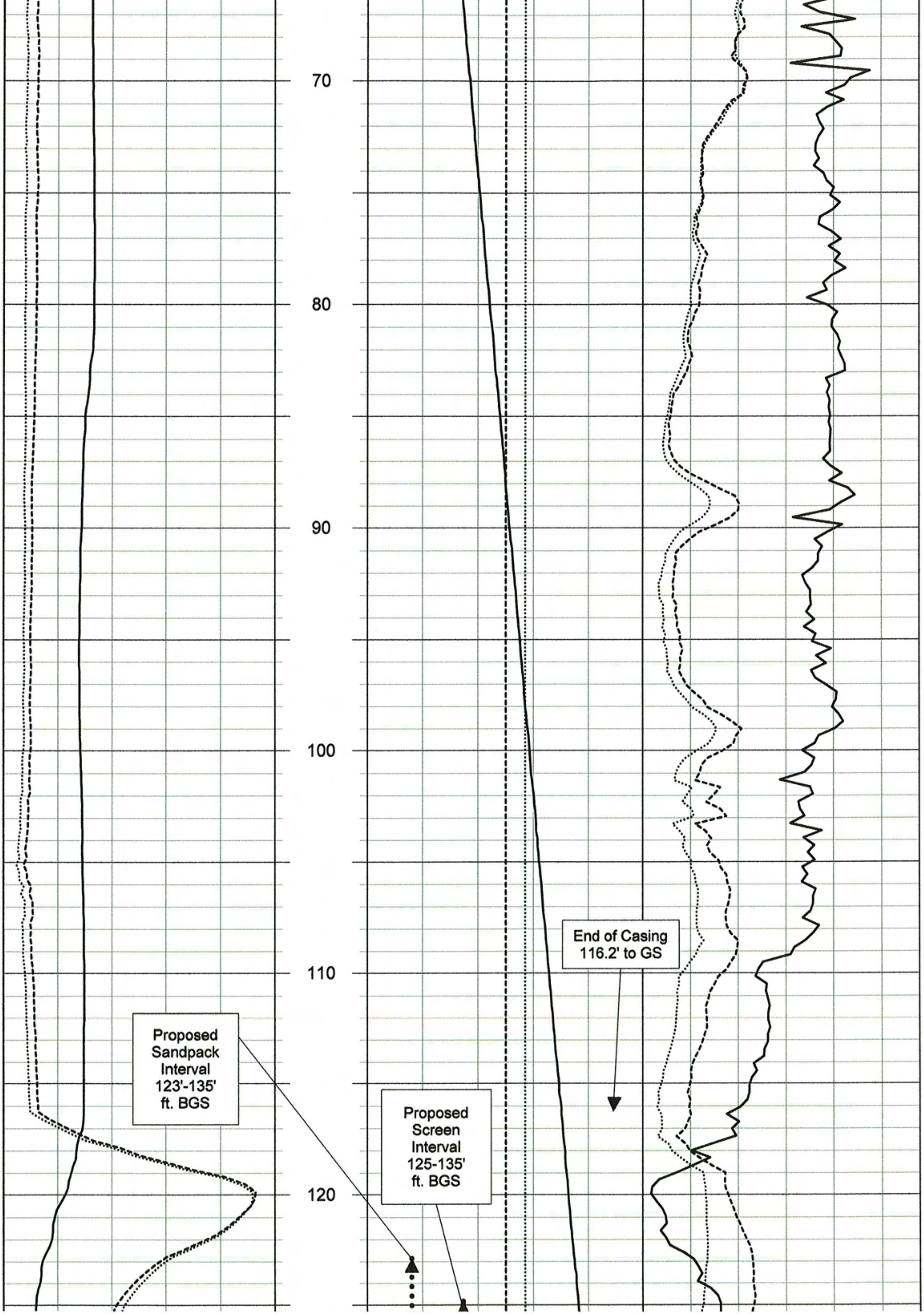
130
140

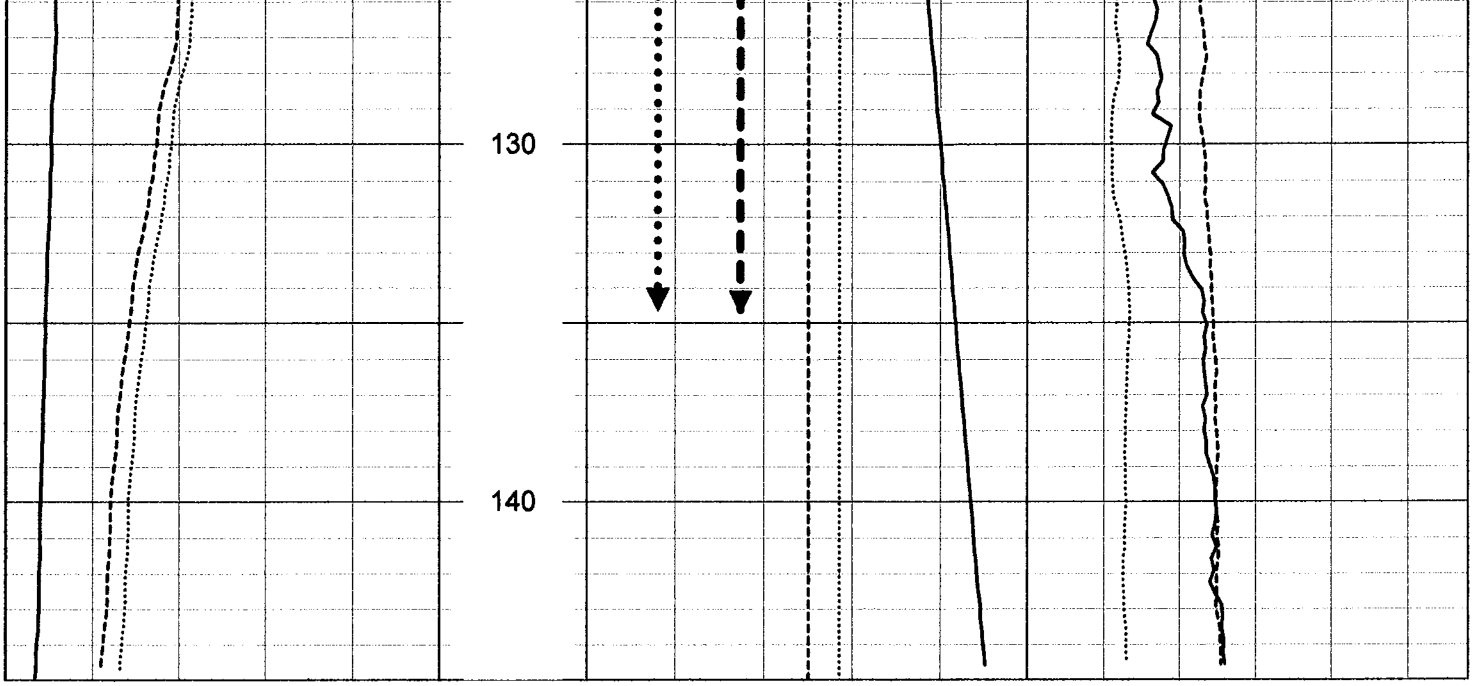
Well: RIMW 22		Log: 22-B
Site: PSC		
City/State: Rock Hill, South Carolina		
Date: 08/22/07	Time: 08:04	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 16.06'	Measured From: GS at ~ 07:15 08/22	
Outer Casing Height AGL (with cap open/removed): 1.65"	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: Ground Surface	Log Speed: ~13 fpm
Log Top: 118.0'	Log Bottom: 145.0'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&86; OTV
Well Diameter: 6.25"	Well Depth: 145.55'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 116.2' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88911822° N	Longitude: -81.07154162° W	
Notes: GPS NAD83 Logged from TOC but converted data to measure from GS		





Temperature
18 Deg C 28
Fluid Conductivity
135 uS/cm 245
Fluid Conductivity 20C
135 uS/cm 245
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 40
Oxygen-saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-15 mV 130
Chloride
105 mg/L 175
Nitrate
55 mg/L 195
20
30
40
50
60
Ground Water
16.06' from GS


70
80
90
100
110
120
End of Casing
116.2' to GS
Proposed
Sandpack
Interval
123'-135'
ft. BGS
Proposed
Screen
Interval
125-135'
ft. BGS


130
140

Well:	RIMW 22	Log: 22 - C
Site:	PSC	

City/State: Rock Hill, South Carolina

Date: 08/22/07	Time: See notes

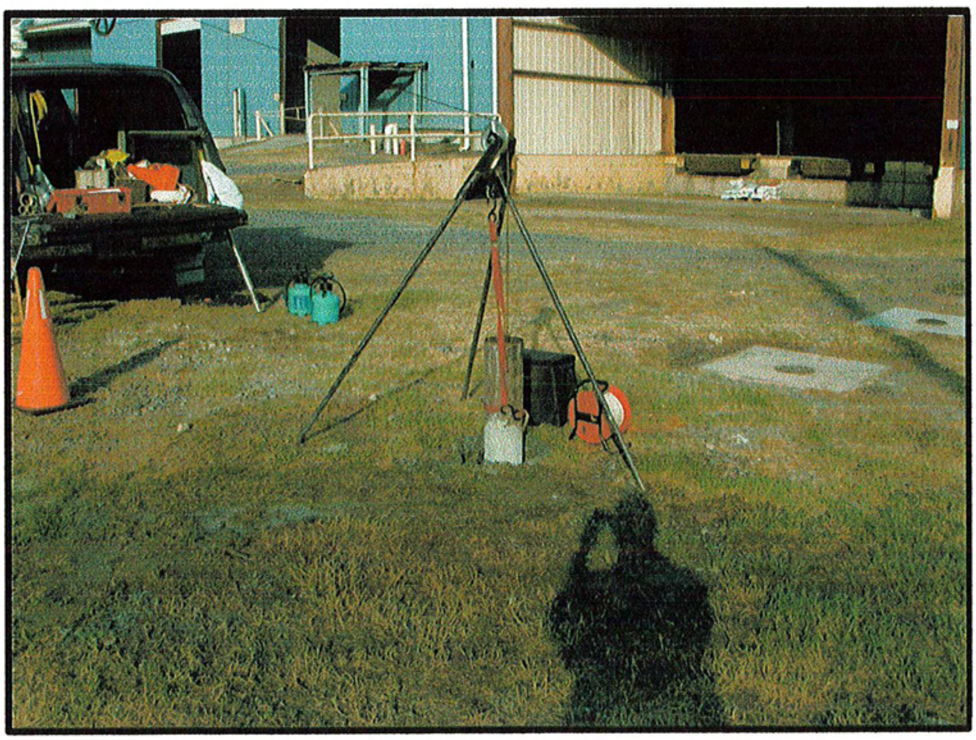
System Configuration: Century 9041, 9065

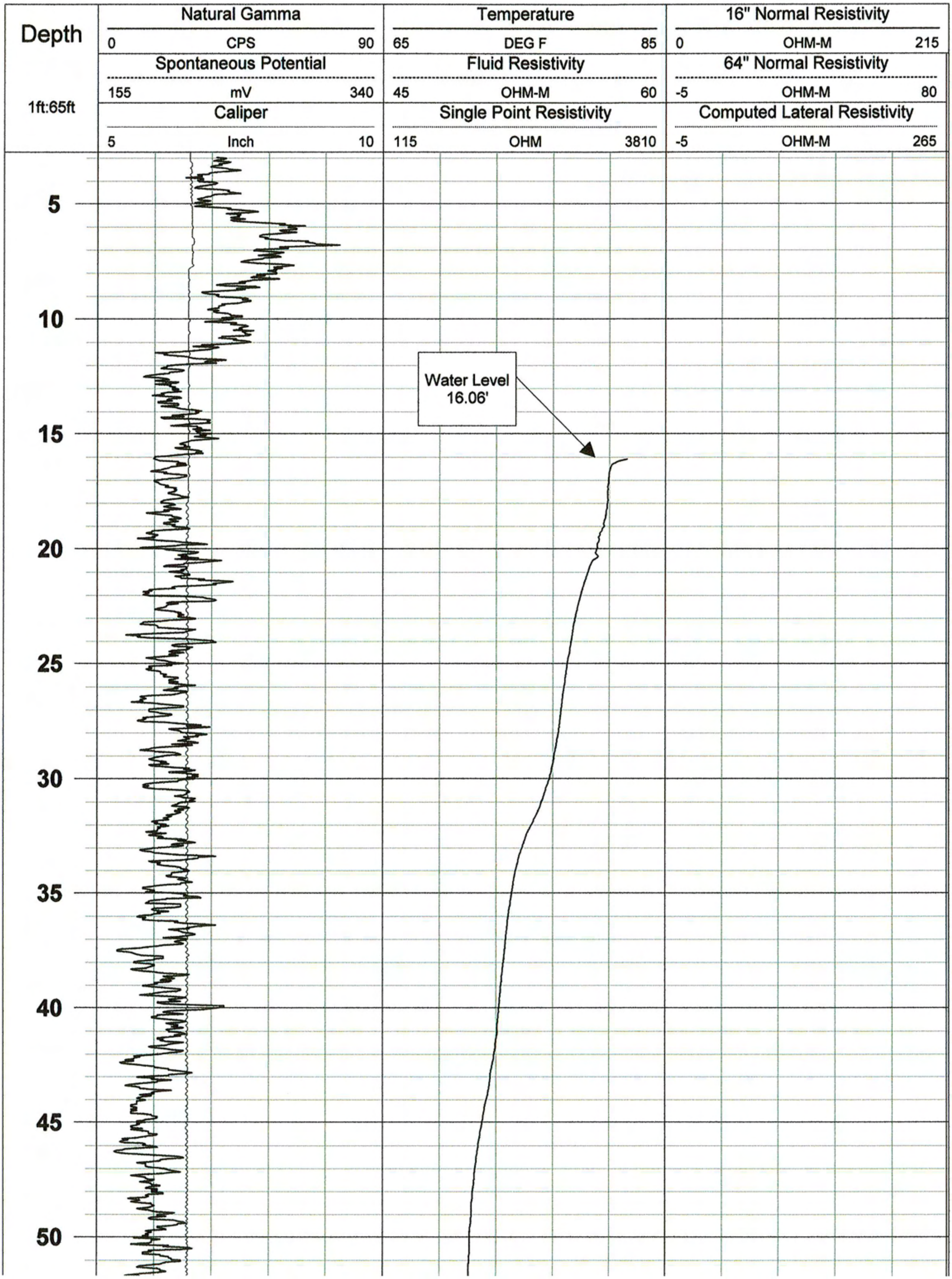
Water Level: 16.06'	Measured From: Ground Surface	
Outer Casing Height AGL (with cap open/removed): 1.65'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: GS	Log Speed: see notes
Log Top: 2.8'	Log Bottom: 144.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 2IDA; OTV
Well Diameter: 6.25"	Well Depth: 1455.5'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 116.2' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88911822° N	Longitude: -81.07154162° W	

Notes: GPS NAD83

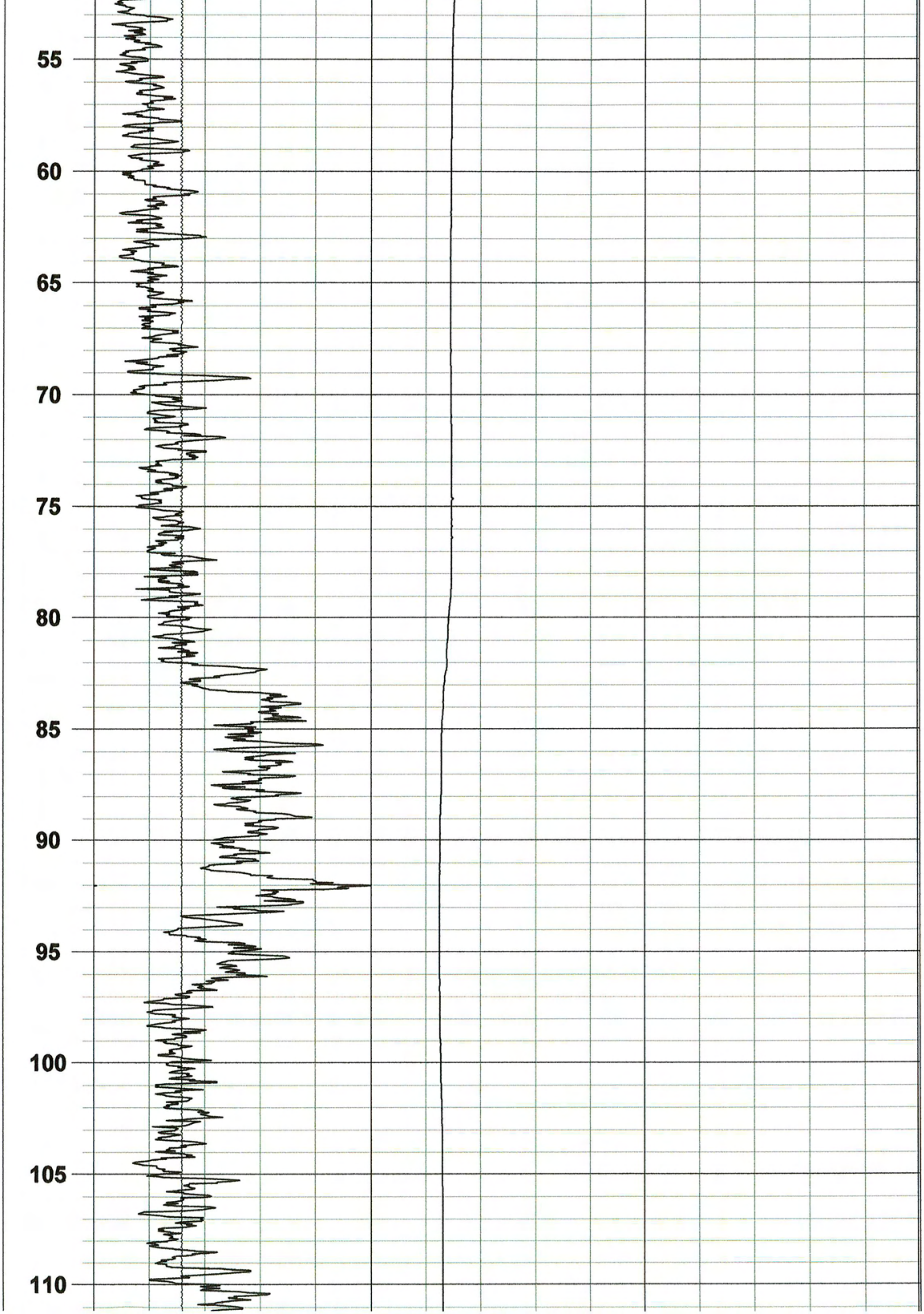
Caliper logged up on 8/22/07 @ 08:55; speed ~16 fpm

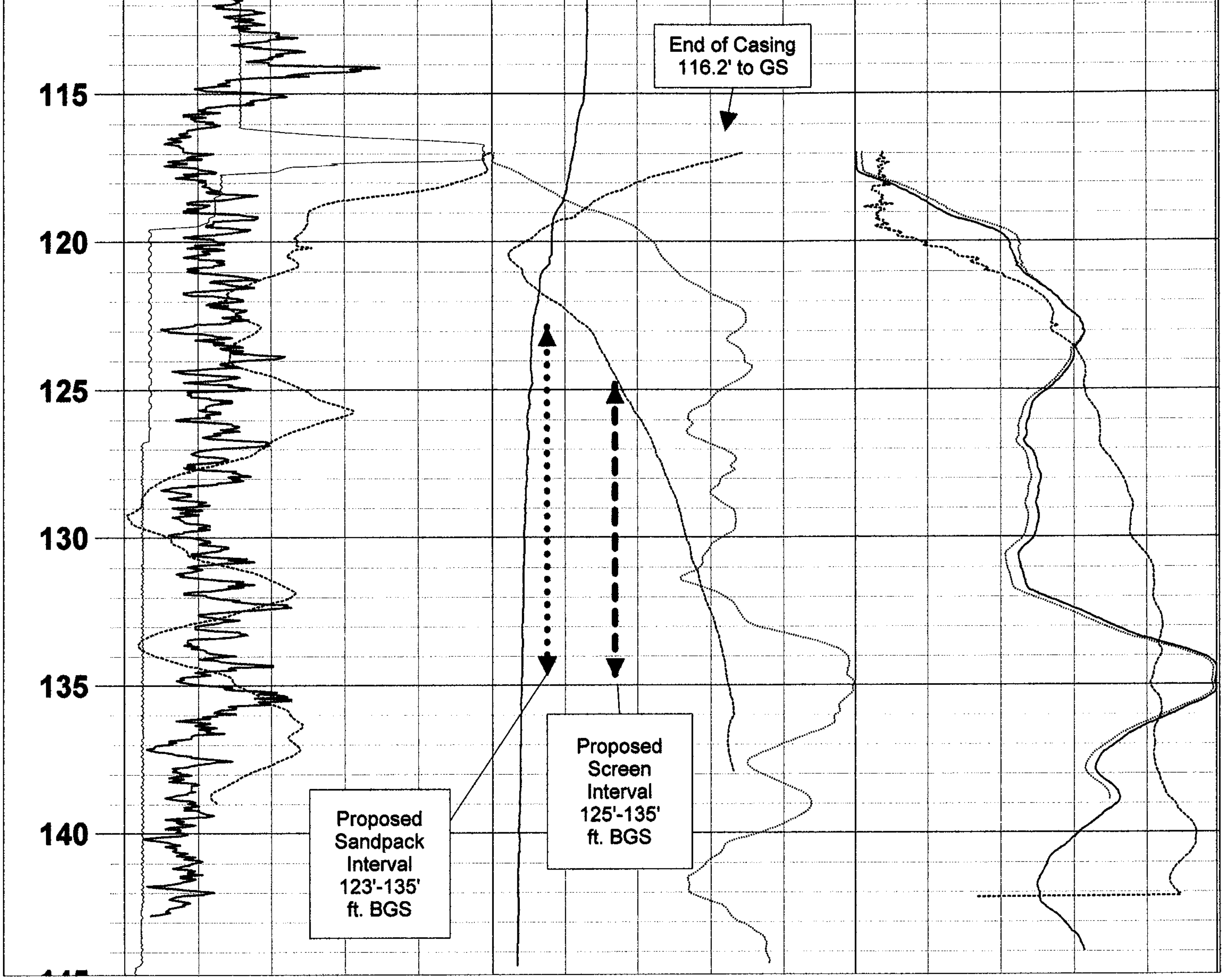
9041 logged down on 8/22/07 @ 09:20; speed 15 fpm





Depth
1ft:65ft
Natural Gamma
0 CPS 90
Spontaneous Potential
155 mV 340
Caliper
5 Inch 10
Temperature
65 DEG F 85
Fluid Resistivity
45 OHM-M 60
Single Point Resistivity
115 OHM 3810
16" Normal Resistivity
0 OHM-M 215
64" Normal Resistivity
-5 OHM-M 80
Computed Lateral Resistivity
-5 OHM-M 265
5
10
15
20
25
30
35
40
45
50
Water Level
16.06'


55
60
65
70
75
80
85
90
95
100
105
110



End of Casing
116.2' to GS
115
120
125
130
135
140
Proposed
Sandpack
Interval
123'-135'
ft. BGS
Proposed
Screen
Interval
125'-135'
ft. BGS

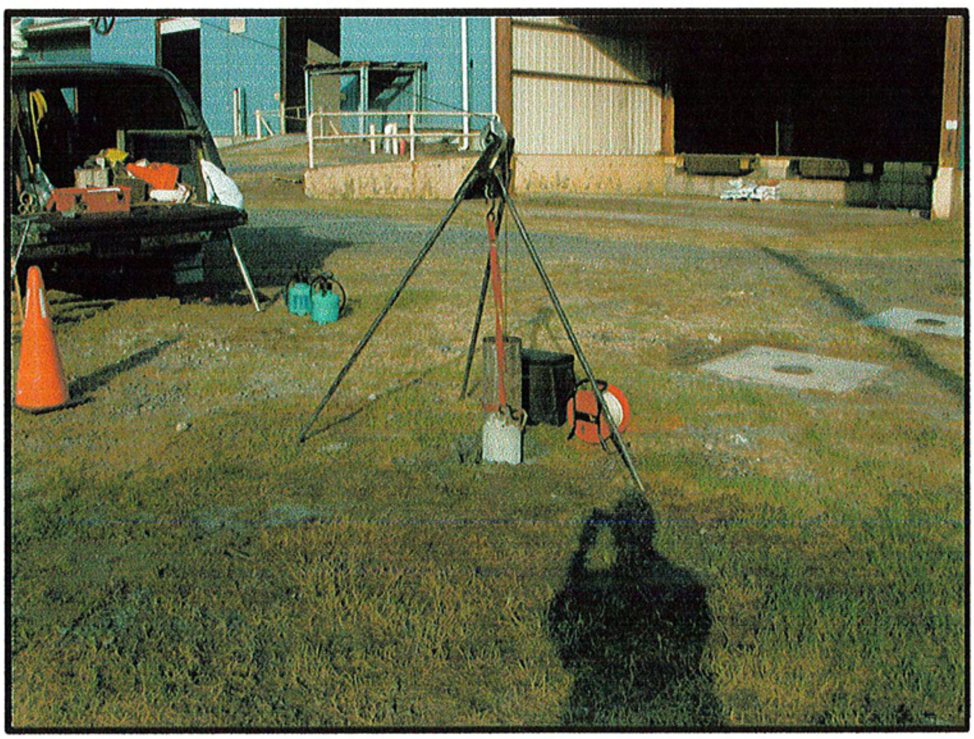
Well: RIMW 22		Log: 22-D
Site: PSC		
City/State: Rock Hill, South Carolina		
Date: 8/22/07	Time: See notes	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 16.06"	Measured From: GS at ~ 07:15 on 8/22	
Outer Casing Height AGL (with cap open/removed): 1.65"	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: Ground Surface	Log Speed: see notes
Log Top: 114.3'	Log Bottom: 145.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11	
Operator: JRU	Witness: None	Other Tools Used: 2IDA
Well Diameter: 6"	Well Depth: 145.55'	Referenced From: GS
Casing Material: None	Non-Cased Interval: 116.2' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88911822° N	Longitude: -81.07154162° W	

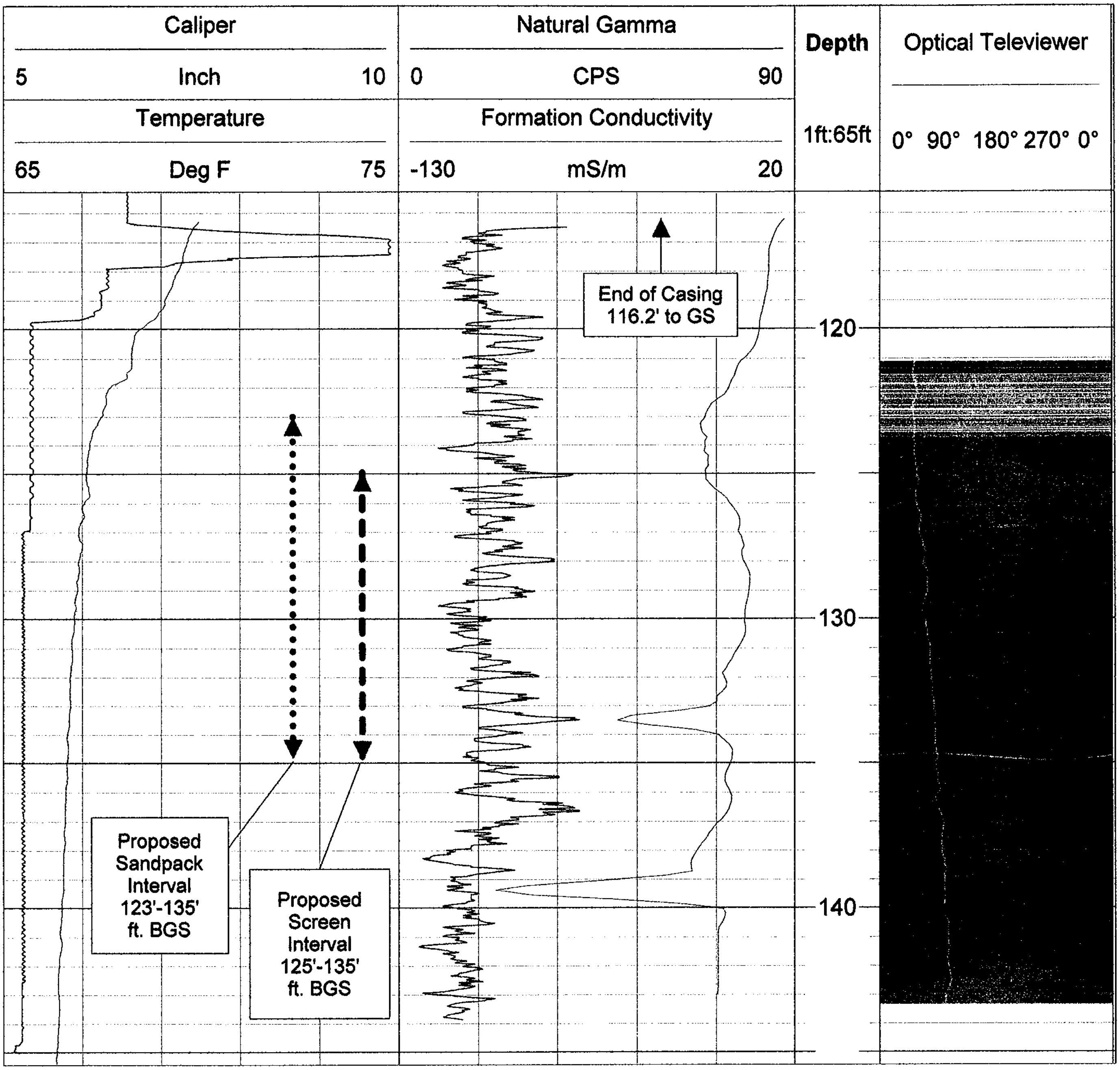
Notes: GPS NAD83

Caliper logged up on 8/22/07 @ 08:55; speed ~16 fpm

9041 logged down on 8/22/07 @ 09:20; speed 15 fpm

Optical televiewer logged up on 8/27/07 @ 12:30; speed 2.3 fpm




Caliper
5 Inch 10
Temperature
65 Deg F 75
Natural Gamma
0 CPS 90
Formation Conductivity
-130 mS/m 20
Depth
1ft:65ft
Optical Televiewer
0° 90° 180° 270° 0°
End of Casing 116.2' to GS
120
130
140
Proposed Sandpack Interval 123'-135' ft. BGS
Proposed Screen Interval 125'-135' ft. BGS

PSC Site
August 22 – 28, 2007
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW 23

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 23 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 23 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 23 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 23 - D

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m
Optical televiewer – color digital image

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool
- Temperature – degrees Fahrenheit
- Natural gamma – cps
- Spontaneous potential - mV
- Fluid resistivity – Ohm/M
- Single point resistivity - Ohm
- 16 inch normal resistivity – Ohm/M
- 24 inch normal resistivity – Ohm/M
- Computed lateral resistivity – Ohm/M

Century 9065 tool
- Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration
- Temperature – degrees Centigrade
- Fluid conductivity – µS/cm
- Fluid conductivity at 20˚ C – µS/cm
- Hydraulic pressure - dBar
- Oxygen – saturated - percent
- Oxygen – ppm
- Redox - mV
- Chloride – mg/L
- Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool
- Formation conductivity – mS/m

Mount Sopris ALT OBI-40-2 Tool
- Optical televiewer – color digital image

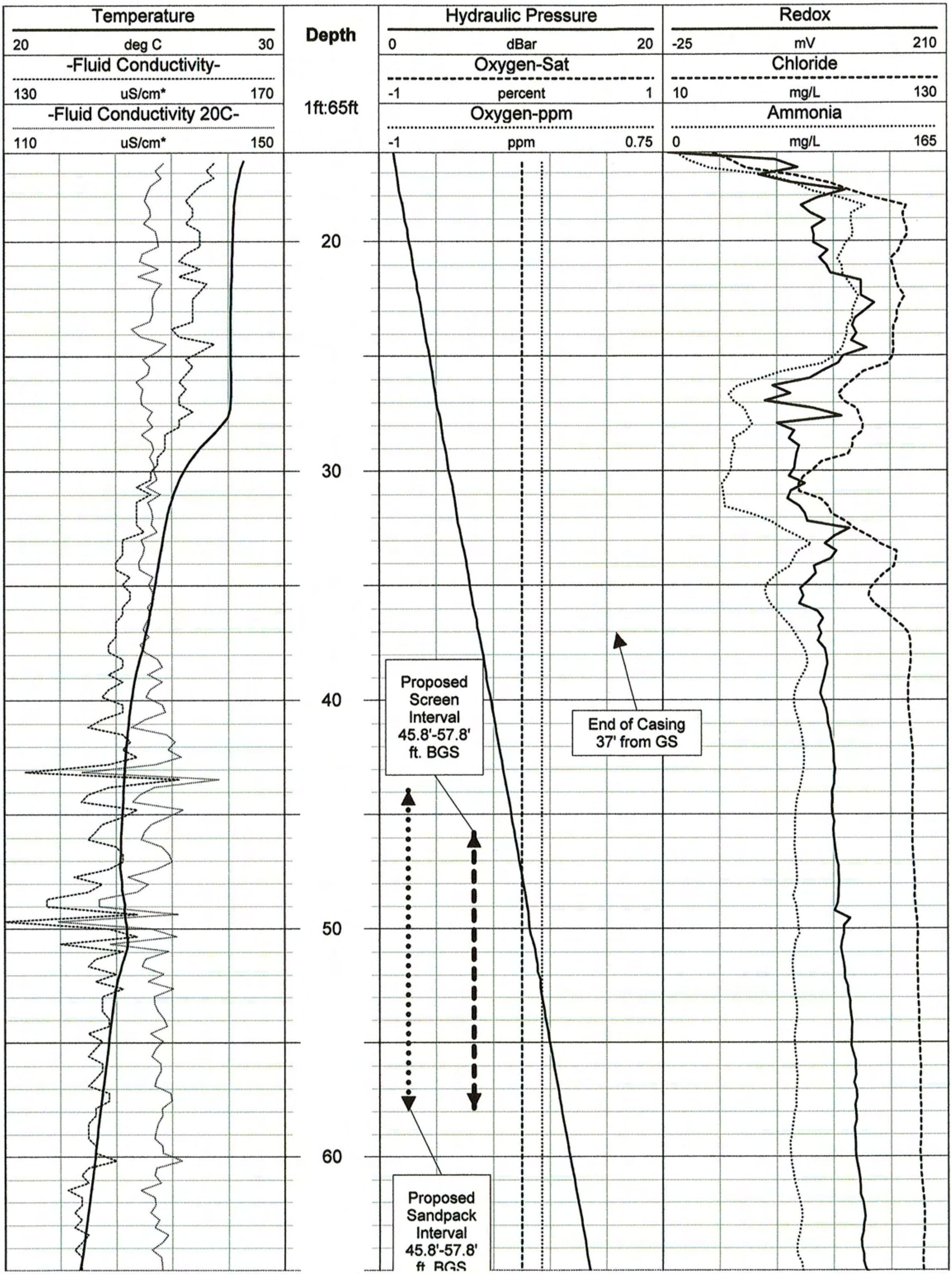
Well:	RIMW 23	Log: 23-A

Site:	PSC

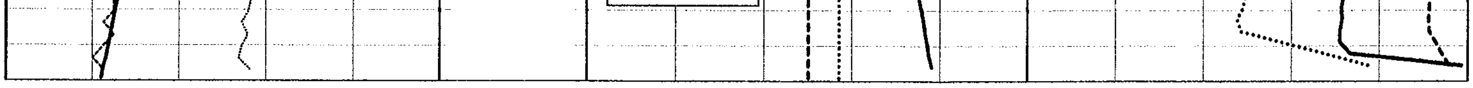
City/State: Rock Hill, South Carolina		
Date: 8/24/07	Time: 13:45	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 12.65'	Measured From: GS at ~ 13:15 on 8/24	
Outer Casing Height AGL (with cap open/removed): 3.12'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: down	Measured from: Ground Surface	Log Speed: 14 fpm
Log Top: 16.2'	Log Bottom: 68'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1; Cl, NH4 = 5	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"	Well Depth: 69.48'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 70.6' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88862735° N	Longitude: -81.07101140° W	

Notes: GPS values ± 5.71M; NAD83

* fluid conductivity data collected at mS/cm but displayed as uS/cm



Temperature
20
deg C
30
-Fluid Conductivity-
130
uS/cm*
170
-Fluid Conductivity 20C-
110
uS/cm*
150
Depth
1ft:65ft
Hydraulic Pressure
0
dBar
20
Oxygen-Sat
-1
percent
1
Oxygen-ppm
-1
ppm
0.75
Redox
-25
mV
210
Chloride
10
mg/L
130
Ammonia
0
mg/L
165
20
30
40
50
60
Proposed Screen Interval 45.8'-57.8' ft. BGS
End of Casing 37' from GS
Proposed Sandpack Interval 45.8'-57.8' ft. BGS



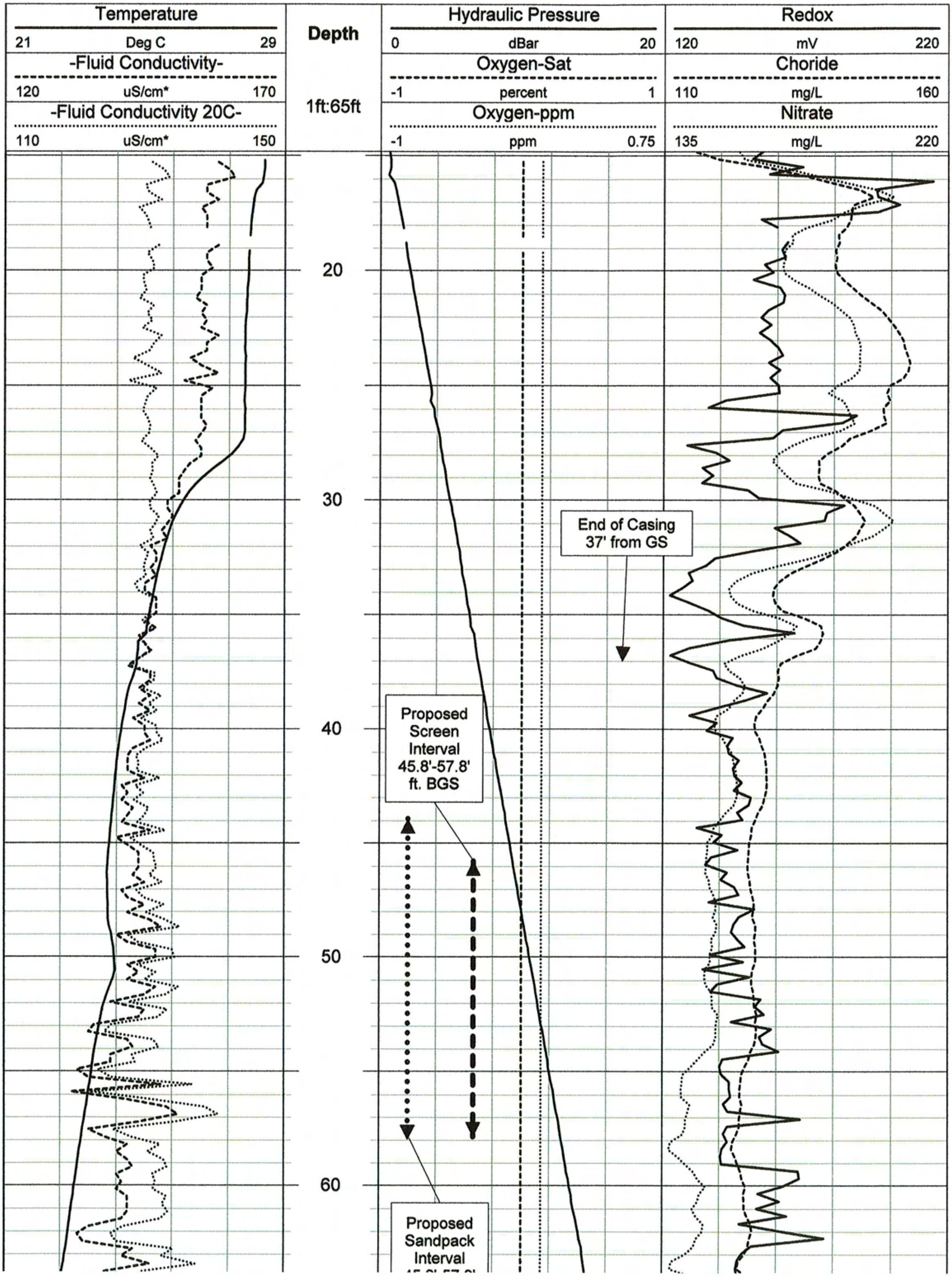
Well:	**RIMW 23**	**Log: 23-B**
Site:	**PSC**	

City/State: Rock Hill, South Carolina		
Date: 8/24/07	Time: 14:05	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 12.65'	Measured From: GS at ~ 13:15 on 8/24	
Outer Casing Height AGL (with cap open/removed): 3.12' Type: Steel		
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: down	Measured from: Ground Surface	Log Speed: 13 fpm
Log Top: 14.9'	Log Bottom: 68'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1; Cl, NO3 = 5	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"	Well Depth: 69.48'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 37' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88862735° N	Longitude: -81.07101140° W	

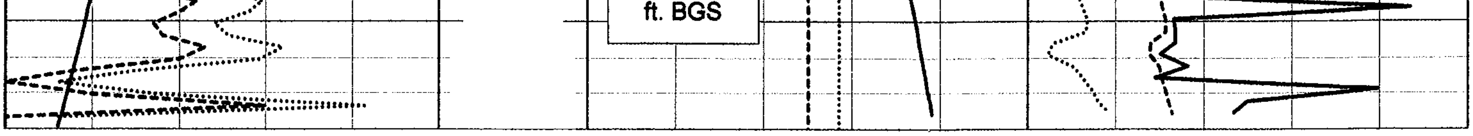
Notes: GPS values; NAD83

* fluid conductivity data collected at mS/cm but displayed as uS/cm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Temperature
21 Deg C 29
-Fluid Conductivity-
120 uS/cm* 170
-Fluid Conductivity 20C-
110 uS/cm* 150
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
120 mV 220
Choride
110 mg/L 160
Nitrate
135 mg/L 220
20
30
40
50
60
End of Casing
37' from GS
Proposed
Screen
Interval
45.8'-57.8'
ft. BGS
Proposed
Sandpack
Interval

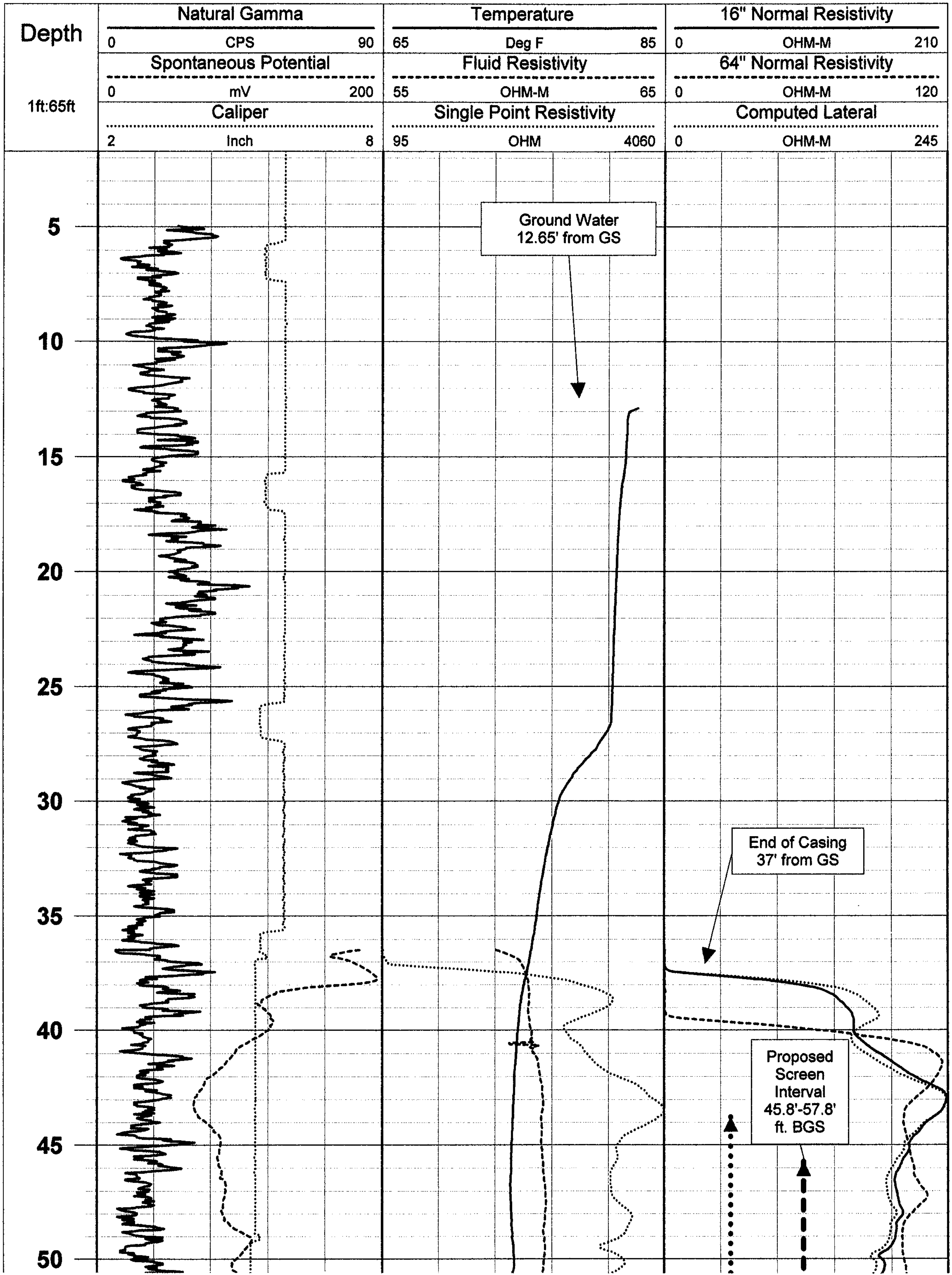

ft. BGS

Well:	**RIMW 23**	**Log: 23-C**
Site:	**PSC**	

City/State: Rock Hill, South Carolina		
Date: 8/24/07	Time: See notes	
System Configuration: Century 9041 & 9065		
Water Level: 12.65'	Measured From: GS at ~ 13:15 on 8/24	
Outer Casing Height AGL (with cap open/removed): 3.12'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: see notes	Measured from: Ground Surface	Log Speed: see notes
Log Top: 16.2'	Log Bottom: 68'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: natural gamma = 11	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"	Well Depth: 69.48'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 70.6' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88862735° N	Longitude: -81.07101140° W	

Notes: GPS values; NAD83
Caliper logged up at 15:00 on 8/24; speed 18 fpm
9041 logged down at 15:15 on 8/24; speed 16 fpm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Depth
1ft:65ft
Natural Gamma
0 CPS 90
Spontaneous Potential
0 mV 200
Caliper
2 Inch 8
Temperature
65 Deg F 85
Fluid Resistivity
55 OHM-M 65
Single Point Resistivity
95 OHM 4060
16" Normal Resistivity
0 OHM-M 210
64" Normal Resistivity
0 OHM-M 120
Computed Lateral
0 OHM-M 245
Ground Water
12.65' from GS
End of Casing
37' from GS
Proposed
Screen
Interval
45.8'-57.8'
ft. BGS
5
10
15
20
25
30
35
40
45
50


55
60
65
Proposed Sandpack Interval 45.8'-57.8' ft. BGS

Well: RIMW 23 Log: 23-D

Site: PSC

City/State: Rock Hill, South Carolina		
Date: 8/24/07	Time: See notes	
System Configuration: Century & Mount Sopris		
Water Level: 12.65'	Measured From: GS at ~ 13:15 on 8/24	
Outer Casing Height AGL (with cap open/removed): 3.12' Type: Steel		
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: Ground Surface	Log Speed: see notes
Log Top: 37'	Log Bottom: 69.4'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 2IDA; 9041
Well Diameter: 6"	Well Depth: 69.48'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 37' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88862735° N	Longitude: -81.07101140° W	

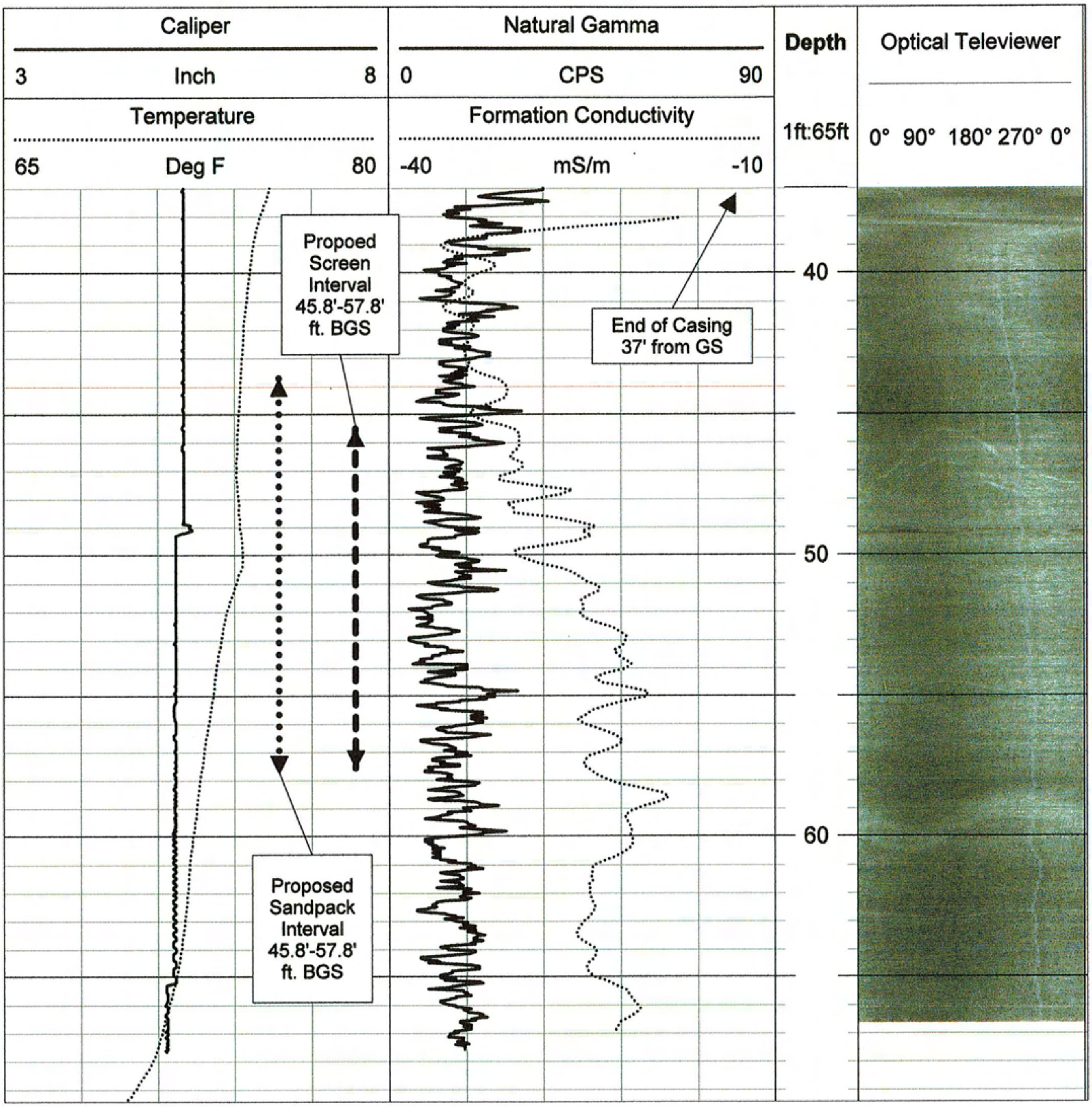
Notes: GPS values; NAD83

Formation conductivity logged up at 14:30 on 8/24; speed 15 fpm

Caliper logged up at 15:00 on 8/24; speed 18 fpm

9041 logged down at 15:15 on 8/24; speed 16 fpm

Optical televiewer logged down at 07:40 on 8/28; speed 2.1 fpm



Caliper
3
Inch
8
Temperature
65
Deg F
80
Natural Gamma
0
CPS
90
Formation Conductivity
-40
mS/m
-10
Depth
1ft:65ft
Optical Televiewer
0° 90° 180° 270° 0°
40
50
60
Propoed Screen Interval 45.8'-57.8' ft. BGS
End of Casing 37' from GS
Proposed Sandpack Interval 45.8'-57.8' ft. BGS

PSC Site
August 22 – 28, 2007
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW 25

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 25 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 25 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 25 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 25 - D

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m
Optical televiewer – color digital image

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity – Ohm/M
Computed lateral resistivity – Ohm/M

Century 9065 tool

Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool

Formation conductivity – mS/m

Mount Sopris ALT OBI-40-2 Tool

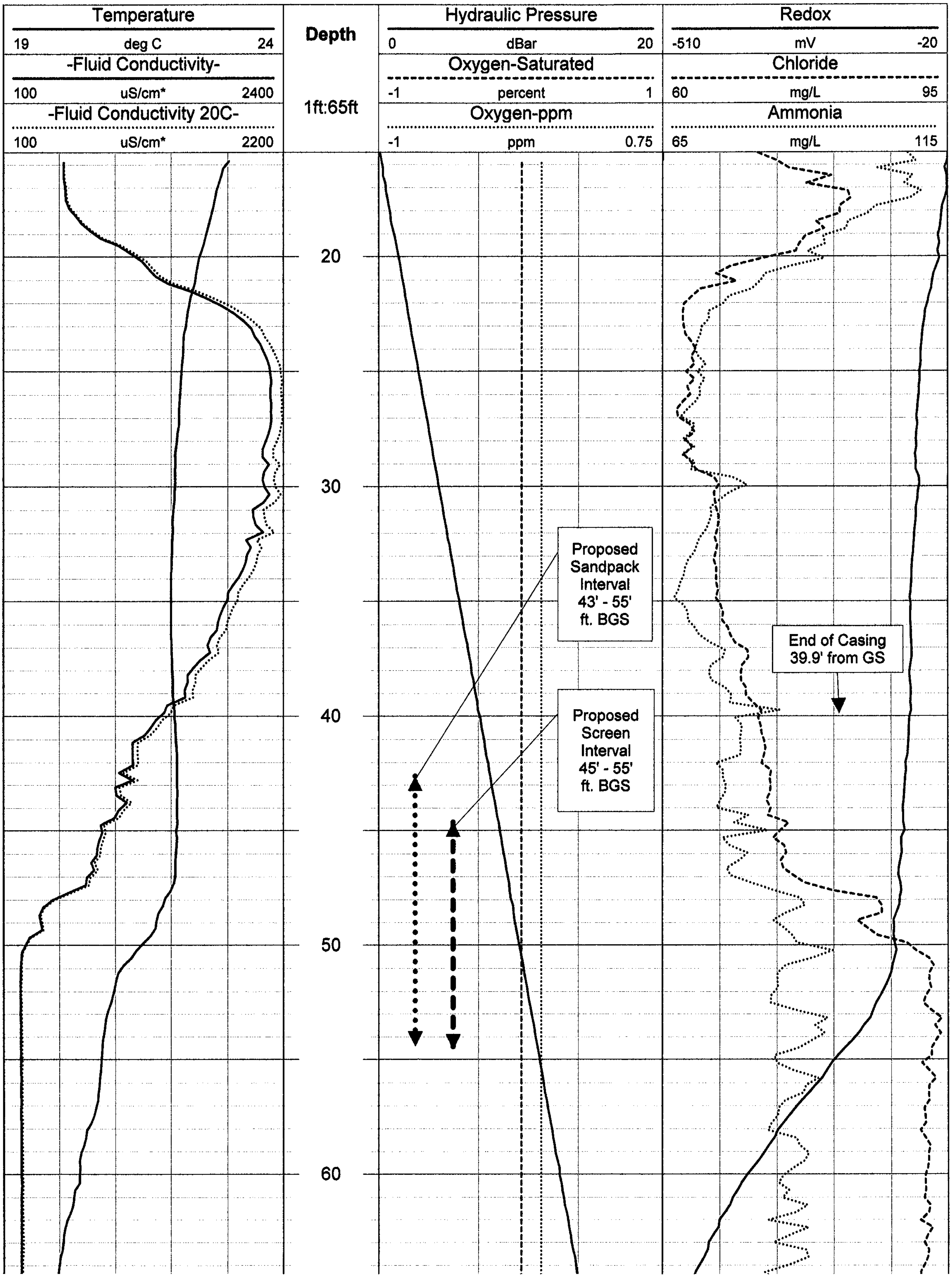
Optical televiewer – color digital image

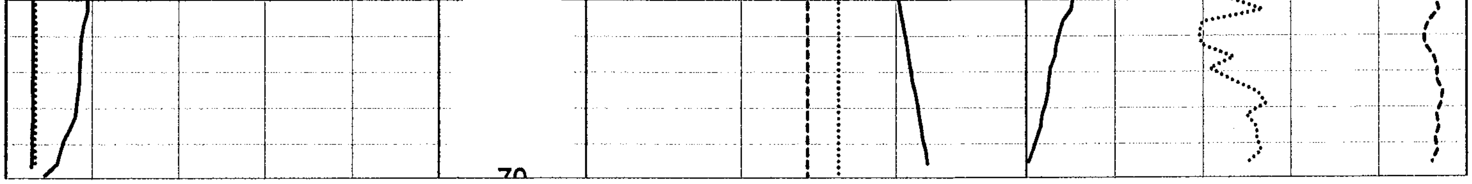
Well:	**RIMW 25**	**Log: 25-A**

Site:	**PSC**

City/State: Rock Hill, South Carolina		
Date: 8/28/07	Time: 09:30	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 15.2'	Measured From: GS at ~ 09:15 8/07	
Outer Casing Height AGL (with cap open/removed): 0.7' Type: Steel		
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: Ground Surface	Log Speed: 13.8 fpm
Log Top: 15.5'	Log Bottom: 69.9'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6.25"	Well Depth: ~70.3'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 39.9' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.888535° N	Longitude: -81.072158 ° W	

Notes: * fluid conductivity data collected at mS/cm but displayed as uS/cm.
GPS values; NAD83

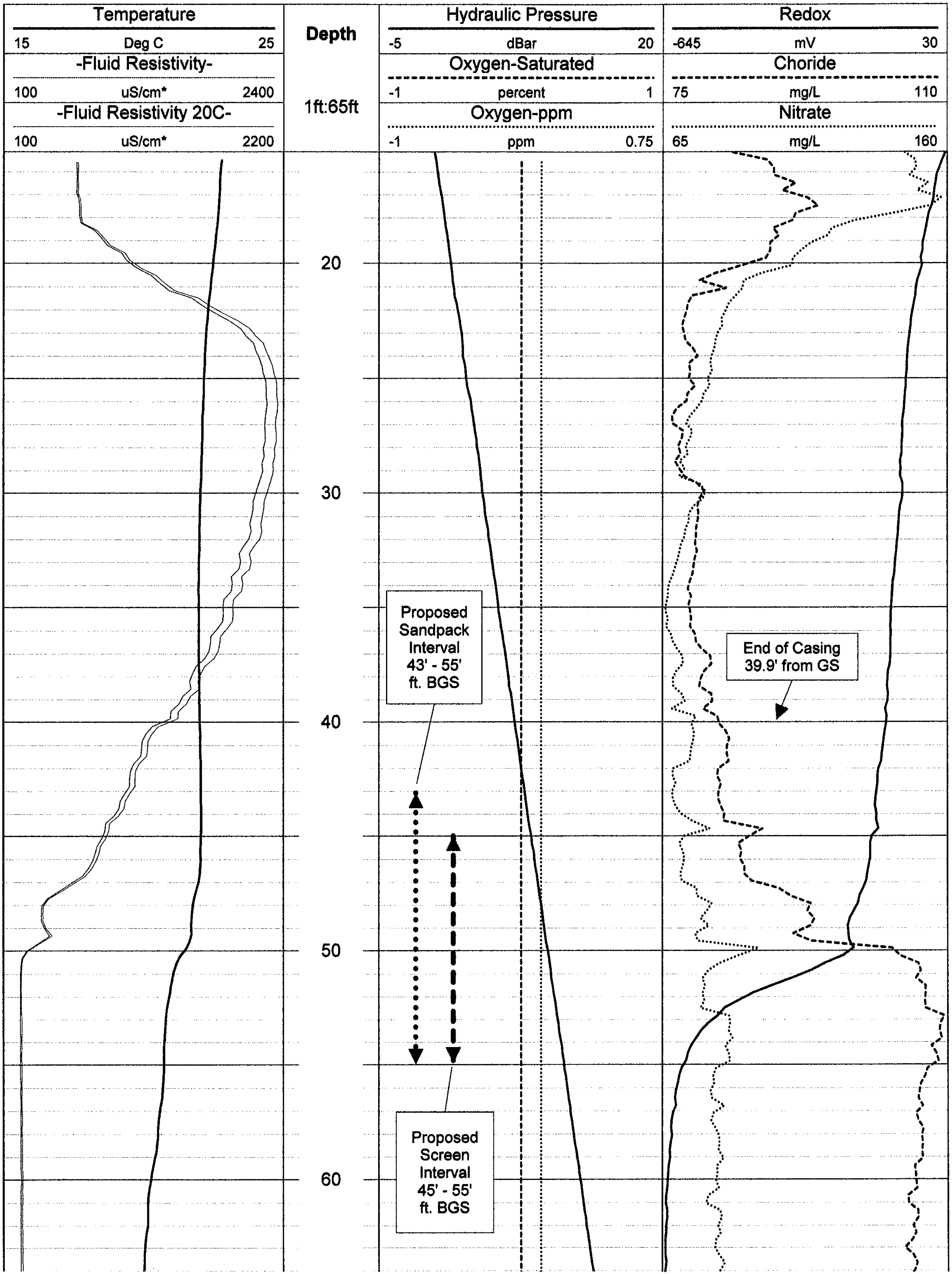

Temperature
19 deg C 24
-Fluid Conductivity-
100 uS/cm* 2400
-Fluid Conductivity 20C-
100 uS/cm* 2200
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-510 mV -20
Chloride
60 mg/L 95
Ammonia
65 mg/L 115
20
30
40
50
60
Proposed Sandpack Interval 43' - 55' ft. BGS
Proposed Screen Interval 45' - 55' ft. BGS
End of Casing 39.9' from GS



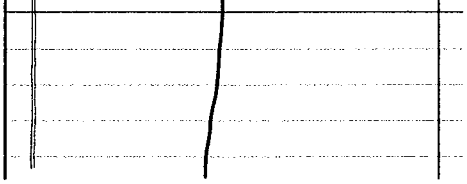
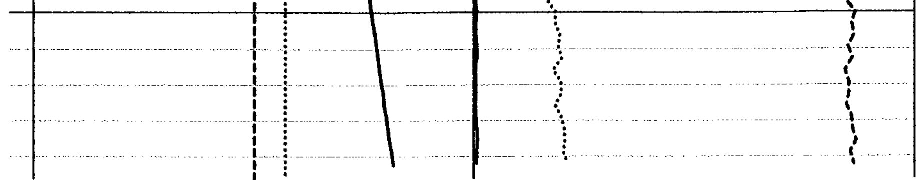
Well:	**RIMW 25**	**Log: 25-B**
Site:	**PSC**	

City/State: Rock Hill, South Carolina		
Date: 8/28/07	Time: 09:55	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 15.2'	Measured From: GS at ~ 09:15 8/07	
Outer Casing Height AGL (with cap open/removed): 0.7'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: Ground Surface	Log Speed: 14 fpm
Log Top: 15.2'	Log Bottom: 69.7'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Rodox = 1	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6.25"	Well Depth: ~70.3'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 39.9' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.888535° N	Longitude: -81.072158 ° W	

Notes: * fluid conductivity data collected at mS/cm but displayed as uS/cm.
GPS values; NAD83



Temperature
15 Deg C 25
-Fluid Resistivity-
100 uS/cm* 2400
-Fluid Resistivity 20C-
100 uS/cm* 2200
Depth
1ft:65ft
Hydraulic Pressure
-5 dBar 20
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-645 mV 30
Choride
75 mg/L 110
Nitrate
65 mg/L 160
20
30
40
50
60
Proposed Sandpack Interval 43' - 55' ft. BGS
Proposed Screen Interval 45' - 55' ft. BGS
End of Casing 39.9' from GS

Well: RIMW 25 Log: 25-C

Site: PSC

City/State: Rock Hill, South Carolina

Date: 8/28/07	Time: See notes

System Configuration: Century 9041, 9065

Water Level: 15.2'	Measured From: GS at ~ 09:15 8/07

Outer Casing Height AGL (with cap open/removed): 0.7' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A

Log Direction: See notes	Measured from: Ground Surface	Log Speed: see notes
Log Top: 4.5'	Log Bottom: 70.1'	Reference Point: GS

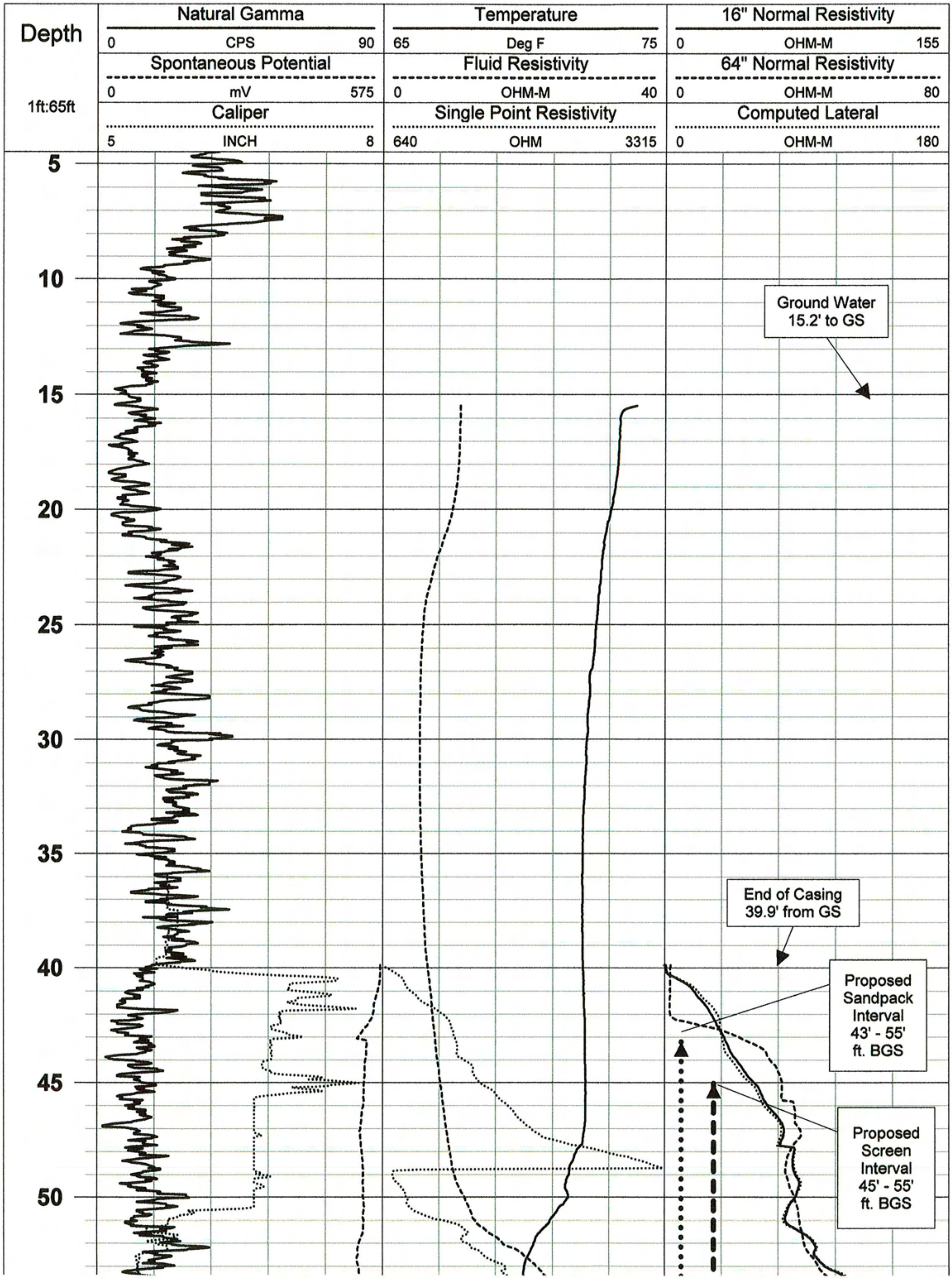
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11

Operator: JRU	Witness: None	Other Tools Used: 2EMA; 2IDA; OTV
Well Diameter: 6.25"	Well Depth: ~70.3'	Referenced From: GS

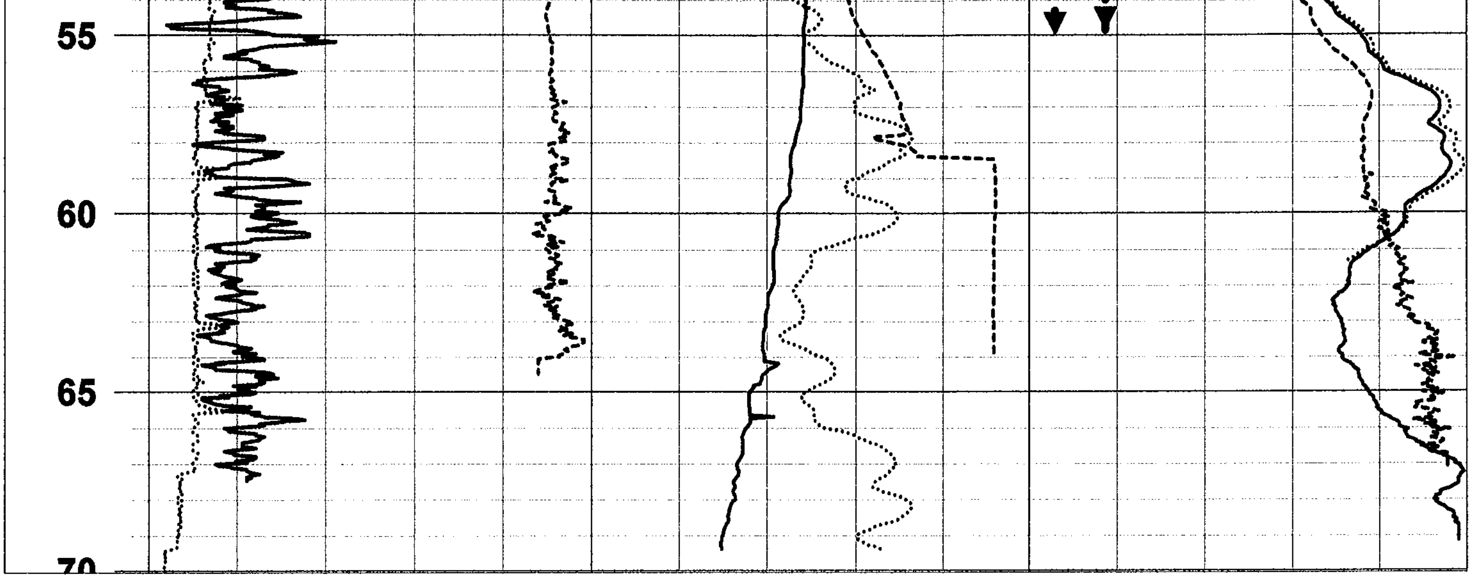
Casing Material: Steel	Non-Cased Interval: 39.9' to bottom
Screen Interval: None	Screen Type: N/A
Latitude: 34.888535° N	Longitude: -81.072158 ° W

Notes: Caliper logged up on 8/28/07 @ 11:00; speed ~16 fpm
9041 logged down on 8/28/07 @ 10:47; speed 15 fpm
GPS values; NAD83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Depth
1ft:65ft
Natural Gamma
0 CPS 90
Spontaneous Potential
0 mV 575
Caliper
5 INCH 8
Temperature
65 Deg F 75
Fluid Resistivity
0 OHM-M 40
Single Point Resistivity
640 OHM 3315
16" Normal Resistivity
0 OHM-M 155
64" Normal Resistivity
0 OHM-M 80
Computed Lateral
0 OHM-M 180
5
10
15
20
25
30
35
40
45
50
Ground Water 15.2' to GS
End of Casing 39.9' from GS
Proposed Sandpack Interval 43' - 55' ft. BGS
Proposed Screen Interval 45' - 55' ft. BGS


55
60
65
70

Well: RIMW 25 Log: 25 - D

Site: PSC

City/State: Rock Hill, South Carolina	
Date: 8/28/07	Time: See notes
System Configuration: Century 9041, 9065, OTV; Mount Sopris 2EMA	
Water Level: 15.2'	Measured From: GS at ~ 09:15 on 8/07
Outer Casing Height AGL (with cap open/removed): 0.7'	Type: Steel
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A
Log Direction: See notes	Measured from: Ground Surface
Log Speed: see notes	
Log Top: 36'	Log Bottom: 70.1'
Reference Point: GS	
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11
Operator: JRU	Witness: None
Other Tools Used: 2IDA	
Well Diameter: 6.25"	Well Depth: ~70.3'
Referenced From: GS	
Casing Material: Steel	Non-Cased Interval: 39.9' to bottom
Screen Interval: None	Screen Type: N/A
Latitude: 34.888535° N	Longitude: -81.072158 ° W

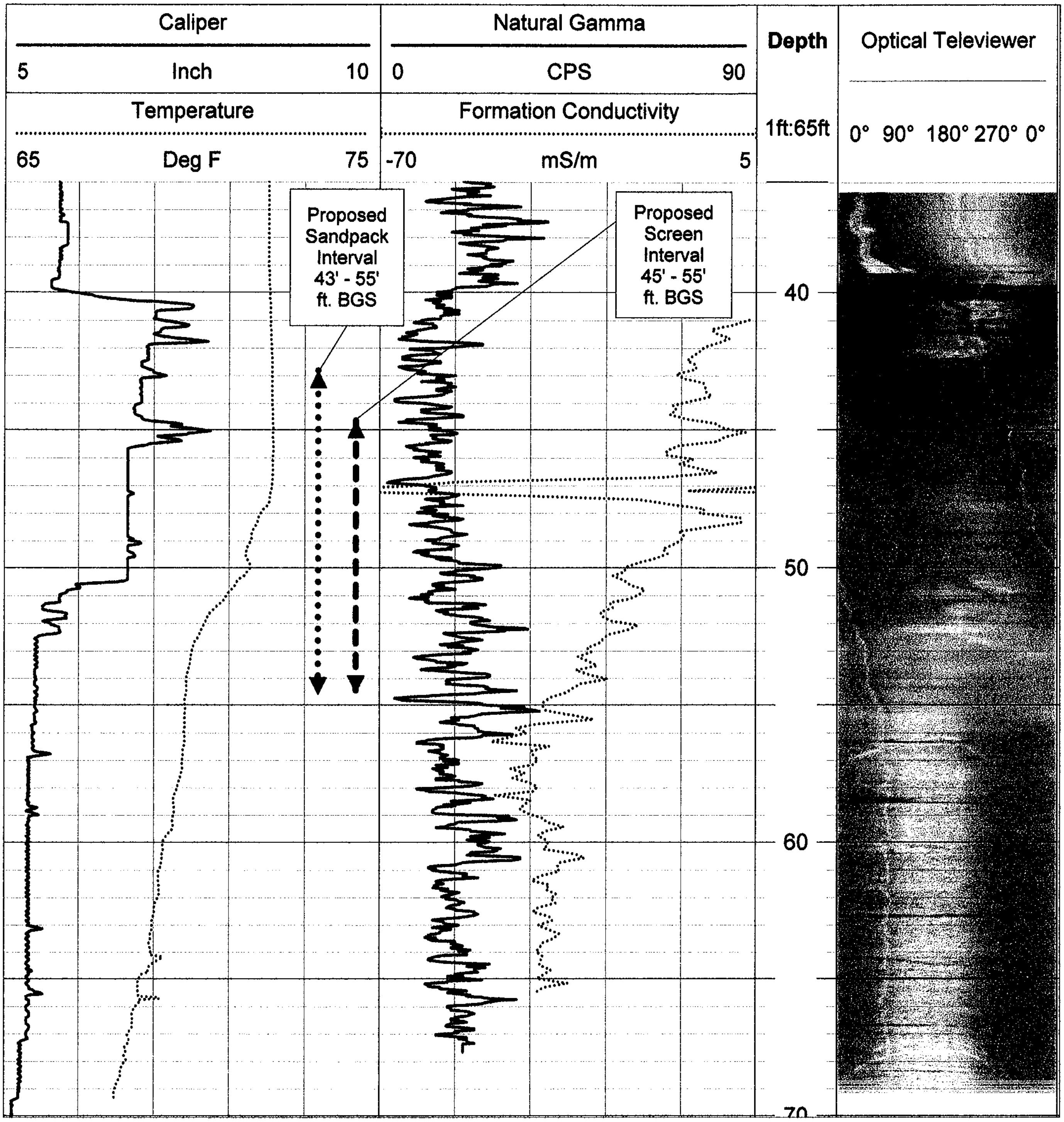
Notes: GPS values; NAD83

Caliper logged up on 8/28/07 @ 11:00; speed ~16 fpm

9041 logged down on 8/28/07 @ 10:47; speed 15 fpm

Optical televiewer logged up on 8/28/07 @ 11:30; speed 2.0 fpm

Formation conductivity logged up at 10:15 on 8/28; speed 15 fpm


Caliper
5
Inch
10
Temperature
65
Deg F
75
Natural Gamma
0
CPS
90
Formation Conductivity
-70
mS/m
5
Depth
1ft:65ft
Optical Televiewer
0° 90° 180° 270° 0°
Proposed Sandpack Interval 43' - 55' ft. BGS
Proposed Screen Interval 45' - 55' ft. BGS
40
50
60
70

PSC Site
August 22 – 28, 2007
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW 26

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 26 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 26 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 26 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 26 - D

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m
Optical televiewer – color digital image

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity – Ohm/M
Computed lateral resistivity – Ohm/M

Century 9065 tool

Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool

Formation conductivity – mS/m

Mount Sopris ALT OBI-40-2 Tool

Optical televiewer – color digital image

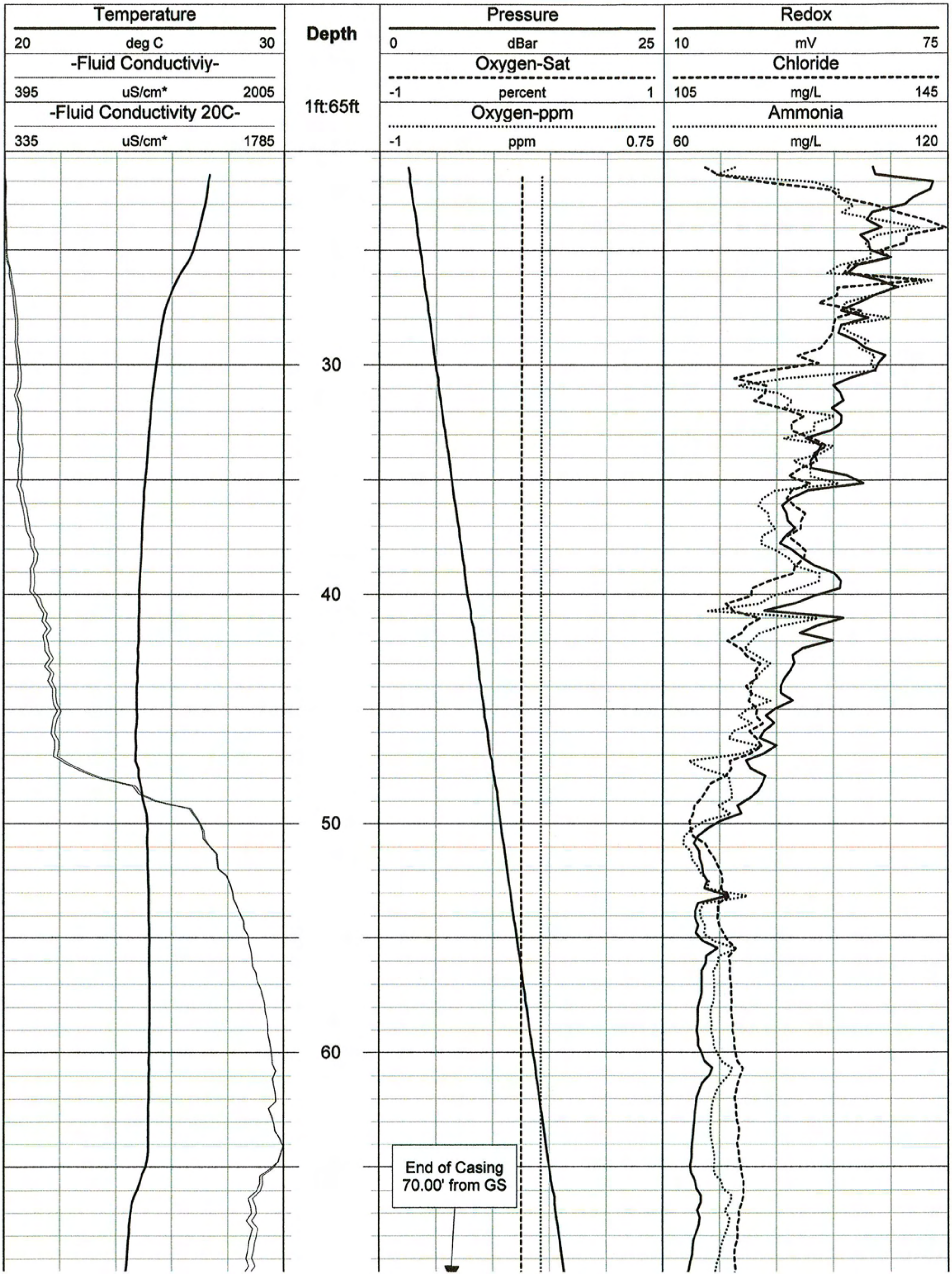
Well:	**RIMW 26**	**Log: 26-A**
Site:	**PSC**	

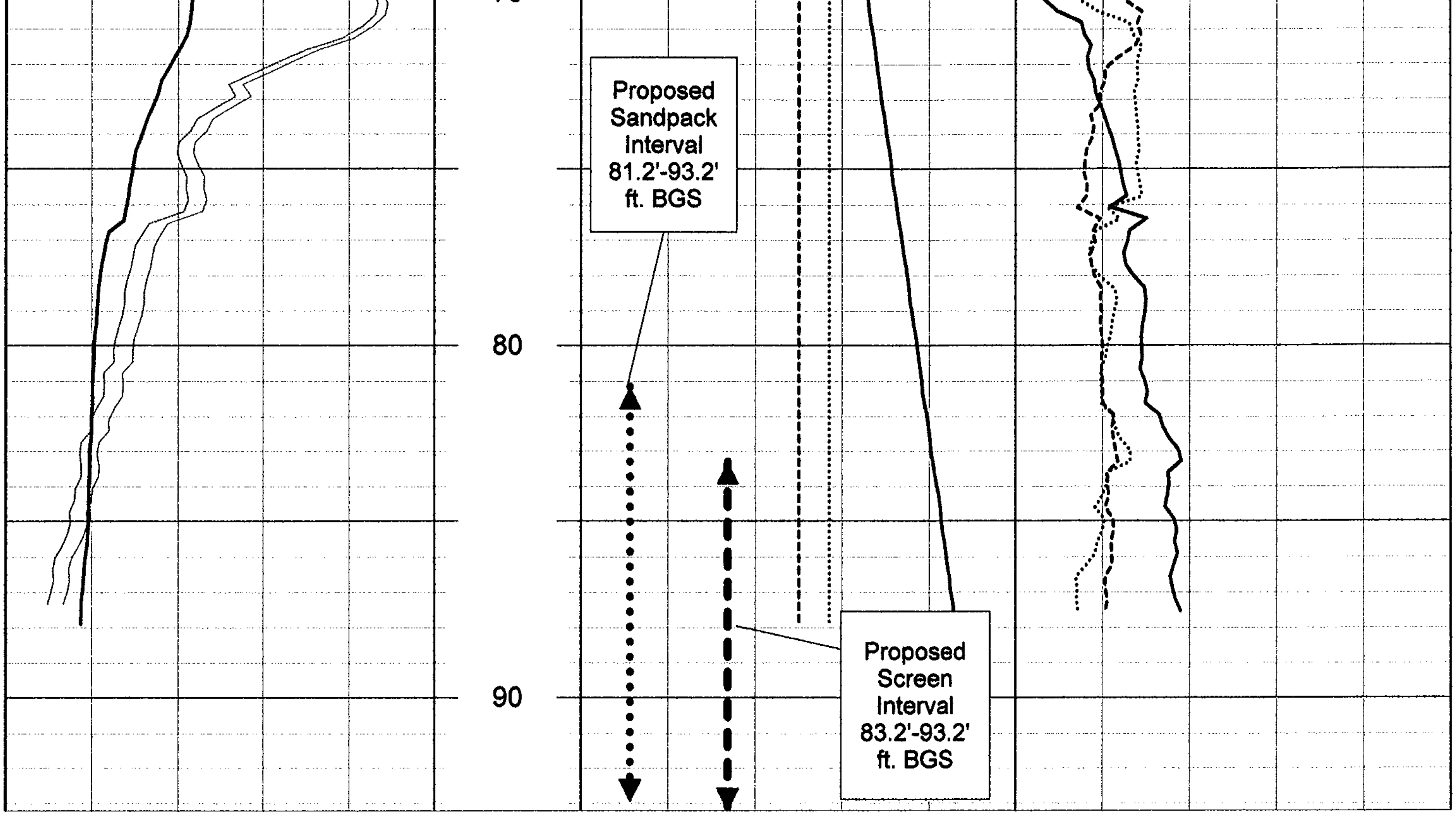
City/State: Rock Hill, South Carolina		
Date: 08/22/07	Time: 12:55	
System Configuration: Mount Sopris with ammonia option		
Water Level: 11.65'	Measured From: GS at ~ 11:15 08/22	
Outer Casing Height AGL (with cap open/removed): -0.65' Type: Steel		
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: GS	Log Speed: 10.8 fpm
Log Top: 21.4'	Log Bottom: 88.0'	Reference Point: Ground Surface
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6.25"	Well Depth: 98.6'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 70.00' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88837161° N	Longitude: -81.07170296° W	

Notes: GPS NAD 83

* fluid conductivity data collected at mS/cm but displayed as uS/cm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Temperature
20 deg C 30
-Fluid Conductiviy-
395 uS/cm* 2005
-Fluid Conductivity 20C-
335 uS/cm* 1785
Depth
1ft:65ft
30
40
50
60
Pressure
0 dBar 25
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
End of Casing
70.00' from GS
Redox
10 mV 75
Chloride
105 mg/L 145
Ammonia
60 mg/L 120



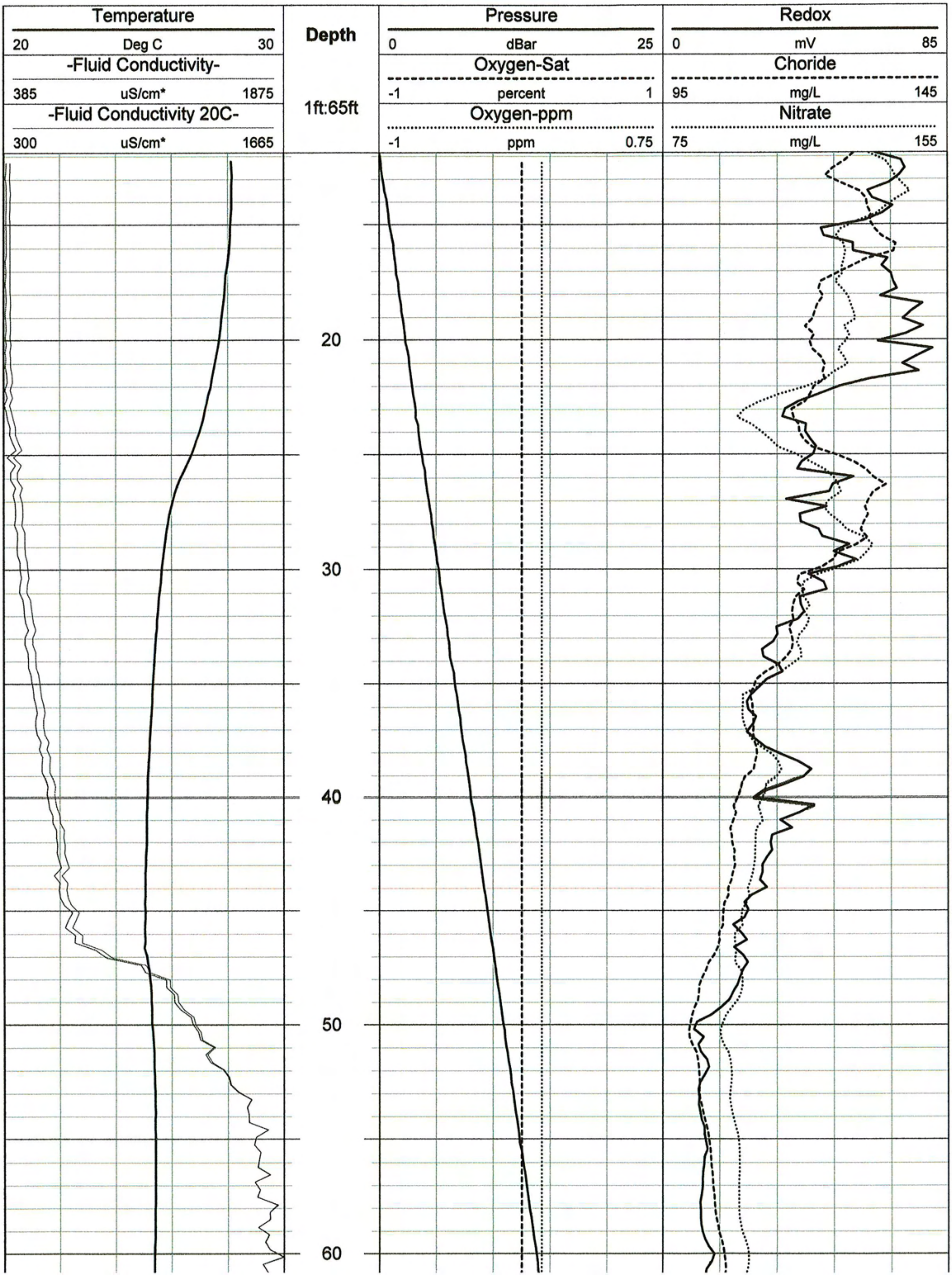
Proposed
Sandpack
Interval
81.2'-93.2'
ft. BGS
80
90
Proposed
Screen
Interval
83.2'-93.2'
ft. BGS

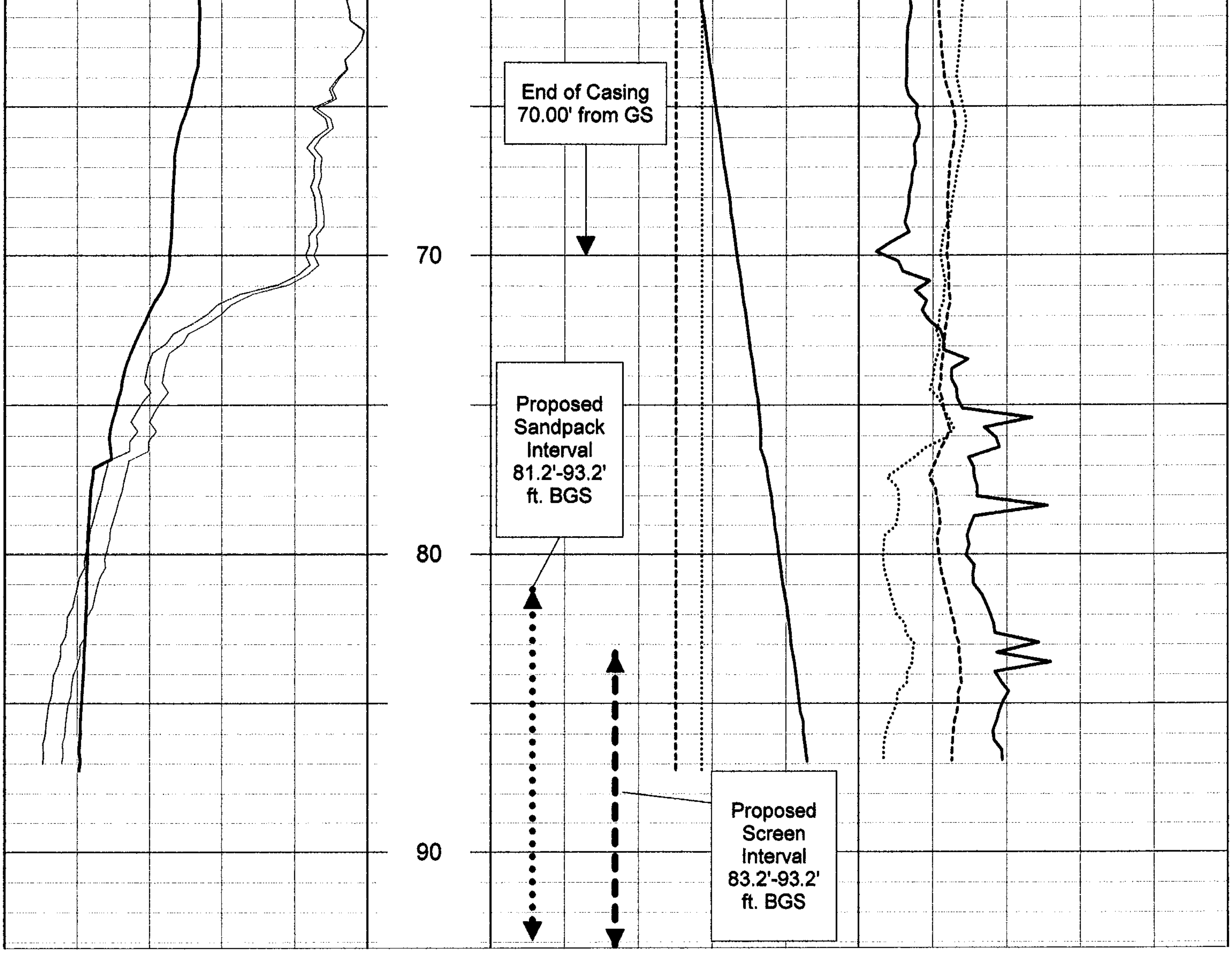
Well:	**RIMW 26**		**Log: 26-B**
Site:	**PSC**		
City/State: Rock Hill, South Carolina			
Date: 08/22/07		Time: 12:18	
System Configuration: Mount Sopris with nitrate option			
Water Level: 11.65'	Measured From: GS at ~ 11:15 08/22		
Outer Casing Height AGL (with cap open/removed): -0.65' Type: Steel			
Inner Casing Ht. ± Outer Casing Ht.: None		Casing Type: N/A	
Log Direction: Down	Measured from: GS		Log Speed: 10.8 fpm
Log Top: 12.3'	Log Bottom: 85.8'	Reference Point: Ground Surface	
Analysis Software: WellCAD	Smoothing Points: Redox = 1		
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV	
Well Diameter: 6.25"	Well Depth: 98.6'	Referenced From: GS	
Casing Material: Steel		Non-Cased Interval: 70.00' to bottom	
Screen Interval: None		Screen Type: N/A	
Latitude: 34.88837161° N		Longitude: -81.07170296° W	

Notes: GPS NAD 83

* fluid conductivity data collected at mS/cm but displayed as uS/cm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Temperature
20 Deg C 30
-Fluid Conductivity-
385 uS/cm* 1875
-Fluid Conductivity 20C-
300 uS/cm* 1665
Depth
1ft:65ft
Pressure
0 dBar 25
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
0 mV 85
Choride
95 mg/L 145
Nitrate
75 mg/L 155
20
30
40
50
60



End of Casing 70.00' from GS
70
Proposed Sandpack Interval 81.2'-93.2' ft. BGS
80
Proposed Screen Interval 83.2'-93.2' ft. BGS
90

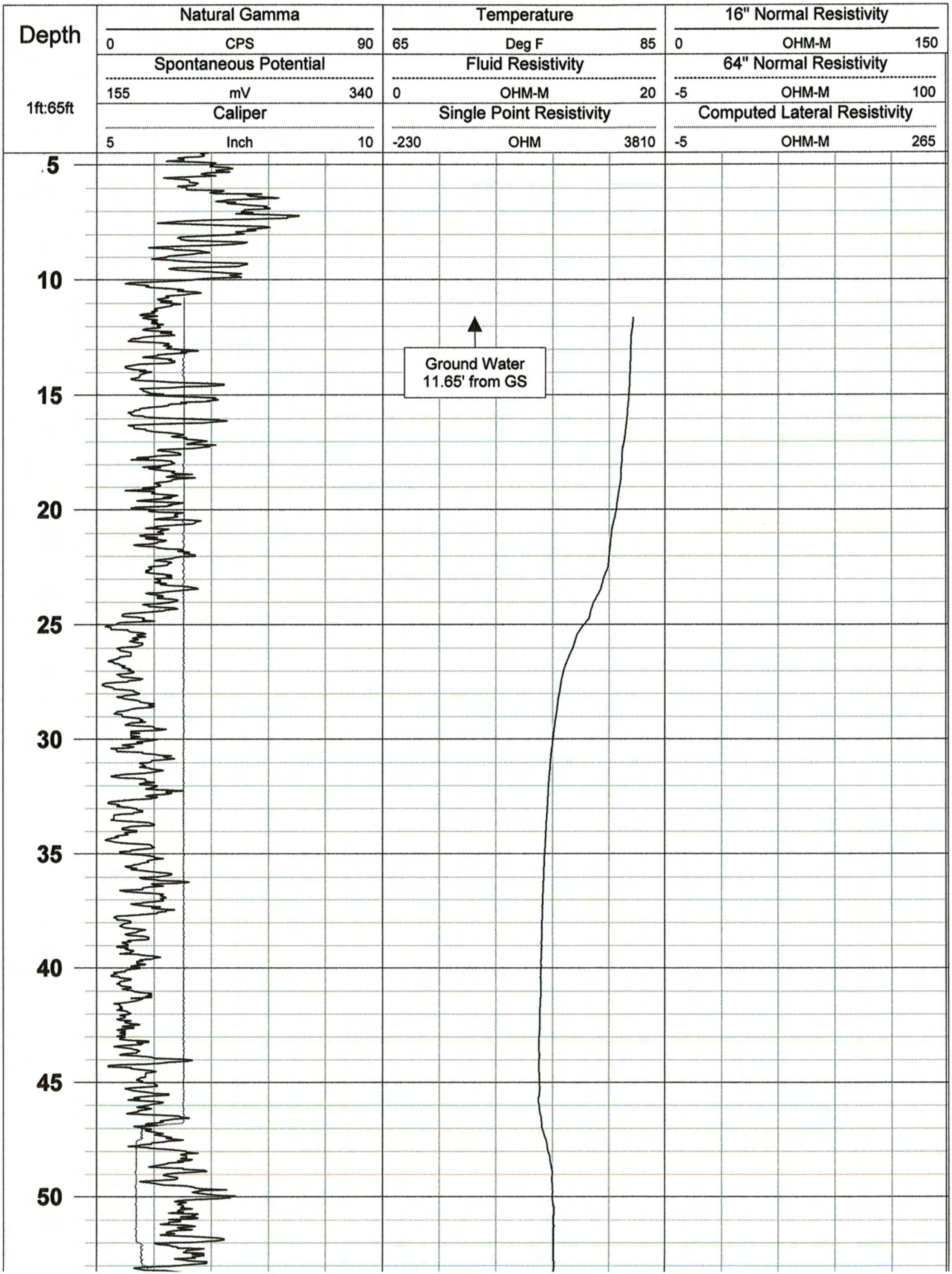
Well: RIMW26 Log: 26-C

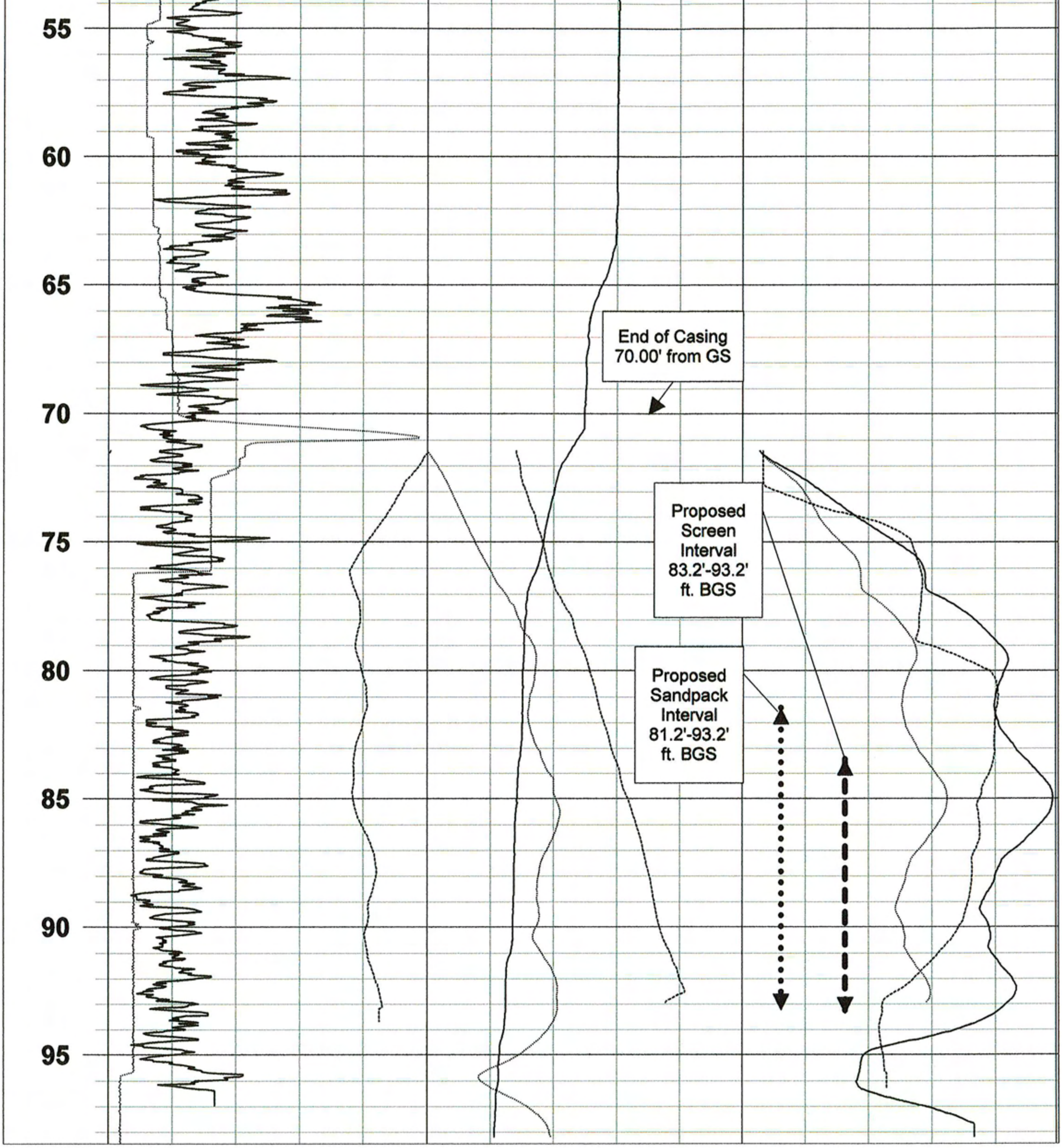
Site: PSC

City/State: Rock Hill, South Carolina		
Date: 08/22/07	Time: See notes	
System Configuration: Century 9041, 9065		
Water Level: 11.65'	Measured From: GS at ~ 11:15 08/22	
Outer Casing Height AGL (with cap open/removed): -0.65'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: GS	Log Speed: see notes
Log Top: 4.5'	Log Bottom: 98.5'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 2IDA
Well Diameter: 6.25"	Well Depth: 98.6'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 70.00' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88837161° N	Longitude: -81.07170296° W	

Notes: GPS values NAD83
Caliper logged up on 08/22/07 @ 14:12; speed ~16 fpm
9041 logged down 08/22/07 @ 15:47; speed ~16 fpm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Depth
1ft:65ft
Natural Gamma
0 CPS 90
Spontaneous Potential
155 mV 340
Caliper
5 Inch 10
Temperature
65 Deg F 85
Fluid Resistivity
0 OHM-M 20
Single Point Resistivity
-230 OHM 3810
16" Normal Resistivity
0 OHM-M 150
64" Normal Resistivity
-5 OHM-M 100
Computed Lateral Resistivity
-5 OHM-M 265
5
10
15
20
25
30
35
40
45
50
Ground Water
11.65' from GS


55
60
65
70
75
80
85
90
95
End of Casing
70.00' from GS
Proposed
Screen
Interval
83.2'-93.2'
ft. BGS
Proposed
Sandpack
Interval
81.2'-93.2'
ft. BGS

Well: RIMW26 Log: 26-D

Site: PSC

City/State: Rock Hill, South Carolina

Date: 08/22/07 | Time: See notes

System Configuration: Century 9041, 9065

Water Level: 11.65' | Measured From: GS at ~ 11:15 08/22

Outer Casing Height AGL (with cap open/removed): -0.65' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: None | Casing Type: N/A

Log Direction: See notes | Measured from: GS | Log Speed: see notes

Log Top: 69.4' | Log Bottom: 98.00' | Reference Point: GS

Analysis Software: WellCAD | Smoothing Points: Natural gamma = 11

Operator: JRU | Witness: None | Other Tools Used: 2EMA; 2IDA

Well Diameter: 6.25" | Well Depth: 98.6' | Referenced From: GS

Casing Material: Steel | Non-Cased Interval: 70.00' to bottom

Screen Interval: None | Screen Type: N/A

Latitude: 34.88837161° N | Longitude: -81.07170296° W

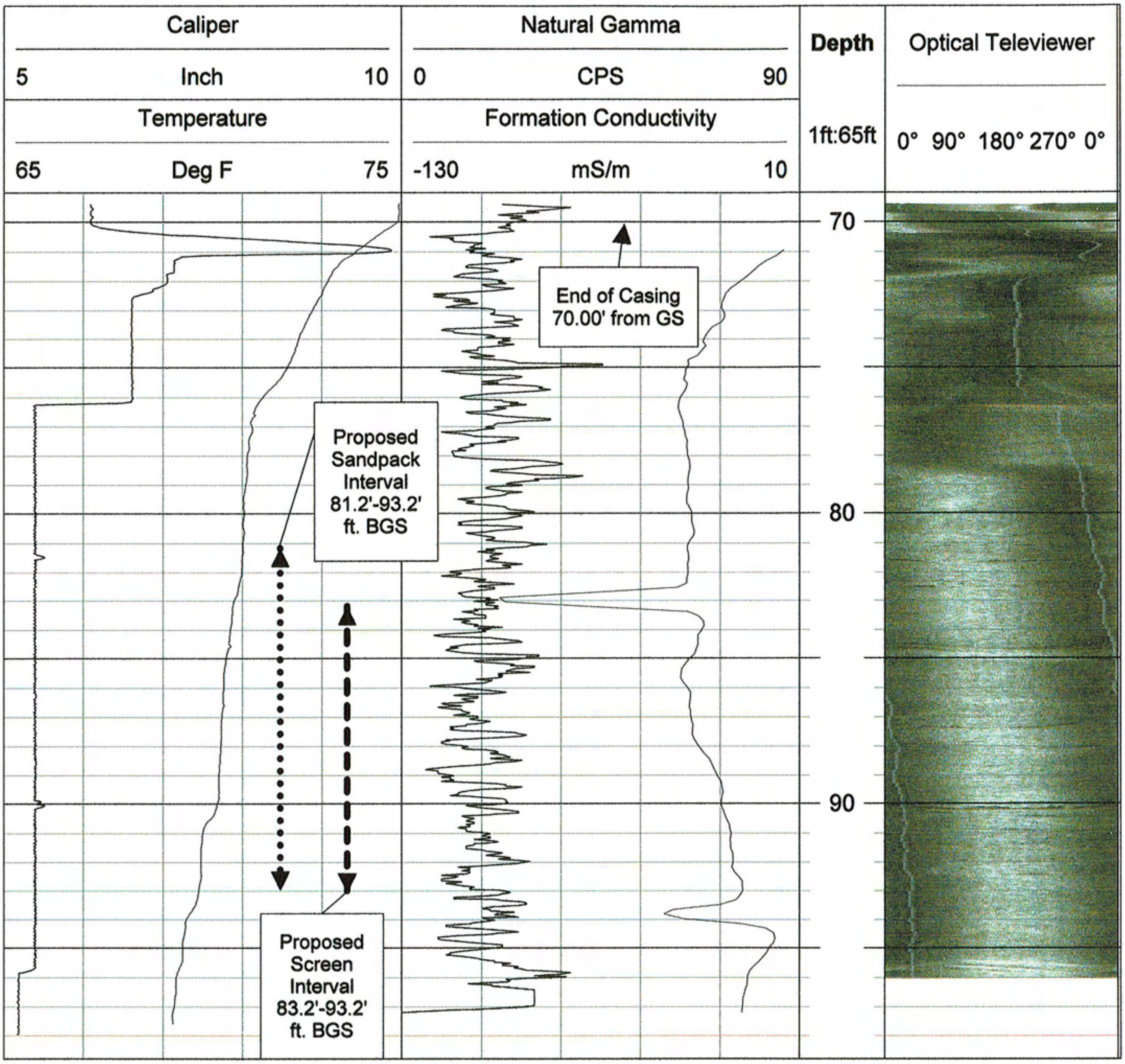
Notes: GPS values NAD83

Formation conductivity logged up at 13:26 on 8/22; speed 14.8 fpm

Caliper logged up at 14:12 on 8/22; speed ~16 fpm

9041 logged down at 14:00 on 8/23; speed ~16 fpm

Optical televiewer logged down at 16:12 on 8/27; speed 2 fpm



Caliper
5
Inch
10
Temperature
65
Deg F
75
Natural Gamma
0
CPS
90
Formation Conductivity
-130
mS/m
10
Depth
1ft:65ft
Optical Televiewer
0° 90° 180° 270° 0°
70
80
90
End of Casing
70.00' from GS
Proposed
Sandpack
Interval
81.2'-93.2'
ft. BGS
Proposed
Screen
Interval
83.2'-93.2'
ft. BGS

PSC Site
August 22 – 28, 2007
Rock Hill, South Carolina

Well Logs for RIMW 28

Geophysical Logs

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 28 - A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 28 - B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20˚ C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 28 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 28 - D

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m
Optical televiewer – color digital image

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity – Ohm/M
Computed lateral resistivity – Ohm/M

Century 9065 tool

Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool

Ground conductivity - ppt

Mount Sopris ALT OBI-40-2 Tool

Optical televiewer – color digital image

Well:	RIMW 28	Log: 28-A

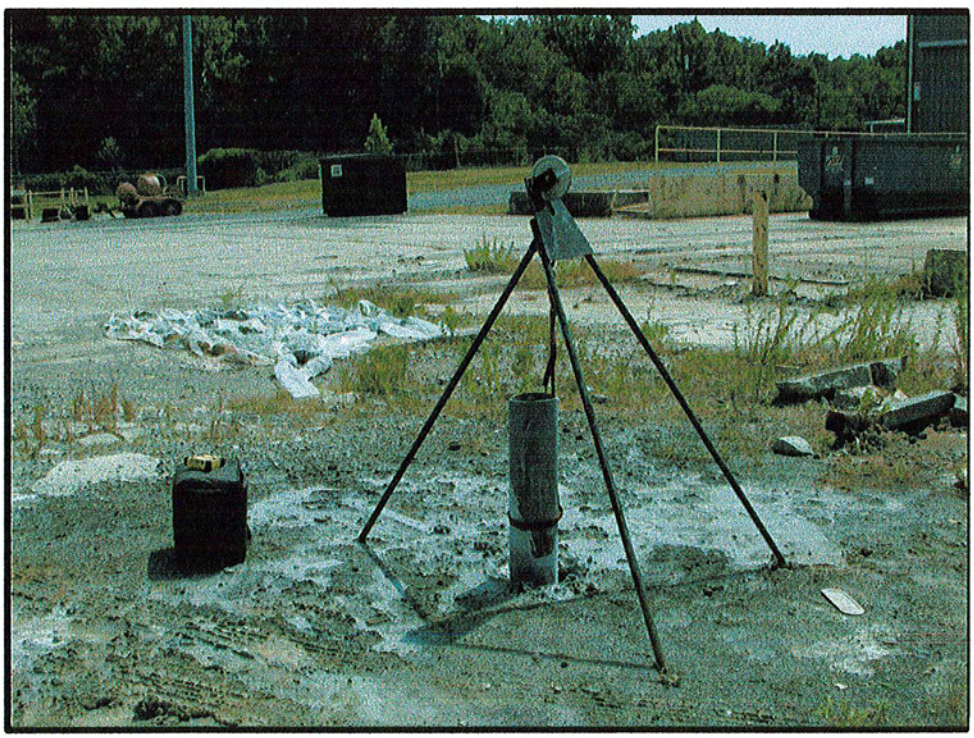
Site:	PSC

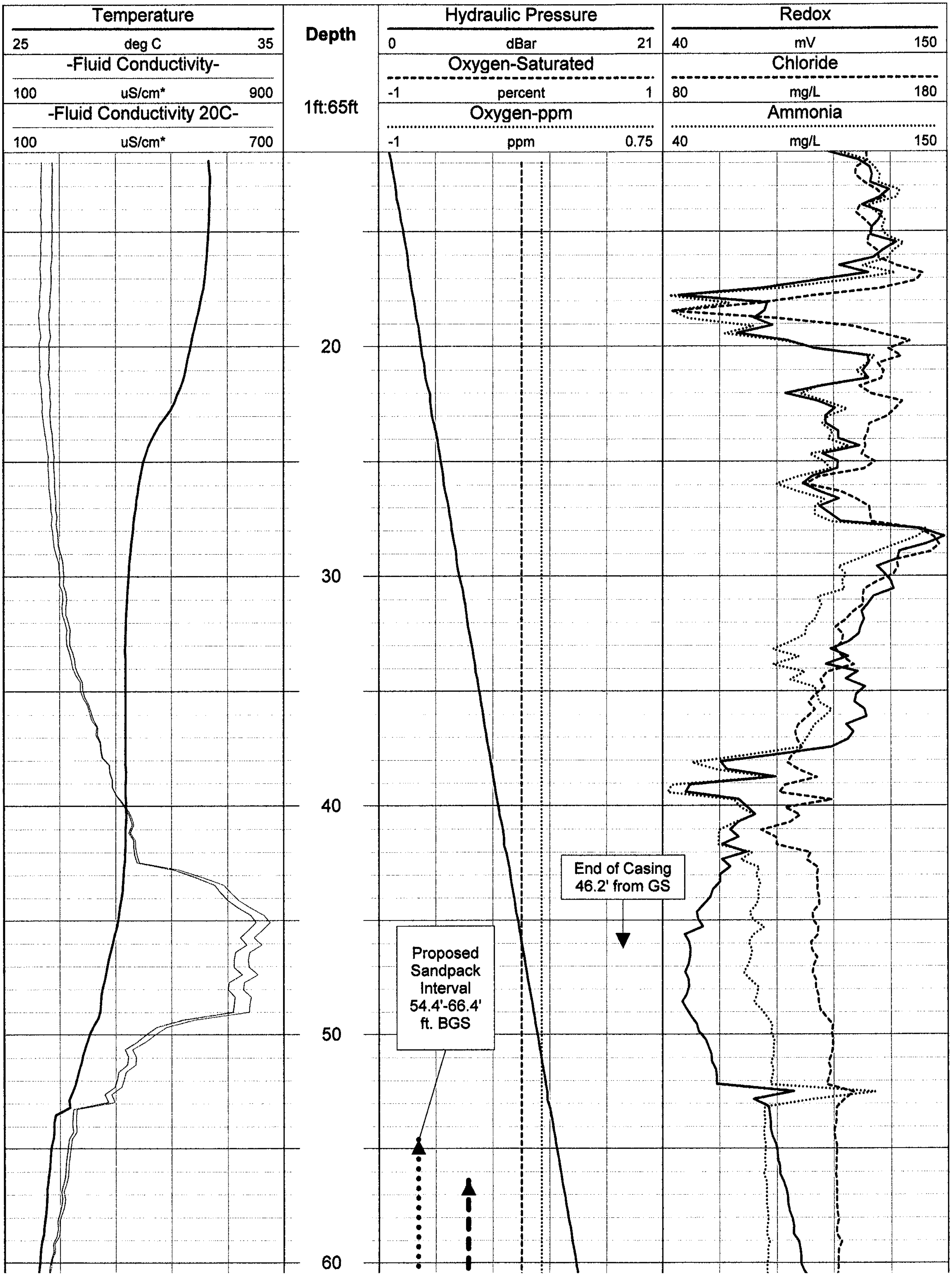
City/State: Rock Hill, South Carolina		
Date: 8/23/07	Time: 14:50	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 6.63'	Measured From: GS at ~ 14:15 on 8/23	
Outer Casing Height AGL (with cap open/removed): 2.15' Type: Steel		
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: down	Measured from: Ground Surface	Log Speed: 14.4 fpm
Log Top: 11.6'	Log Bottom: 127.8	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"	Well Depth: 75.00'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 46.2' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88824904° N	Longitude: -81.07256796° W	

Notes: GPS values; NAD83

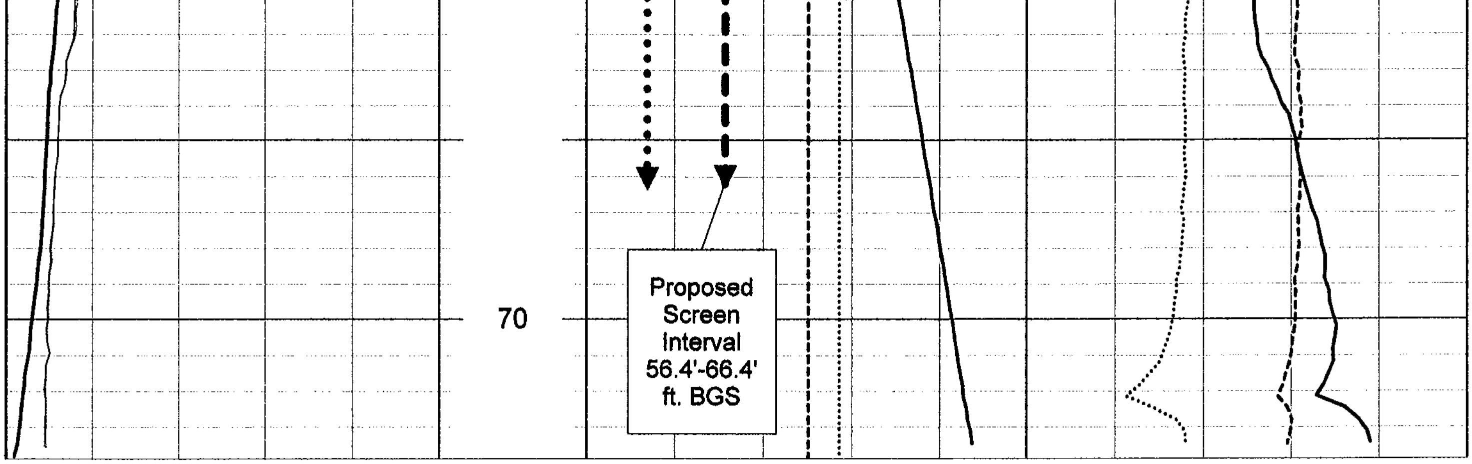
* fluid conductivity data collected at mS/cm but displayed at uS/cm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Temperature
25 deg C 35
-Fluid Conductivity-
100 uS/cm* 900
-Fluid Conductivity 20C-
100 uS/cm* 700
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 21
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
40 mV 150
Chloride
80 mg/L 180
Ammonia
40 mg/L 150
20
30
40
50
60
End of Casing 46.2' from GS
Proposed Sandpack Interval 54.4'-66.4' ft. BGS



70
Proposed
Screen
Interval
56.4'-66.4'
ft. BGS

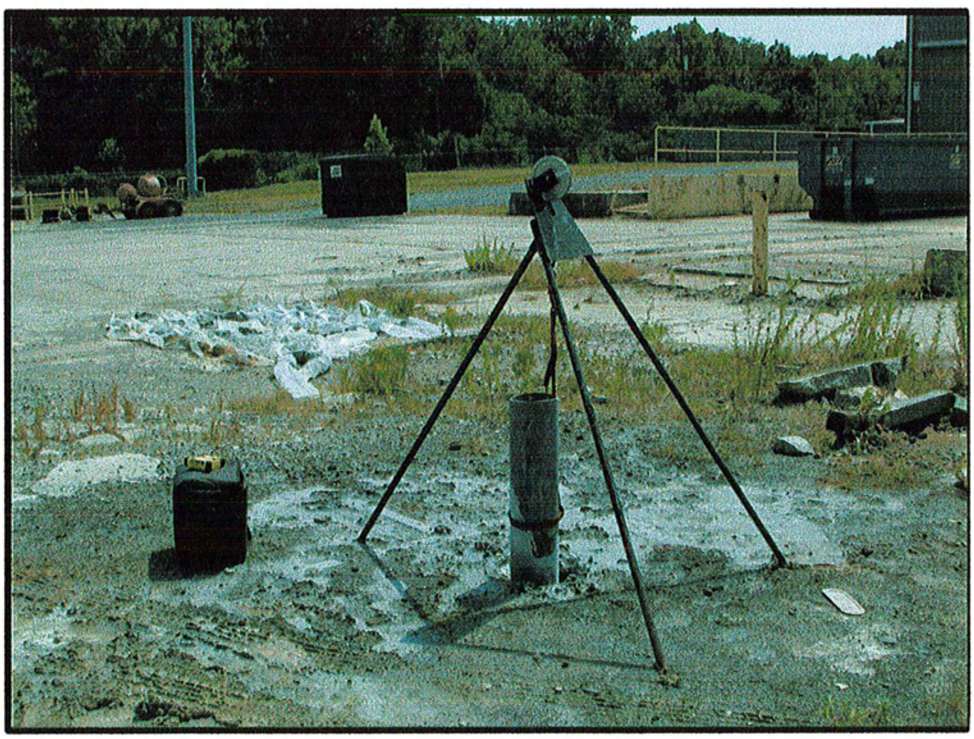
Well:	**RIMW 28**	**Log: 28-B**

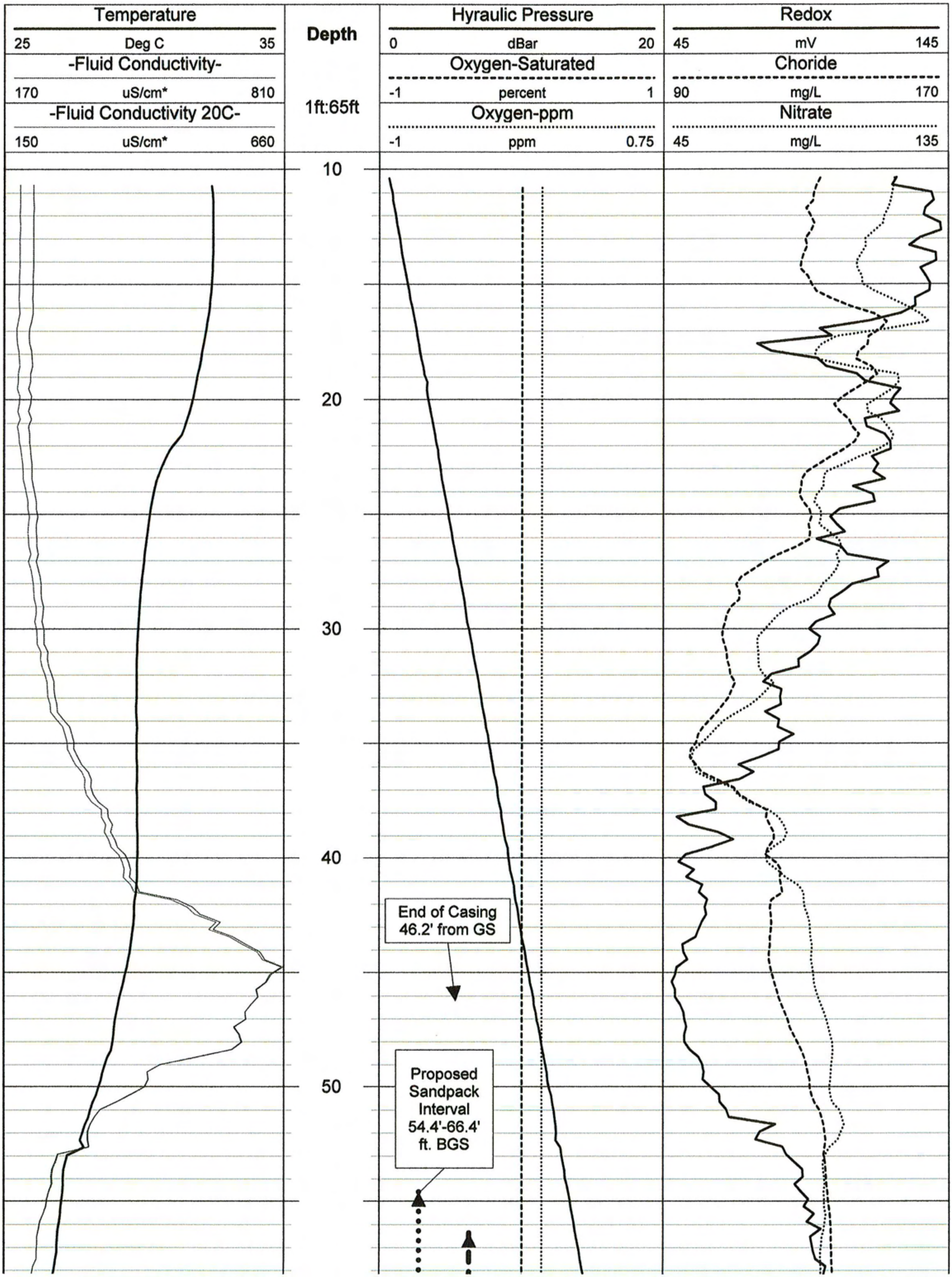
Site:	**PSC**

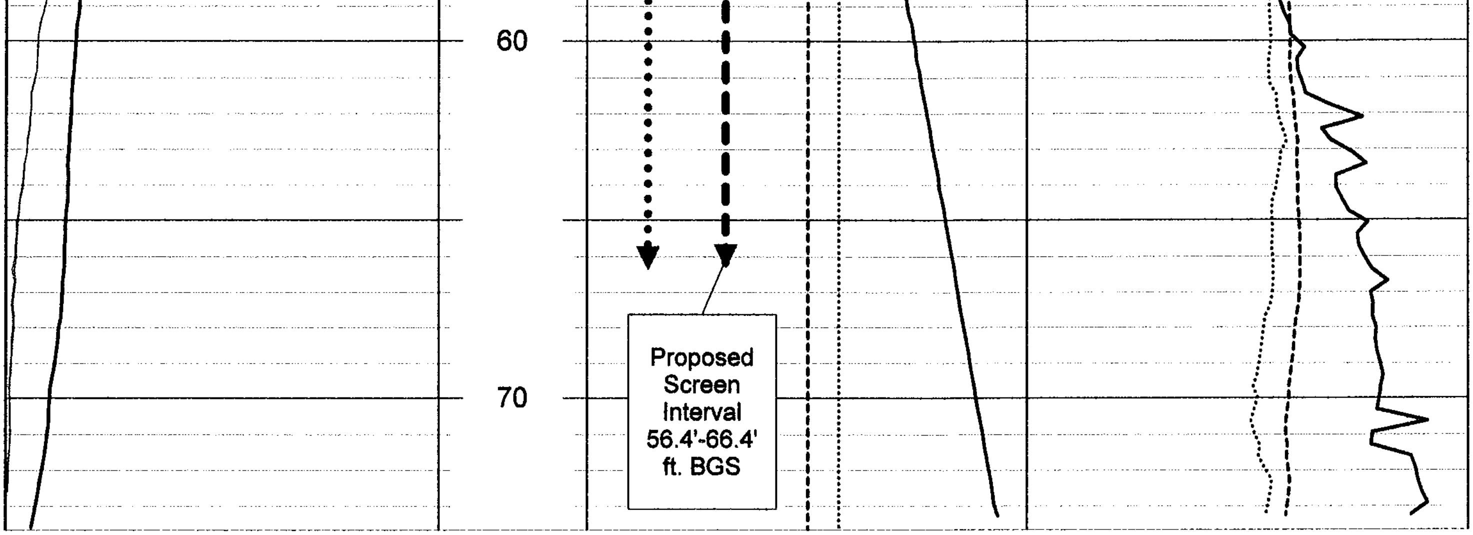
City/State: Rock Hill, South Carolina		
Date: 8/23/07	Time: 14:25	
System Configuration: Mount Sopris 2IDA with nitrate option		
Water Level: 6.63'	Measured From: GS at ~ 14:15 on 8/23	
Outer Casing Height AGL (with cap open/removed): 2.15' Type: Steel		
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: down	Measured from: Ground Surface	Log Speed: 11.8 fpm
Log Top: 10.4'	Log Bottom: 73.7'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"	Well Depth: 75.00'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 46.2' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88824904° N	Longitude: -81.07256796° W	

Notes: GPS values; NAD83

* fluid conductivity data collected at mS/cm but displayed at uS/cm




Temperature
25 Deg C 35
-Fluid Conductivity-
170 uS/cm* 810
-Fluid Conductivity 20C-
150 uS/cm* 660
Depth
1ft:65ft
Hyraulic Pressure
0 dBar 20
Oxygen-Saturated
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
45 mV 145
Choride
90 mg/L 170
Nitrate
45 mg/L 135
10
20
30
40
50
End of Casing 46.2' from GS
Proposed Sandpack Interval 54.4'-66.4' ft. BGS


60
70
Proposed Screen Interval 56.4'-66.4' ft. BGS

Well:	**RIMW 28**	**Log: 28-C**
Site:	**PSC**	

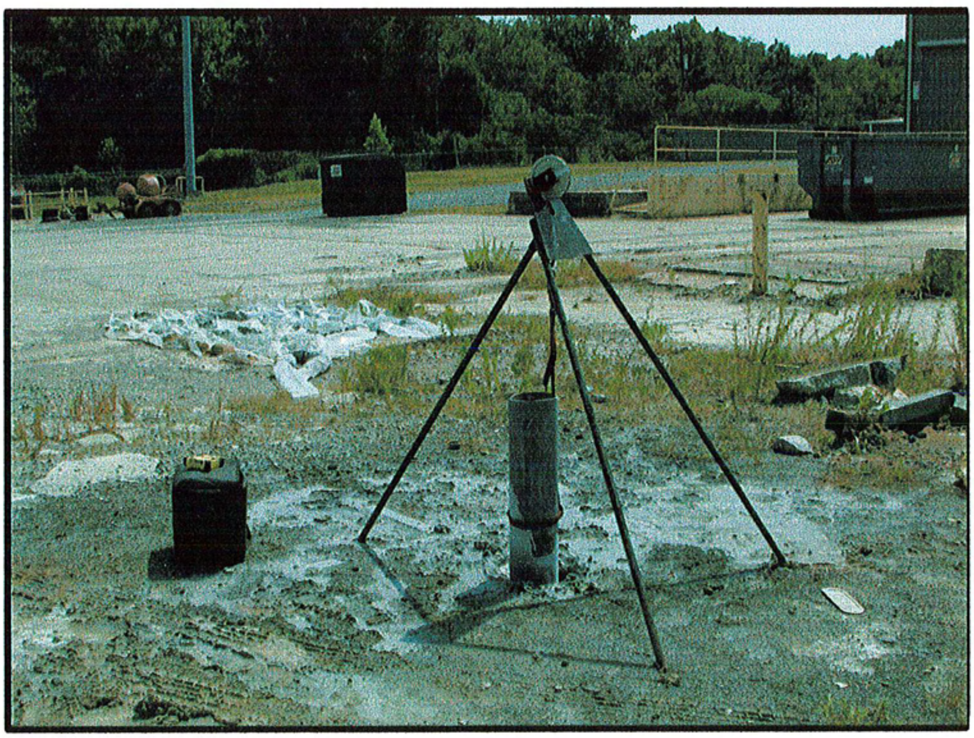
City/State: Rock Hill, South Carolina		
Date: 8/23/07	Time: See notes	
System Configuration: Century 9041 & 9065		
Water Level: 6.63'	Measured From: GS at ~ 14:15 on 8/23	
Outer Casing Height AGL (with cap open/removed): 2.15'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: Ground Surface	Log Speed: see notes
Log Top: 8.8'	Log Bottom: 127.8	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 2IDA; OTV
Well Diameter: 6"	Well Depth: 75.00'	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 46.2' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88824904° N	Longitude: -81.07256796° W	

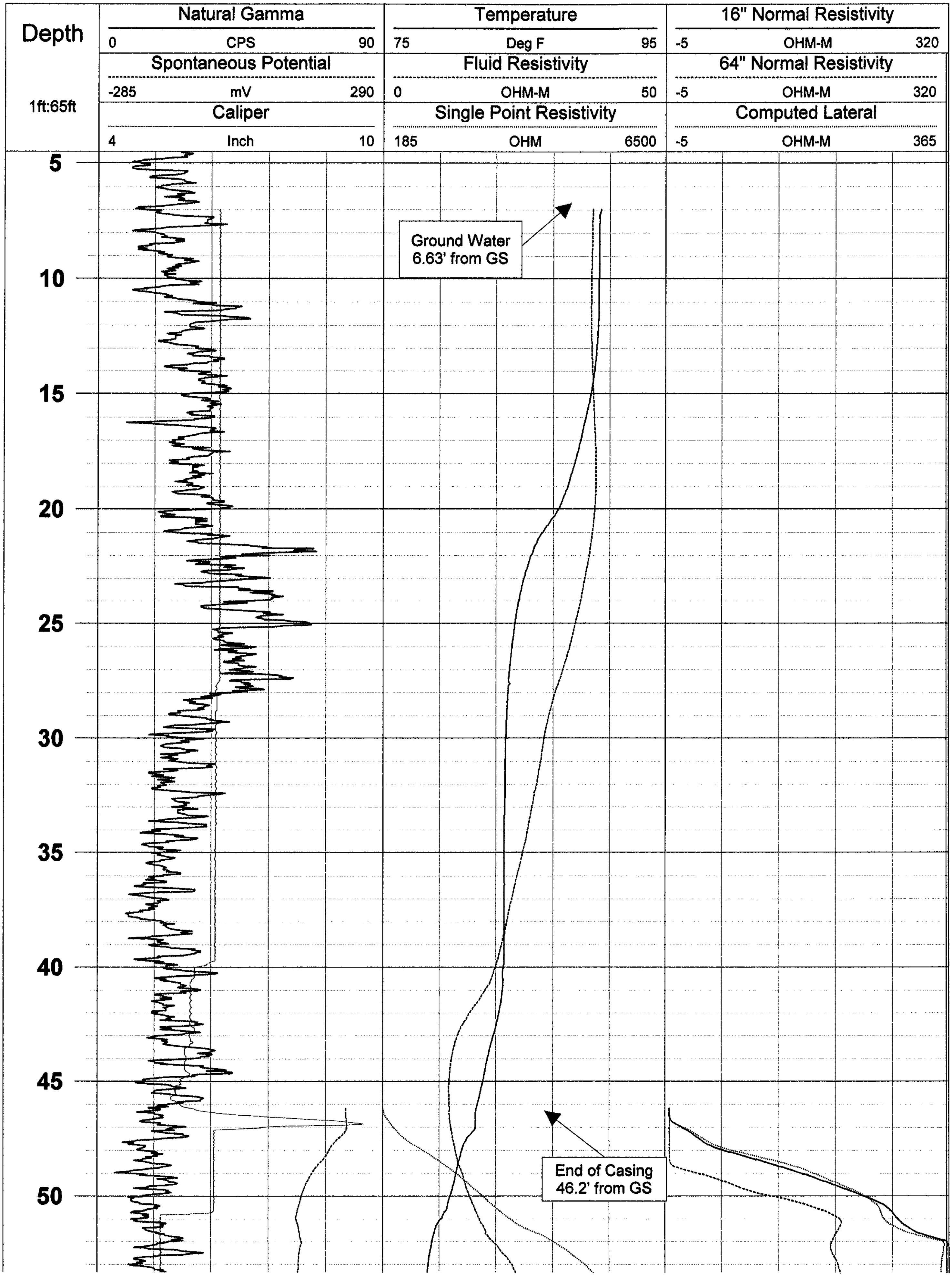
Notes: GPS values; NAD83

Caliper logged up at 15:33 on 8/23; speed 16 fpm

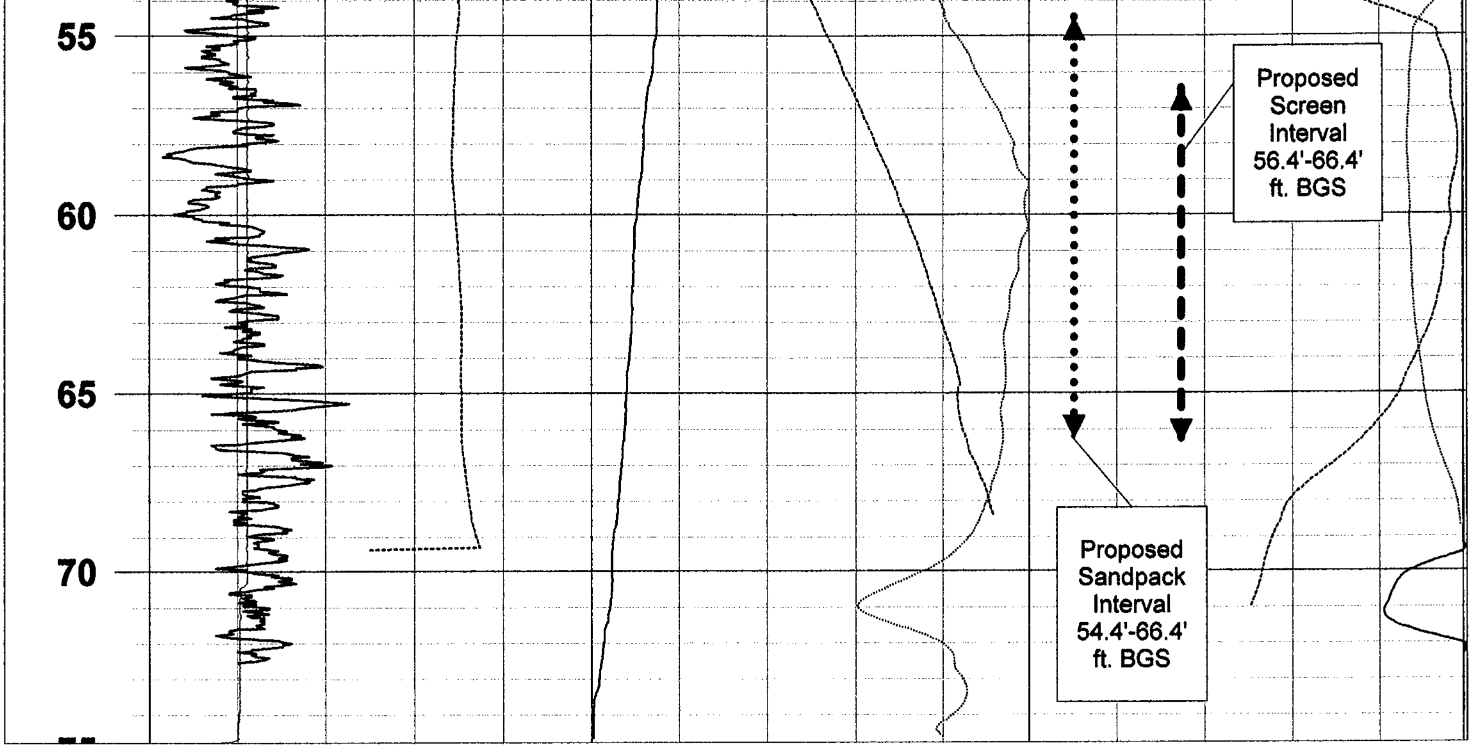
9041 logged down at 16:00 on 8/23; speed 15 fpm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Depth
1ft:65ft
Natural Gamma
0 CPS 90
Spontaneous Potential
-285 mV 290
Caliper
4 Inch 10
Temperature
75 Deg F 95
Fluid Resistivity
0 OHM-M 50
Single Point Resistivity
185 OHM 6500
16" Normal Resistivity
-5 OHM-M 320
64" Normal Resistivity
-5 OHM-M 320
Computed Lateral
-5 OHM-M 365
5
10
15
20
25
30
35
40
45
50
Ground Water
6.63' from GS
End of Casing
46.2' from GS



55
60
65
70
Proposed Screen Interval 56.4'-66.4' ft. BGS
Proposed Sandpack Interval 54.4'-66.4' ft. BGS

Well: RIMW 28 Log: 28-D

Site: PSC

City/State: Rock Hill, South Carolina		
Date: 8/23/07	Time: See notes	
System Configuration: Century and Mount Sopris		
Water Level: 6.63'	Measured From: GS at ~ 14:15 on 8/23	
Outer Casing Height AGL (with cap open/removed): 2.15'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: See notes	Measured from: Ground surface	Log Speed: see notes
Log Top:	Log Bottom:	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11	
Operator: JRU	Witness: none	Other Tools Used: 2IDA
Well Diameter: 6"	Well Depth: 75.00	Referenced From: GS
Casing Material: Steel	Non-Cased Interval: 46.2' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88824904° N	Longitude: -81.07256796° W	

Notes:

GPS values ± 5.71M; NAD83

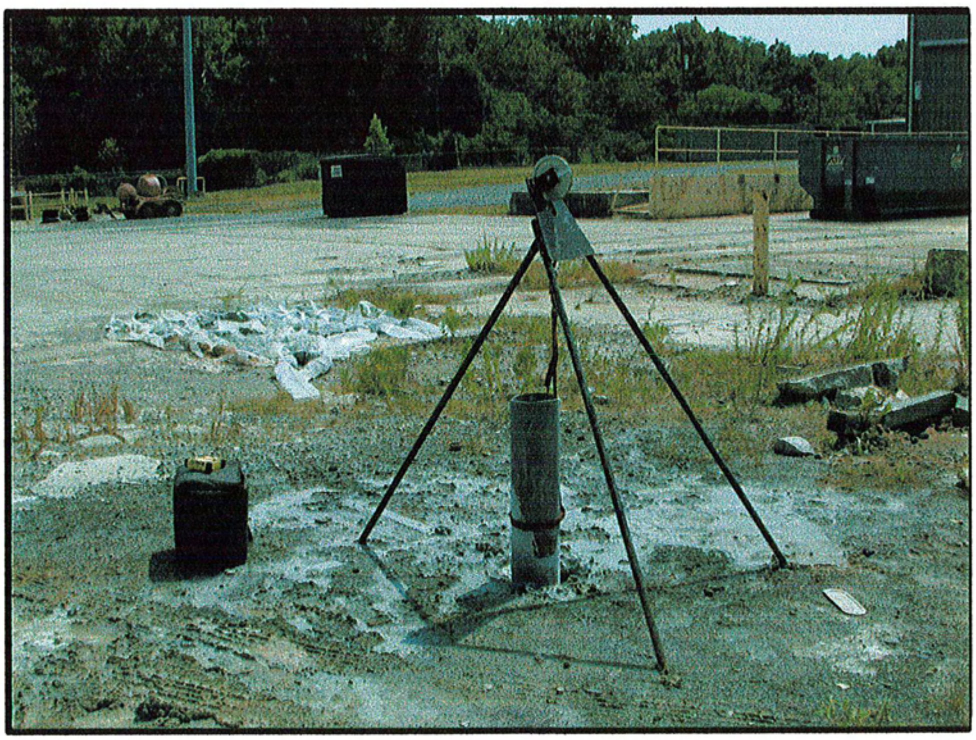
Formation conductivity logged up at 13:25 on 8/23; speed 13.2 fpm

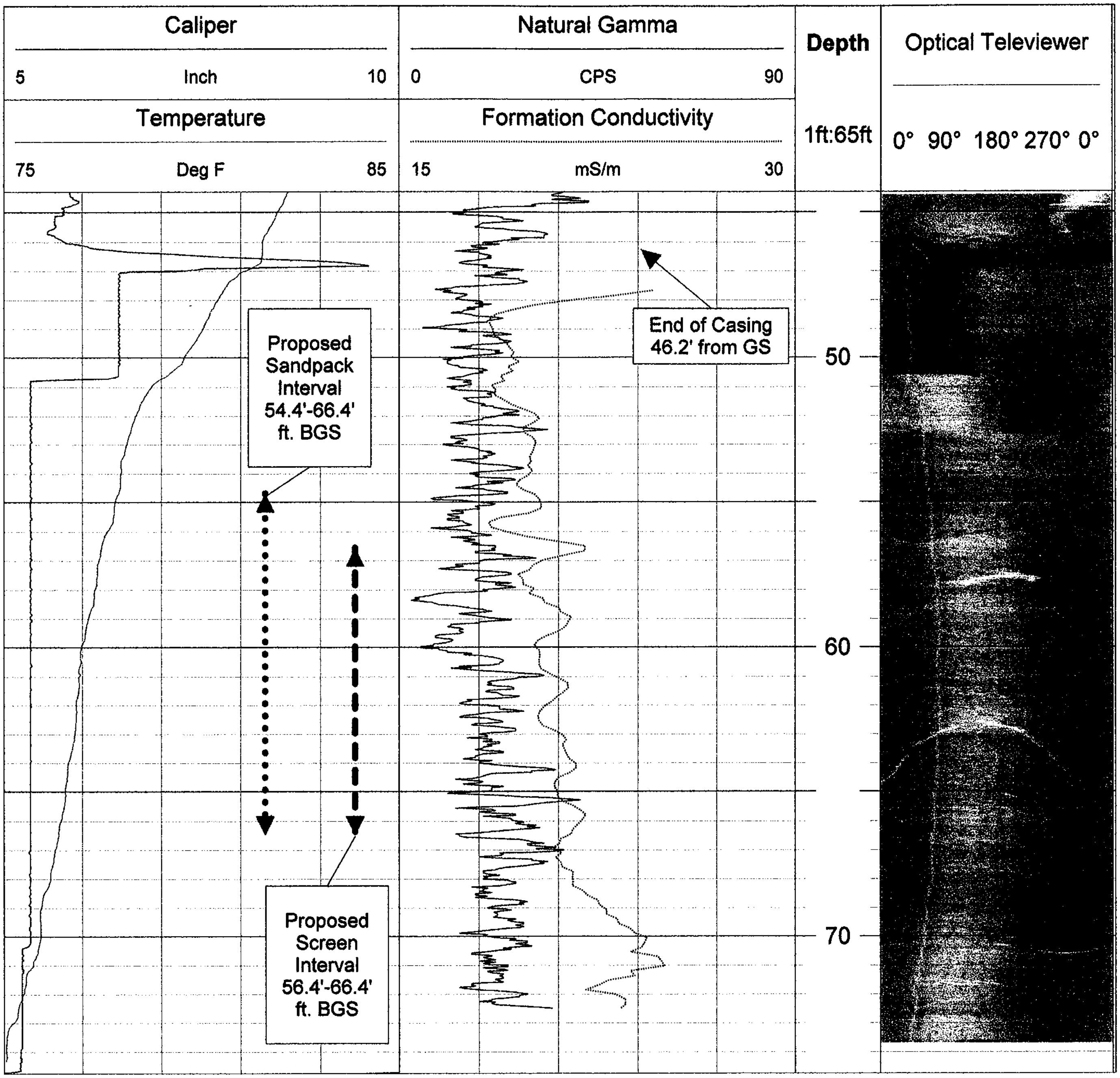
Caliper logged up at 13:33 on 8/23; speed 16 fpm

9041 logged down at 14:00 on 8/23; speed 16 fpm

Optical televiewer logged down at 17:40 on 8/27; speed 2.3 fpm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY





Caliper
5
Inch
10
Temperature
75
Deg F
85
Natural Gamma
0
CPS
90
Formation Conductivity
15
mS/m
30
Depth
1ft:65ft
Optical Televiewer
0° 90° 180° 270° 0°
End of Casing 46.2' from GS
Proposed Sandpack Interval 54.4'-66.4' ft. BGS
Proposed Screen Interval 56.4'-66.4' ft. BGS
50
60
70

PSC Site
August 22 – 28, 2007
Rock Hill, South Carolina

Geophysical Logs

Well Logs for RIMW 29

(note: some logs may have data parameters combined from other tools to improve comprehension)

Log 29 – A

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20° C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L

Log 29 – B

Temperature – degrees Centigrade
Fluid conductivity - µS/cm
Fluid conductivity at 20° C - µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L

Log 29 - C

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity - Ohm/M
Computed lateral resistivity – Ohm/M
Caliper – inches

Log 29 - D

Natural gamma – cps
Caliper, 3-arm - inches
Formation conductivity – mS/m
Optical televiewer – color digital image

List of Individual Logging Tools Used at PSC
and
Selected Parameters

Century 9041 tool

Temperature – degrees Fahrenheit
Natural gamma – cps
Spontaneous potential - mV
Fluid resistivity – Ohm/M
Single point resistivity - Ohm
16 inch normal resistivity – Ohm/M
24 inch normal resistivity – Ohm/M
Computed lateral resistivity – Ohm/M

Century 9065 tool

Caliper, 3-arm - inches

Mount Sopris 2IDA tool – ammonia configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Ammonia – mg/L (option sensor)

Mount Sopris 2IDA tool – nitrate configuration

Temperature – degrees Centigrade
Fluid conductivity – µS/cm
Fluid conductivity at 20˚ C – µS/cm
Hydraulic pressure - dBar
Oxygen – saturated - percent
Oxygen – ppm
Redox - mV
Chloride – mg/L
Nitrate – mg/L (option sensor)

Mount Sopris 2EMA-1000 tool

Formation conductivity – mS/m

Mount Sopris ALT OBI-40-2 Tool

Optical televiewer – color digital image

Well:	**RIMW 29**	**Log: 29-A**

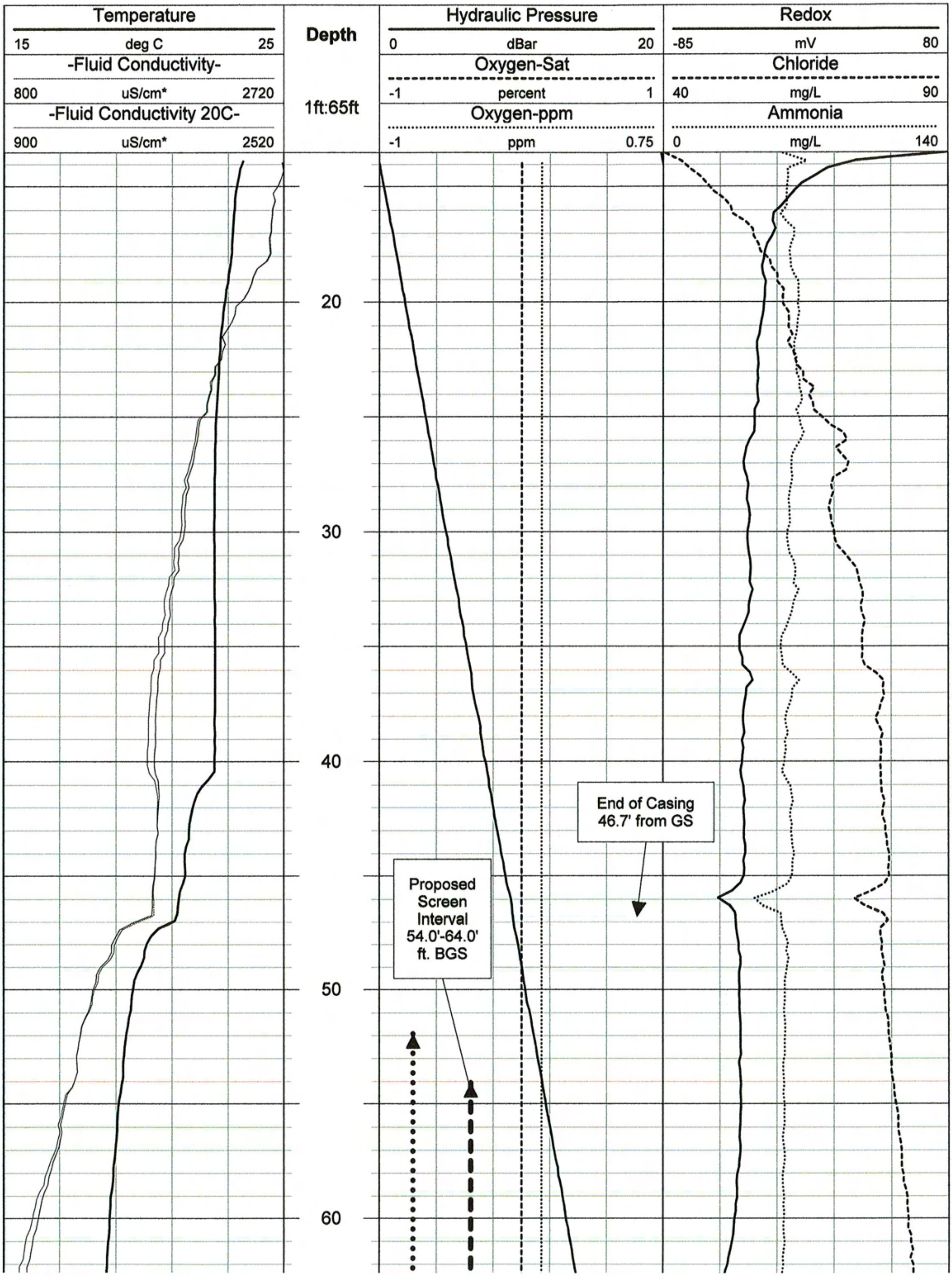
Site:	**PSC**

City/State: Rock Hill, South Carolina		
Date: 8/23/07	Time: 08:13	
System Configuration: Mount Sopris 2IDA with ammonia option		
Water Level: 13.4'	Measured From: GS at ~ 08:00 on 8/23	
Outer Casing Height AGL (with cap open/removed): -1.30'	Type: Steel	
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A	
Log Direction: Down	Measured from: Ground Surface	Log Speed: 13.1 fpm
Log Top: 14	Log Bottom: 73.3'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1	
Operator: JRU	Witness: None	Other Tools Used: 2EMA; 9041&65; OTV
Well Diameter: 6"	Well Depth: 74.35'	Referenced From: GS
Casing Material: None	Non-Cased Interval: 46.7' to bottom	
Screen Interval: None	Screen Type: N/A	
Latitude: 34.88756758° N	Longitude: -81.07156490° W	

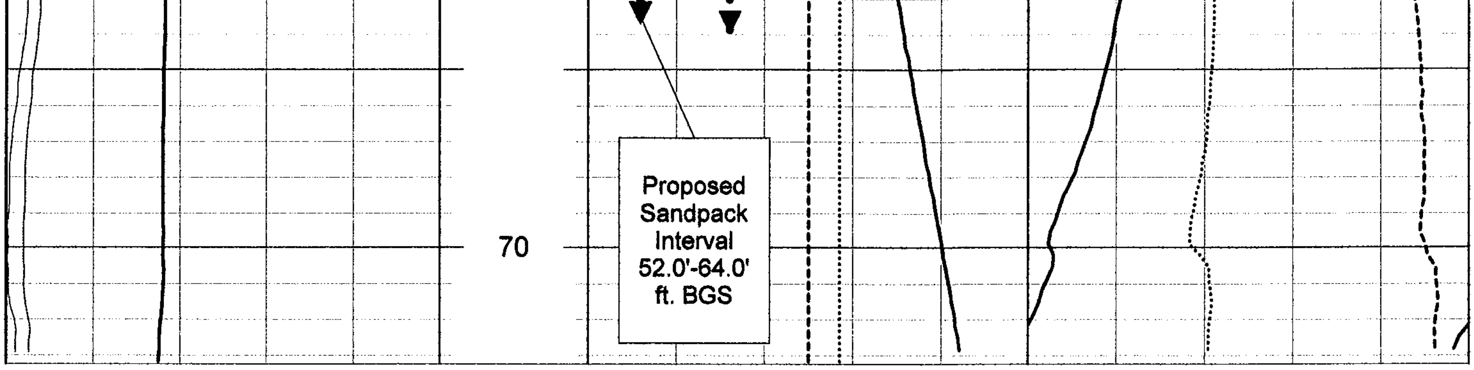
Notes: GPS values; NAD83

* fluid conductivity data collected at mS/cm but displayed at uS/cm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Temperature
15 deg C 25
-Fluid Conductivity-
800 uS/cm* 2720
-Fluid Conductivity 20C-
900 uS/cm* 2520
Depth
1ft:65ft
Hydraulic Pressure
0 dBar 20
Oxygen-Sat
-1 percent 1
Oxygen-ppm
-1 ppm 0.75
Redox
-85 mV 80
Chloride
40 mg/L 90
Ammonia
0 mg/L 140
20
30
40
50
60
End of Casing 46.7' from GS
Proposed Screen Interval 54.0'-64.0' ft. BGS


70
Proposed
Sandpack
Interval
52.0'-64.0'
ft. BGS

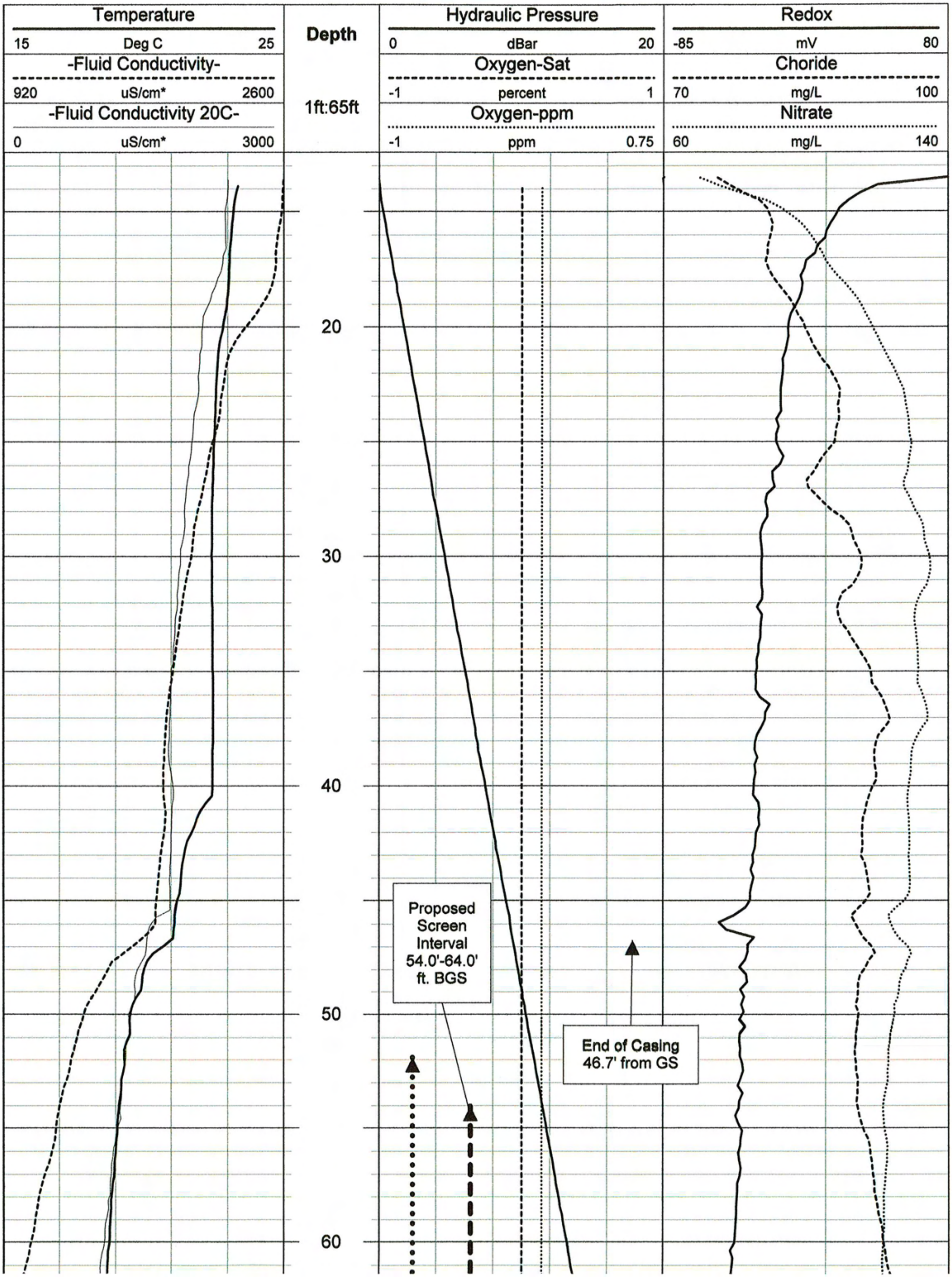
Well: RIMW 29 Log: 29-B

Site: PSC

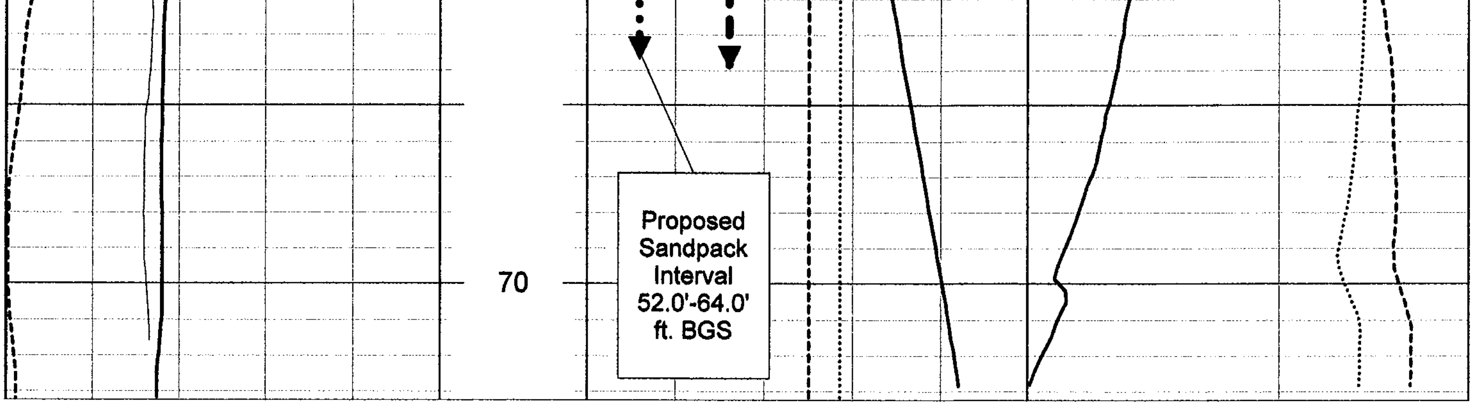
City/State: Rock Hill, South Carolina	
Date: 8/23/07	Time: 08:40
System Configuration: Mount Sopris 2IDA with nitrate option	
Water Level: 13.4'	Measured From: GS at ~ 08:00 on 8/23
Outer Casing Height AGL (with cap open/removed): -1.30'	Type: Steel
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A
Log Direction: Down	Measured from: Ground Surface; Log Speed: 17 fpm
Log Top: 14'; Log Bottom: 73.3'	Reference Point: GS
Analysis Software: WellCAD	Smoothing Points: Redox = 1
Operator: JRU; Witness: None	Other Tools Used: 2EMA; 9041&65;OTV
Well Diameter: 6"; Well Depth: 74.35'	Referenced From: GS
Casing Material: None	Non-Cased Interval: 46.7' to bottom
Screen Interval: None	Screen Type: N/A
Latitude: 34.88756758° N	Longitude: -81.07156490° W

Notes: GPS values; NAD83

* fluid conductivity data collected at mS/cm but displayed at uS/cm



Temperature
15
Deg C
25
-Fluid Conductivity-
920
uS/cm*
2600
-Fluid Conductivity 20C-
0
uS/cm*
3000
Depth
1ft:65ft
Hydraulic Pressure
0
dBar
20
Oxygen-Sat
-1
percent
1
Oxygen-ppm
-1
ppm
0.75
Redox
-85
mV
80
Choride
70
mg/L
100
Nitrate
60
mg/L
140
20
30
40
50
60
Proposed Screen Interval 54.0'-64.0' ft. BGS
End of Casing 46.7' from GS



70
Proposed
Sandpack
Interval
52.0'-64.0'
ft. BGS

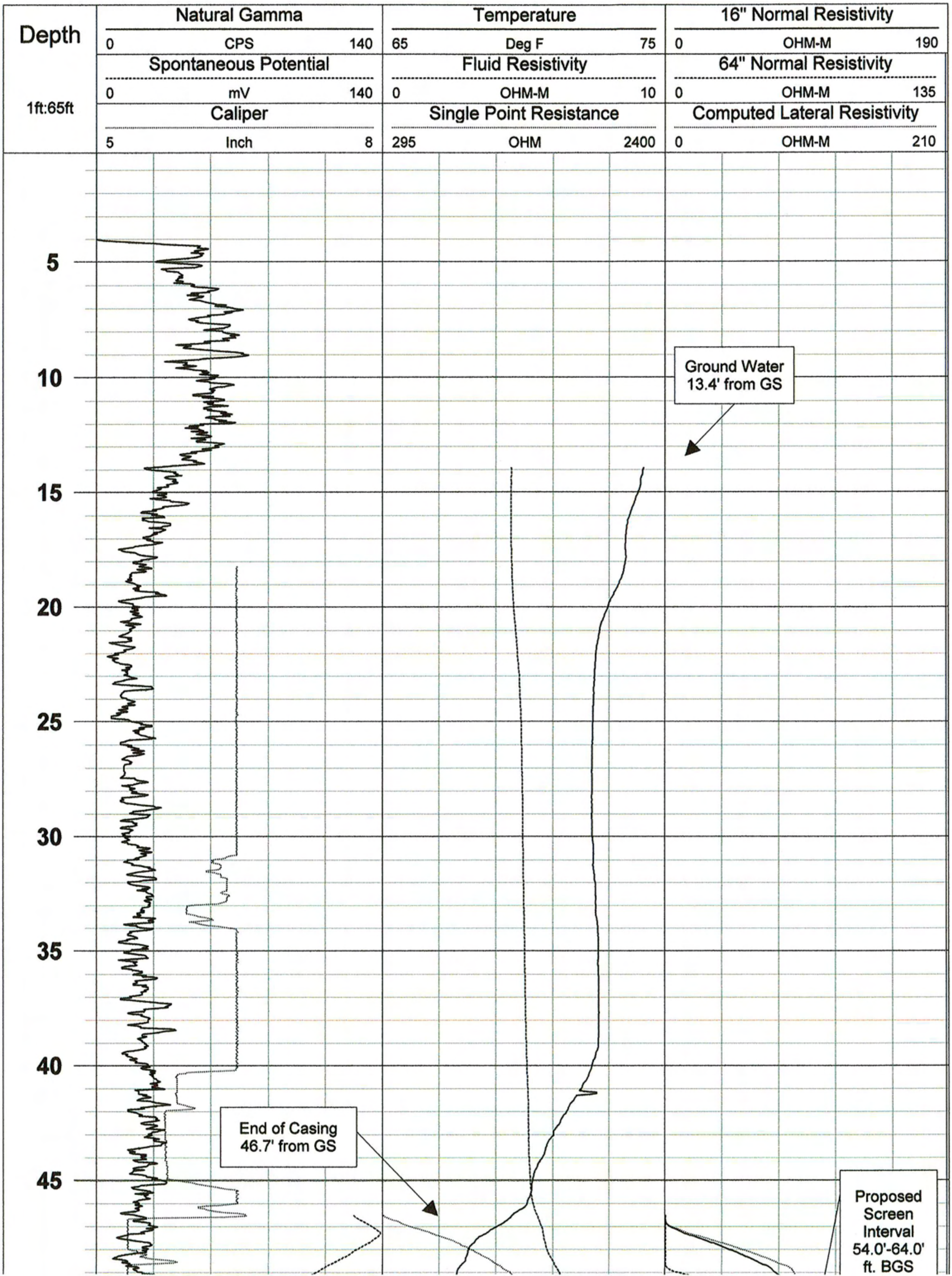
Well: RIMW 29 Log: 29-C

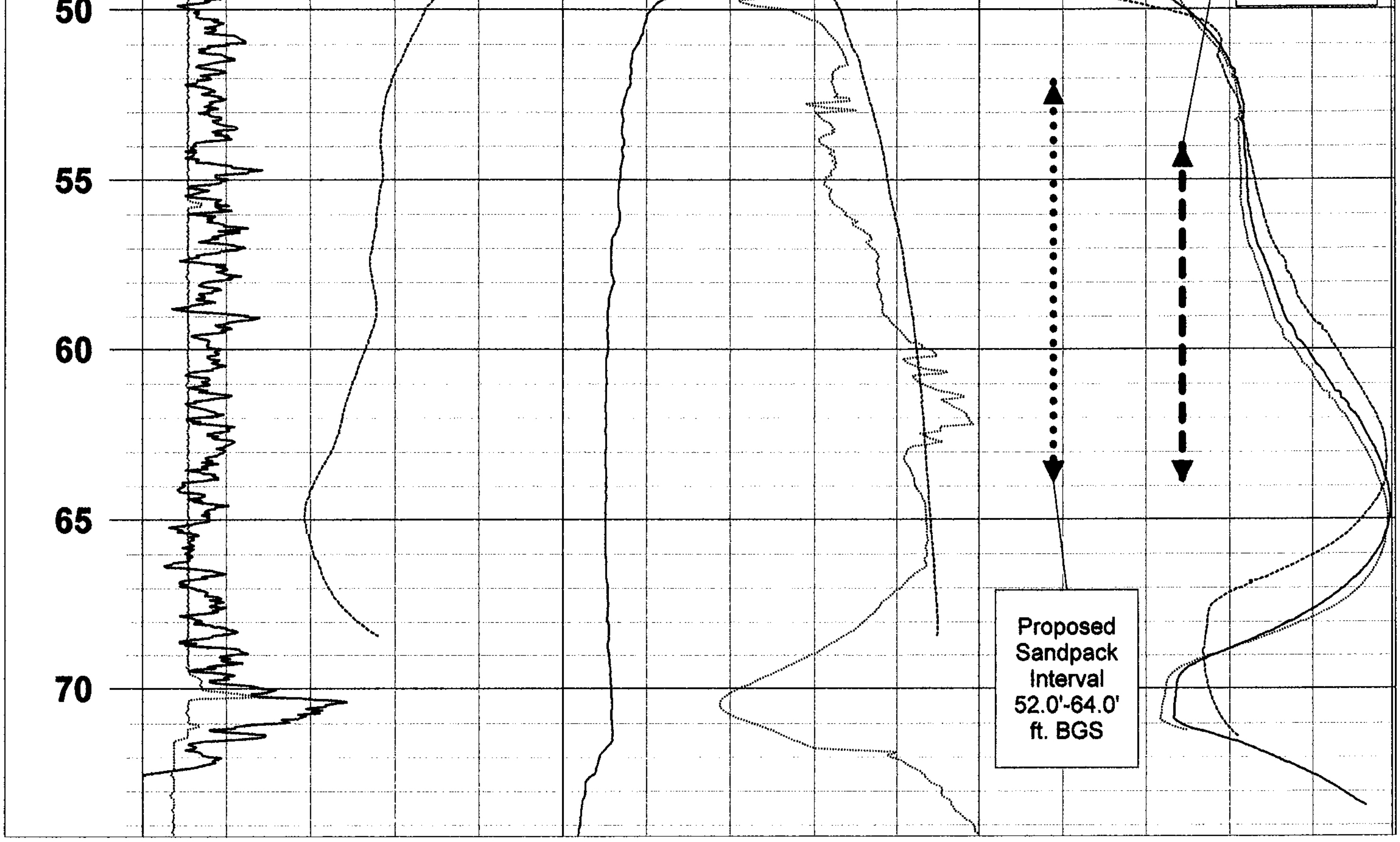
Site: PSC

City/State: Rock Hill, South Carolina	
Date: 8/23/07	Time: See notes
System Configuration: Century 9041 & 9065	
Water Level: 13.4'	Measured From: GS at ~ 08:00 on 8/23
Outer Casing Height AGL (with cap open/removed): -1.30'	Type: Steel
Inner Casing Ht. ± Outer Casing Ht.: None	Casing Type: N/A
Log Direction: See notes	Measured from: Ground Surface
Log Speed: see notes	
Log Top: 4.2'	Log Bottom: 74.3'
Reference Point: GS	
Analysis Software: WellCAD	Smoothing Points: Natural gamma = 11
Operator: JRU	Witness: None
Other Tools Used: 2EMA; 2IDA; OTV	
Well Diameter: 6"	Well Depth: 74.35'
Referenced From: GS	
Casing Material: None	Non-Cased Interval: 46.7' to bottom
Screen Interval: None	Screen Type: N/A
Latitude: 34.88756758° N	Longitude: -81.07156490° W

Notes: GPS values; NAD83
Caliper logged up at 10:05 on 8/23; speed 17 fpm
9041 logged down at 11:30 on 8/25; speed 16 fpm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


Depth
1ft:65ft
Natural Gamma
0 CPS 140
Spontaneous Potential
0 mV 140
Caliper
5 Inch 8
Temperature
65 Deg F 75
Fluid Resistivity
0 OHM-M 10
Single Point Resistance
295 OHM 2400
16" Normal Resistivity
0 OHM-M 190
64" Normal Resistivity
0 OHM-M 135
Computed Lateral Resistivity
0 OHM-M 210
5
10
15
20
25
30
35
40
45
Ground Water
13.4' from GS
End of Casing
46.7' from GS
Proposed
Screen
Interval
54.0'-64.0'
ft. BGS


50
55
60
65
70
Proposed Sandpack Interval 52.0'-64.0' ft. BGS

Well: RIMW 29	Log: 29-D

Site: PSC

City/State: Rock Hill, South Carolina

Date: 8/23 & 28/07 | Time: See notes

System Configuration: Century 9041, 9065, OTV & Mount Sopris 2EMA

Water Level: 13.4' | Measured From: Ground Surface

Outer Casing Height AGL (with cap open/removed): -1.3' Type: Steel

Inner Casing Ht. ± Outer Casing Ht.: None | Casing Type: N/A

Log Direction: See notes | Measured from: Ground Surface | Log Speed: see notes

Log Top: 45.5' | Log Bottom: | Reference Point: GS

Analysis Software: WellCAD | Smoothing Points: Natureal gamma = 11

Operator: JRU | Witness: None | Other Tools Used: 2IDA

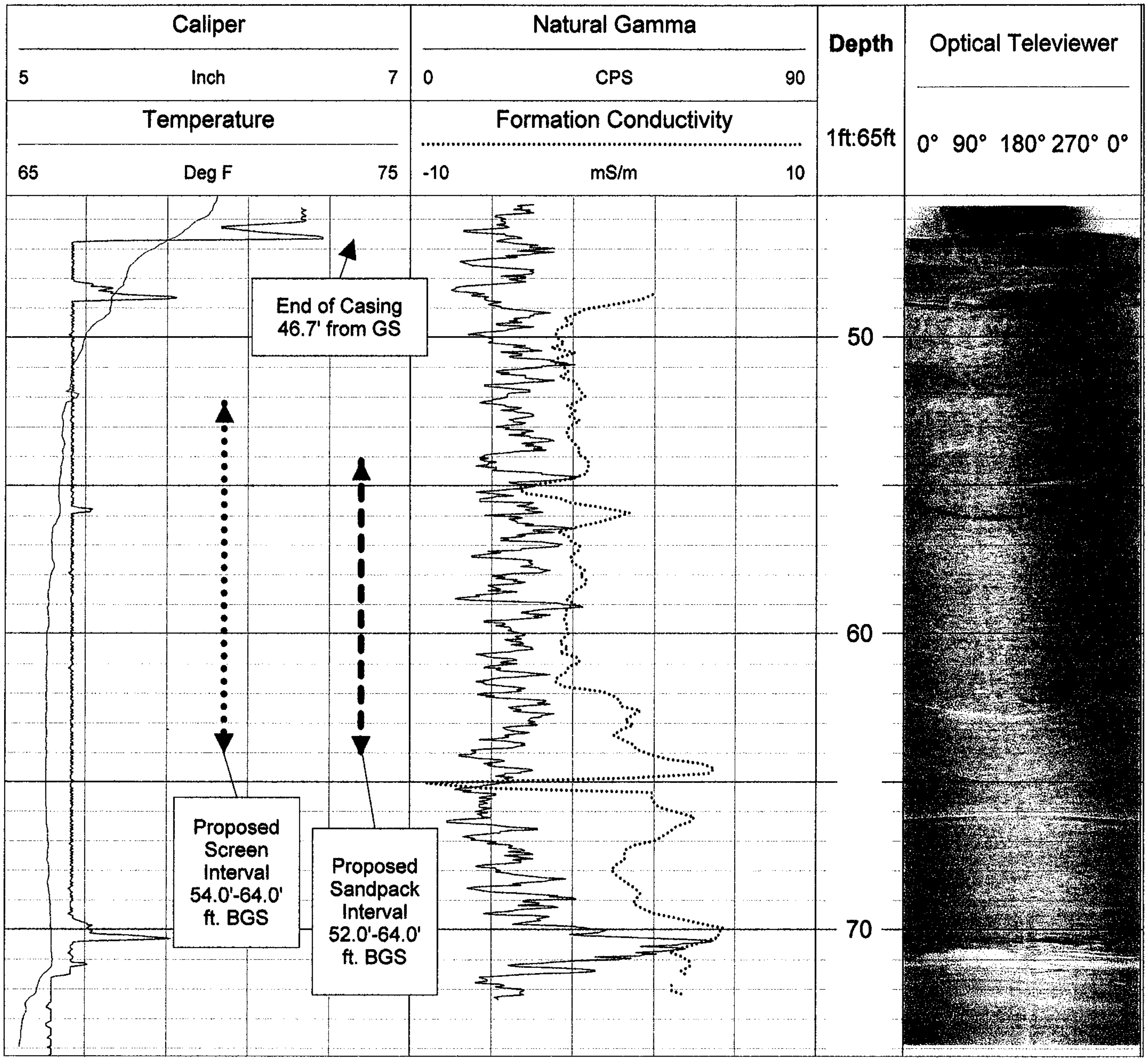
Well Diameter: 6" | Well Depth: 74.35' | Referenced From: GS

Casing Material: None | Non-Cased Interval: 46.7' to bottom

Screen Interval: None | Screen Type: N/A

Latitude: 34.88756758° N | Longitude: -81.07156490° W

Notes: GPS values; NAD83
Formation conductivity logged up at 09:40 on 8/23; speed 11.2 fpm
Caliper logged up at 10:305 on 8/23; speed 17 fpm
9041 logged down at 10:37 on 8/23; speed 16 fpm
Optical televiewer logged down at 08:25on 8/28; speed 2.3 fpm


Caliper
5
Inch
7
Temperature
65
Deg F
75
Natural Gamma
0
CPS
90
Formation Conductivity
-10
mS/m
10
Depth
1ft:65ft
Optical Televiewer
0° 90° 180° 270° 0°
End of Casing
46.7' from GS
Proposed
Screen
Interval
54.0'-64.0'
ft. BGS
Proposed
Sandpack
Interval
52.0'-64.0'
ft. BGS
50
60
70

Appendix D
Analytical Results

Appendix D
Summary of Analytical Results

PCB - Polychlorinated Biphenyl

SVOC - Semi-Volatile Organic Compound

VOC - Volatile Organic Compound

< indicates that the compound was not detected above the specified reporting limit

Start and end depths are listed in feet below ground surface

Laboratory Qualifiers:

J - Estimated value

J1 - Estimated value: surrogate recovery failed to meet established criteria.

J2 - Estimated value: sample result above the method detection limit but below the reporting limit.

M - Estimated value: a matrix effect was determined to be present in the sample.

D-1 Phase I Soil

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																
			1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-1	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-2	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-2-DUP	0	1	< 9.9	< 410	< 9.9	< 9.9	< 9.9	< 9.9	< 410	< 410	< 9.9	< 9.9	24.9 J2	71	< 9.9	< 410	23.2 J2	< 9.9	< 9.9
RISB-2	9	13	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	110	780	< 11	20	20	5200	< 11
RISB-2	17	21	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	350 J2	< 480	< 480	< 480	530	< 480
RISB-3	0	1	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8
RISB-3	9	13	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-4	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-4	5	9	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	2.5 J2	< 9.7	< 9.7	< 9.7	< 9.7	15	< 9.7
RISB-5	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-5	5	9	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3
RISB-6	0	1	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	120 J2	< 450
RISB-6	13	15	< 9.2	< 9.2	< 9.2	< 9.2	2.7 J2	8.1 J2	< 9.2	< 9.2	< 9.2	< 9.2	1.2 J2	2 J2	< 9.2	< 9.2	0.72 J2	< 9.2	< 9.2
RISB-7	0	1	< 12	< 12	< 12	< 12	< 12	6.7 J2	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
RISB-7	1	5	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	9.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7
RISB-8	0	1	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-8	5	8	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-9	0	1	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5
RISB-9	5	9	2.7 J2	< 8.7	< 8.7	< 8.7	2.1 J2	3.1 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7
RISB-10	5	9	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-11	0	1	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	1.06 J2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2
RISB-11	1	5	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	0.84 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	4.93 J2	< 8.7	< 8.7	< 8.7	5.27 J2	< 8.7
RISB-11	5	9	< 10	< 10	< 10	< 10	< 10	1.11 J2	< 10	< 10	< 10	< 10	< 10	100	< 10	< 10	< 10	< 10	< 10
RISB-12	0	1	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970
RISB-12	1	5	< 1000	< 1000	< 1000	< 1000	76 J2	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	33000	< 1000
RISB-12	17	21	< 9.6	< 9.6	< 9.6	< 9.6	12	1.8 J2	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	12	< 9.6
RISB-13	0	1	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570
RISB-13	5	9	< 11	< 11	< 11	< 11	3.29 J2	2.04 J2	< 11	0.52 J2	< 11	< 11	4.05 J2	1.56 J2	< 11	< 11	1.09 J2	8.31 J2	< 11
RISB-13-DUP	5	9	< 11	< 11	< 11	< 11	0.89 J2	< 11	< 11	1.01 J2	< 11	< 11	5.96 J2	1.1 J2	< 11	< 11	1.46 J2	5.65 J2	< 11
RISB-14	0	1	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-14	5	9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-14-DUP	5	9	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-14	9	13	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	1.25 J2	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	0.63 J2	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3
RISB-15	0	1	< 11	< 11	0.98 J2	< 11	< 11	1.37 J2	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-15	9	13	< 9.4	< 9.4	< 9.4	< 9.4	0.93 J2	1.59 J2	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	0.71 J2	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-16	0	1	64.7 J2	< 510	< 510	< 510	18.8 J2	39.2 J2	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510
RISB-16	1	5	13	< 7.6	< 7.6	2 J2	6.23 J2	6.02 J2	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6
RISB-17	0	1	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-17	9	13	< 15	< 15	< 15	< 15	4.1 J2	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	5 J2	< 15
RISB-18	0	1	< 12	< 12	< 12	< 12	< 12	< 12	< 12	3.4 J2	< 12	< 12	1600 J	9.6 J2	< 12	57	600 J	30	< 12
RISB-18	1	5	< 480	< 480	< 480	99 J2	< 480	< 480	76 J2	95 J2	< 480	< 480	22000	4800	< 480	340 J2	4000	< 480	< 480
RISB-19	0	1	< 9	< 9	< 9	< 9	4.3 J2	8.2 J2	< 9	< 9	< 9	< 9	7.3 J2	< 9	< 9	< 9	< 9	< 9	< 9
RISB-20	5	9	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450
RISB-21	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																
			1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-21	5	9	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	25 J1M	< 11
RISB-22	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-23	0	1	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8
RISB-23	9	11	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	1 J2	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-24	0	1	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
RISB-25	0	1	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	2.5 J2	2.7 J2	< 9.2	< 9.2	0.45 J2	< 9.2	< 9.2
RISB-25	9	13	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	24000	< 1100	< 1100	< 1100	< 1100	< 1100
RISB-25	17	20	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	45000	< 610	< 610	< 610	< 610	< 610
RISB-26	0	1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	7 J2	< 9.1	1.3 J2	< 9.1	< 9.1	14	< 9.1	< 9.1	< 9.1	3.5 J2	< 9.1	< 9.1
RISB-26	1	5	< 11	< 11	< 11	< 11	< 11	5.8 J2	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-27	0	1	< 9.6	< 9.6	2.3 J2	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	2.9 J2	< 9.6
RISB-27	5	9	< 8.6	< 8.6	3.3 J2	< 8.6	< 8.6	< 8.6	< 8.6	< 9.5	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6
RISB-28	0	1	120	< 13	< 13	< 13	15	7.7 J2	< 13	< 13	< 13	< 13	< 13	7.2 J2	< 13	< 13	< 13	< 13	< 13
RISB-28	5	9	1900 J	< 8.3	< 8.3	< 8.3	25	400 J	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	27	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3
RISB-28	9	13	26	< 8.2	< 8.2	< 8.2	< 8.2	2.3 J2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	10	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-29	0	1	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580
RISB-29	1	5	< 5400	< 540	< 540	< 540	< 5400	< 5400	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540
RISB-29	9	13	2.8 J2	< 8.6	< 8.6	< 8.6	0.89 J2	1.7 J2	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	23	< 8.6	< 8.6	< 8.6	8.4 J2	< 8.6
RISB-30	0	1	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8
RISB-30	9	13	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-31	0	1	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-31	9	13	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-32	0	1	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9
RISB-33	5	9	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-33	17	20	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-33-DUP	17	20	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-34	11	13	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	15 J1M	< 9.8
RISB-35	0	1	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-35	5	9	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	2.76 J2	< 9.7
RISB-35-DUP	5	9	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-36	0	1	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6
RISB-36	13	16	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-37	0	1	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RISB-37	9	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.86 J2	< 10
RISB-38	0	1	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RISB-38	17	21	< 9.6	< 9.6	< 9.6	< 9.6	140	27	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RISB-39	0	1	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8
RISB-39	13	17	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	12 J2	< 13
RISB-40	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-40	9	13	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-41	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	3.58 J2	< 11
RISB-42	0	1	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-43	0	1	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9
RISB-44	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																
			1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-44	5	8.5	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14
RISB-45	0	1	< 460	< 460	< 460	< 460	37 J2	340 J2	< 460	< 460	< 460	< 460	< 460	1400	< 460	< 460	< 460	< 460	< 460
RISB-45	1	5	< 420	< 420	< 420	< 420	48 J2	480	< 420	< 420	< 420	< 420	< 420	2500	< 420	< 420	< 420	120 J2	< 420
RISB-46	0	1	< 670	< 670	< 670	< 670	< 670	< 670	< 670	3500	< 670	< 670	730	< 670	< 670	870	710	< 670	< 670
RISB-46-DUP	0	1	< 600	< 600	< 600	< 600	< 600	< 600	540 J2	17000	< 600	< 600	3700	< 600	< 600	5400	3700	< 600	< 600
RISB-46	1	5	< 13	< 13	< 13	< 13	< 13	< 13	2.8 J2	1300	< 13	< 13	93	< 13	< 13	240 J2	120	< 13	< 13
RISB-47	0	1	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-47	9	13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	14	< 13	< 13	< 13	< 13	< 13
RISB-48	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-48	13	15	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5
RISB-49	0	1	< 7.9	< 7.9	< 7.9	< 7.9	0.53 J2	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	7.8 J2	< 7.9
RISB-49	13	17	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100
RISB-50	9	13	28	< 9.7	< 9.7	< 9.7	3.1 J2	8.2 J2	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	75	< 9.7	< 9.7	< 9.7	2.5 J2	< 9.7
RISB-51	9	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-51-DUP	9	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-52	0	1	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	0.54 J2	< 8.6	< 8.6	< 8.6	8.5 J2	< 8.6
RISB-52	9	13	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1
RI-BCK1	0	1	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
RI-BCK1	3	4	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14
RI-BCK2	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RI-BCK2	3	4	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISS-1	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-2	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-3	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-4	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-5	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-6	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-7	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-8	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-9	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-10	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-10-DUP	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																
			4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-1	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-2	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-2-DUP	0	1	< 9.9	< 9.9	0.86 J2	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	6.94 J2	< 9.9	6.31 J2	< 9.9	< 9.9	< 9.9
RISB-2	9	13	303 J2	2800	247 J2	< 11	< 11	< 11	< 11	< 11	< 11	2.45 J2	< 11	63	< 11	323 J2	< 11	< 11	< 11
RISB-2	17	21	1600	229 J2	264 J2	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	9.62 J2	< 480	159 J2	< 480	< 480	< 480
RISB-3	0	1	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8
RISB-3	9	13	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-4	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-4	5	9	< 9.7	110	0.64 J2	< 9.7	< 9.7	< 9.7	< 9.7	2.2 J2	< 9.7	4.1 J2	< 9.7	< 9.7	< 9.7	6.3 J2	< 9.7	< 9.7	< 9.7
RISB-5	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-5	5	9	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3
RISB-6	0	1	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	240 J2	< 450	< 450	< 450
RISB-6	13	15	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	130	< 9.2	< 9.2	< 9.2
RISB-7	0	1	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
RISB-7	1	5	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	0.82 J2	< 8.7	< 8.7	< 8.7
RISB-8	0	1	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-8	5	8	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-9	0	1	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5
RISB-9	5	9	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7
RISB-10	5	9	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-11	0	1	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	38	< 9.2	< 9.2	< 9.2
RISB-11	1	5	< 8.7	35	5.43 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	840	< 8.7	1.41 J2	< 8.7
RISB-11	5	9	< 10	< 10	42	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	7.39 J2	< 10	316 J2	< 10	< 10	< 10
RISB-12	0	1	420 J2	< 970	150 J2	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970	< 970
RISB-12	1	5	48000	19000 J2	5600	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	390 J2	< 1000	< 1000	< 1000
RISB-12	17	21	27	13	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	14	< 9.6	< 9.6	< 9.6
RISB-13	0	1	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570	< 570
RISB-13	5	9	1.64 J2	580 J	14	< 11	< 11	< 11	< 11	< 11	< 11	1.18 J2	< 11	< 11	< 11	4.37 J2	< 11	1.36 J2	< 11
RISB-13-DUP	5	9	1.62 J2	43	7.3 J2	< 11	< 11	< 11	< 11	< 11	< 11	1.54 J2	< 11	< 11	< 11	1.96 J2	< 11	< 11	< 11
RISB-14	0	1	< 9.4	5.84 J2	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-14	5	9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-14-DUP	5	9	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-14	9	13	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	0.3 J2	< 9.3	0.64 J2	< 9.3	< 9.3	< 9.3
RISB-15	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-15	9	13	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	0.24 J2	< 9.4	0.55 J2	< 9.4	< 9.4	< 9.4
RISB-16	0	1	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	55 J2	< 510	< 510	< 510
RISB-16	1	5	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	0.54 J2	< 7.6	20	< 7.6	< 7.6	< 7.6
RISB-17	0	1	< 8.9	< 9.8	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-17	9	13	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	140	< 15	< 15	< 15	< 15	< 15	< 15	< 15
RISB-18	0	1	13	160	3.9 J2	< 12	< 12	< 12	< 12	< 12	< 12	150	23	< 12	< 12	7.5 J2	< 12	< 12	< 12
RISB-18	1	5	< 480	< 480	< 480	< 480	< 480	< 480	59 J2	< 480	< 480	450 J2	< 480	< 480	< 480	460 J2	< 480	< 480	< 480
RISB-19	0	1	< 9	57	12	< 9	< 9	< 9	< 9	0.98 J2	< 9	1.9 J2	< 9	0.47 J2	< 9	70	< 9	< 9	< 9
RISB-20	5	9	< 450	< 450	< 450	< 450	< 450	< 450	60 J2	< 450	< 450	< 450	< 450	< 450	< 450	2100	< 450	< 450	< 450
RISB-21	0	1	< 10	10 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																
			4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-21	5	9	< 11	100 J1M	< 11	< 11	< 11	< 11	< 11	8.4 J1MJ	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-22	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-23	0	1	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8
RISB-23	9	11	< 9.4	< 9.4	5.7 J2	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	0.23 J2	< 9.4	260 J2	< 9.4	< 9.4	< 9.4
RISB-24	0	1	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
RISB-25	0	1	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	0.91 J2	< 9.2	1.5 J2	< 9.2	< 9.2	< 9.2
RISB-25	9	13	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	460 J2	< 1100	2900	< 1100	< 1100	< 1100
RISB-25	17	20	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	690	< 610	4100	< 610	< 610	< 610
RISB-26	0	1	< 9.1	140	2.5 J2	< 9.1	< 9.1	< 9.1	< 9.1	8 J2	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	220 J	< 9.1	< 9.1	< 9.1
RISB-26	1	5	< 11	28	1.6 J2	< 11	< 11	< 11	< 11	< 11	< 11	< 11	7.8 J2	< 11	< 11	140	< 11	< 11	< 11
RISB-27	0	1	< 9.6	10	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RISB-27	5	9	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	2 J2	< 8.6	< 8.6	< 8.6
RISB-28	0	1	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	1.1 J2	< 13	2.2 J2	< 13	< 13	< 13
RISB-28	5	9	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	0.87 J2	< 8.3	10	< 8.3	4.6 J2	< 8.3	< 8.3	< 8.3
RISB-28	9	13	9.1	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-29	0	1	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580
RISB-29	1	5	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540
RISB-29	9	13	110	89	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6
RISB-30	0	1	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8
RISB-30	9	13	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	650	< 8.9	< 8.9	< 8.9
RISB-31	0	1	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-31	9	13	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-32	0	1	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9
RISB-33	5	9	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-33	17	20	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-33-DUP	17	20	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-34	11	13	< 9.8	43 J1M	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	2.9 J1MJ	< 9.8	< 9.8	< 9.8
RISB-35	0	1	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-35	5	9	< 9.7	17	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	0.76 J2	< 9.7	1 J2	< 9.7
RISB-35-DUP	5	9	< 11	21	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	1.59 J2	< 11	< 11	< 11
RISB-36	0	1	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6
RISB-36	13	16	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	0.81 J2	< 8.2	< 8.2	< 8.2
RISB-37	0	1	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RISB-37	9	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-38	0	1	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RISB-38	17	21	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	51	< 9.6	< 9.6	< 9.6
RISB-39	0	1	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8
RISB-39	13	17	< 13	48	5.5 J2	< 13	< 13	< 13	< 13	1.8 J2	< 13	2.3 J2	< 13	< 13	< 13	< 13	< 13	< 13	< 13
RISB-40	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-40	9	13	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-41	0	1	< 11	41	< 11	< 11	< 11	< 11	< 11	0.93 J2	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-42	0	1	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-43	0	1	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9
RISB-44	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																
			4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-44	5	8.5	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14
RISB-45	0	1	1200	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	250 J2	< 460	< 460	< 460
RISB-45	1	5	2700	170 J2	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	350 J2	< 420	< 420	< 420
RISB-46	0	1	< 670	< 670	64 J2	< 670	< 670	< 670	< 670	< 670	< 670	560 J2	< 670	< 670	< 670	< 670	< 670	< 670	< 670
RISB-46-DUP	0	1	< 600	< 600	150 J2	< 600	< 600	< 600	< 600	< 600	< 600	2000	< 600	< 600	< 600	< 600	< 600	< 600	< 600
RISB-46	1	5	< 13	< 13	2.5 J2	< 13	< 13	< 13	< 13	< 13	< 13	27	< 13	< 13	< 13	< 13	< 13	< 13	< 13
RISB-47	0	1	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-47	9	13	< 13	25	5.16 J2	< 13	< 13	< 13	< 13	< 13	< 13	110	< 13	0.48 J2	< 13	110	< 13	< 13	< 13
RISB-48	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-48	13	15	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5
RISB-49	0	1	< 7.9	44	1.3 J2	< 7.9	< 7.9	< 7.9	< 7.9	2.8 J2	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	3.5 J2	< 7.9	< 7.9	< 7.9
RISB-49	13	17	< 1100	990 J2	490 J2	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	200 J2	< 1100	< 1100	< 1100
RISB-50	9	13	16	13	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-51	9	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-51-DUP	9	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.4 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-52	0	1	< 8.6	44	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6
RISB-52	9	13	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1
RI-BCK1	0	1	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
RI-BCK1	3	4	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14
RI-BCK2	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RI-BCK2	3	4	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISS-1	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-2	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-3	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-4	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-5	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-6	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-7	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-8	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-9	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-10	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-10-DUP	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs															
			Dichloro-difluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether	Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-1	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-2	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-2-DUP	0	1	< 9.9	< 9.9	< 410	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	37	0.76 J2	< 9.9	< 9.9	24	< 9.9	< 9.9	5.04 J2
RISB-2	9	13	< 11	90	3.89 J2	< 11	< 11	< 11	9.38 J2	< 11	15	5300	< 11	< 11	67	< 11	5.26 J2	279 J2
RISB-2	17	21	< 480	28.9 J2	< 480	< 480	< 480	< 480	< 480	< 480	< 480	3900	< 480	< 480	< 480	< 480	< 480	180 J2
RISB-3	0	1	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8
RISB-3	9	13	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-4	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-4	5	9	< 9.7	7.7 J2	7.6 J2	< 9.7	< 9.7	9.5 J2	< 9.7	< 9.7	0.73 J2	3.3 J2	< 9.7	< 9.7	< 9.7	< 9.7	0.98 J2	2.9 J2
RISB-5	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-5	5	9	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3
RISB-6	0	1	< 450	23 J2	< 450	< 450	< 450	< 450	< 450	< 450	2700	110 J2	< 450	< 450	300 J2	< 450	< 450	100 J2
RISB-6	13	15	< 9.2	0.3 J2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	1000	2.8 J2	< 9.2	< 9.2	39	< 9.2	< 9.2	0.81 J2
RISB-7	0	1	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	35	< 12	< 12	< 12	2.8 J2	< 12	< 12	< 12
RISB-7	1	5	< 8.7	0.66 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	48	6 J2	< 8.7	< 8.7	4.3 J2	< 8.7	< 8.7	2.1 J2
RISB-8	0	1	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	1.6 J2	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-8	5	8	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-9	0	1	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5
RISB-9	5	9	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	4.2 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7
RISB-10	5	9	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.5 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-11	0	1	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	0.98 J2	< 9.2	< 9.2	< 9.2	5.62 J2	< 9.2	< 9.2	< 9.2
RISB-11	1	5	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	4.01 J2	< 8.7	< 8.7	0.78 J2	0.71 J2	2.5 J2	< 8.7	3.43 J2	< 8.7	0.73 J2	0.99 J2
RISB-11	5	9	< 10	< 10	< 10	< 10	< 10	1.96 J2	< 10	< 10	171 J2	1.03 J2	1.95 J2	< 10	850	< 10	0.92 J2	1.84 J2
RISB-12	0	1	< 970	830 J2	< 970	< 970	< 970	< 970	< 970	< 970	< 970	9200	< 970	< 970	< 970	< 970	< 970	3000
RISB-12	1	5	< 1000	150000	4100	< 1000	< 1000	17000 J2	< 1000	< 1000	300 J2	1900000	< 1000	< 1000	240 J2	< 1000	< 1000	650000
RISB-12	17	21	< 9.6	0.93 J2	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	58	15	< 9.6	< 9.6	2.4 J2	< 9.6	< 9.6	4.4 J2
RISB-13	0	1	< 570	105 J2	< 570	< 570	< 570	< 570	< 570	< 570	111 J2	9200	< 570	< 570	< 570	< 570	< 570	798 J2
RISB-13	5	9	< 11	17	1.68 J2	< 11	< 11	3.8 J2	< 11	< 11	< 11	4.76 J2	< 11	< 11	0.73 J2	< 11	4.07 J2	40
RISB-13-DUP	5	9	< 11	13	1.62 J2	< 11	< 11	1.13 J2	< 11	< 11	< 11	3.27 J2	< 11	< 11	< 11	< 11	< 11	36
RISB-14	0	1	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-14	5	9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	0.68 J2	< 8.9	< 8.9	< 8.9	0.66 J2	< 8.9	< 8.9	< 8.9
RISB-14-DUP	5	9	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	0.58 J2	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-14	9	13	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	0.64 J2	< 9.3	< 9.3	< 9.3	2 J2	< 9.3	< 9.3	< 9.3
RISB-15	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	0.69 J2	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-15	9	13	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	0.91 J2	< 9.4	< 9.4	< 9.4
RISB-16	0	1	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510	2800	< 510	< 510	< 510	61.6 J2	< 510	< 510	< 510
RISB-16	1	5	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	< 7.6	880	< 7.6	< 7.6	< 7.6	11	< 7.6	< 7.6	< 7.6
RISB-17	0	1	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-17	9	13	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
RISB-18	0	1	< 12	1.6 J2	< 12	< 12	< 12	< 12	1.2 J2	< 12	< 12	22	1.3 J2	< 12	0.94 J2	< 12	29	5.1 J2
RISB-18	1	5	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	31 J2	44 J2	< 480	< 480	452 J2	< 480	< 480	< 480
RISB-19	0	1	< 9	310 J2	6.3 J2	< 9	< 9	31	0.88 J2	< 9	49	7.5 J2	< 9	< 9	9.2	< 9	6.8 J2	69
RISB-20	5	9	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	2100	19 J2	< 450	< 450	340 J2	< 450	< 450	< 450
RISB-21	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs															
			Dichloro-difluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether	Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-21	5	9	< 11	330 J1M	82 J1M	< 11	< 11	2100 J1M	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-22	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	0.67 J2	< 11	< 11	< 11	< 11	< 11	< 11
RISB-23	0	1	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	0.55 J2	< 8	< 8	< 8	< 8	< 8	< 8
RISB-23	9	11	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	16	< 9.4	0.74 J2	< 9.4	340 J2	< 9.4	2.6 J2	< 9.4
RISB-24	0	1	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	0.76 J2	< 12	< 12	< 12	< 12	< 12	< 12
RISB-25	0	1	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	8.9 J2	< 9.2	< 9.2	< 9.2	3.3 J2	< 9.2	< 9.2	< 9.2
RISB-25	9	13	< 1100	35 J2	< 1100	< 1100	< 1100	< 1100	110 J2	< 1100	280 J2	310 J2	< 1100	< 1100	310 J2	< 1100	< 1100	< 1100
RISB-25	17	20	< 610	< 610	< 610	< 610	< 610	< 610	160 J2	< 610	300 J2	< 610	< 610	< 610	470 J2	< 610	< 610	170 J2
RISB-26	0	1	< 9.1	1.7 J2	0.87 J2	< 9.1	< 9.1	21	< 9.1	< 9.1	< 9.1	8.6 J2	5.1 J2	< 9.1	6.1 J2	< 9.1	12	9.5
RISB-26	1	5	< 11	< 11	< 11	< 11	< 11	1.8 J2	< 11	< 11	6.5 J2	0.55 J2	2 J2	< 11	130	< 11	12	< 11
RISB-27	0	1	< 9.6	0.45 J2	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	0.45 J2	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	1.2 J2
RISB-27	5	9	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	1.1 J2	< 8.6	< 8.6
RISB-28	0	1	< 13	< 13	< 13	< 13	< 13	< 13	< 13	< 13	2.2 J2	1 J2	< 13	< 13	4.4 J2	1.5 J2	< 13	< 13
RISB-28	5	9	< 8.3	80	2.2 J2	< 8.3	< 8.3	20	37	< 8.3	26	580 J	< 8.3	< 8.3	37	130 J	< 8.3	250
RISB-28	9	13	< 8.2	2 J2	< 8.2	< 8.2	< 8.2	< 8.2	1.1 J2	< 8.2	< 8.2	24	< 8.2	< 8.2	< 8.2	0.6 J2	< 8.2	7 J2
RISB-29	0	1	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580	< 580
RISB-29	1	5	< 540	70000	4400 J2	< 540	< 540	8300	< 540	< 540	< 540	220000	< 540	< 540	< 540	< 540	< 540	300000
RISB-29	9	13	< 8.6	16	0.36 J2	< 8.6	< 8.6	< 8.6	9.1	< 8.6	< 8.6	250 J2	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	76
RISB-30	0	1	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	7.68 J2	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8
RISB-30	9	13	< 8.9	0.75 J2	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	1100	2.63 J2	< 8.9	< 8.9	15.9	< 8.9	0.84 J2	3.93 J2
RISB-31	0	1	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-31	9	13	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-32	0	1	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9
RISB-33	5	9	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-33	17	20	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-33-DUP	17	20	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-34	11	13	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	170 J1M	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	2.1 J1MJ2	< 9.8
RISB-35	0	1	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-35	5	9	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	2.6 J2	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-35-DUP	5	9	< 11	< 11	< 11	< 11	< 11	1.47 J2	< 11	< 11	< 11	0.48 J2	< 11	< 11	< 11	< 11	< 11	< 11
RISB-36	0	1	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6
RISB-36	13	16	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-37	0	1	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RISB-37	9	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-38	0	1	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RISB-38	17	21	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	48	< 9.6	< 9.6	< 9.6	3.24 J2	< 9.6	4.02 J2	< 9.6
RISB-39	0	1	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8
RISB-39	13	17	< 13	62	9.1 J2	< 13	< 13	42	< 13	< 13	< 13	17	< 13	< 13	< 13	< 13	< 13	530
RISB-40	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-40	9	13	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-41	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-42	0	1	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-43	0	1	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	1.4 J2	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9
RISB-44	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs															
			Dichloro-difluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether	Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-44	5	8.5	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14
RISB-45	0	1	< 460	36 J2	< 460	< 460	< 460	< 460	54 J2	< 460	93 J2	2100	< 460	< 460	200 J2	< 460	< 460	230 J2
RISB-45	1	5	< 420	50 J2	15 J2	< 420	< 420	< 420	110 J2	< 420	120 J2	3200	< 420	< 420	330 J2	< 420	< 420	320 J2
RISB-46	0	1	< 670	590 J2	< 670	< 670	< 670	170 J2	< 670	< 670	< 670	7700	< 670	< 670	< 670	< 670	< 670	2500
RISB-46-DUP	0	1	< 600	2300	< 600	< 600	< 600	620	< 600	< 600	< 600	21000	< 600	< 600	< 600	< 600	< 600	9800
RISB-46	1	5	< 13	32	< 13	< 13	< 13	21	< 13	< 13	6.1 J2	74	< 13	< 13	0.96 J2	< 13	< 13	130
RISB-47	0	1	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-47	9	13	< 13	33	3.12 J2	< 13	< 13	4.19 J2	< 13	< 13	3.22 J2	0.57 J2	< 13	< 13	22	< 13	16	44.8 J2
RISB-48	0	1	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-48	13	15	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5
RISB-49	0	1	< 7.9	< 7.9	8.5	< 7.9	< 7.9	34	< 7.9	< 7.9	< 7.9	0.66 J2	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9	< 7.9
RISB-49	13	17	< 1100	6300	4200	< 1100	< 1100	5700	< 1100	< 1100	< 1100	7700	< 1100	< 1100	< 1100	< 1100	< 1100	22000
RISB-50	9	13	< 9.7	58	1.8 J2	< 9.7	< 9.7	2.9 J2	21	< 9.7	1.5 J2	130 J2	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	240
RISB-51	9	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	3 J2	< 10	< 10	< 10	3.4 J2	< 10	< 10	< 10
RISB-51-DUP	9	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-52	0	1	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	3.8 J2	0.45 J2	< 8.6	< 8.6	< 8.6	< 8.6	1.1 J2	< 8.6
RISB-52	9	13	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1
RI-BCK1	0	1	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
RI-BCK1	3	4	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14
RI-BCK2	0	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RI-BCK2	3	4	< 11	< 11	< 11	< 11	< 11	< 11	< 11	250 J	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISS-1	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-2	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-3	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-4	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-5	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-6	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-7	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-8	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-9	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-10	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISS-10-DUP	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																
			1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-1	0	1	< 390	< 990	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 990
RISB-2	0	1	< 350	< 870	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 870
RISB-2-DUP	0	1	< 340	< 860	< 340	< 340	< 340	< 860	< 340	< 340	< 340	< 340	< 340	< 340	< 860	< 340	< 340	< 340	< 860
RISB-2	9	13	< 460	< 1200	< 460	< 460	< 460	< 1200	< 460	< 460	< 460	< 460	< 460	< 460	< 1200	< 460	< 460	< 460	< 1200
RISB-2	17	21	< 370	< 930	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 930
RISB-3	0	1	< 380	< 970	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 970
RISB-3	9	13	< 350	< 870	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 870
RISB-4	0	1	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100
RISB-4	5	9	< 400	< 1000	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 1000
RISB-5	0	1	< 410	< 1000	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 1000
RISB-5	5	9	< 380	< 950	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 950
RISB-6	0	1	< 370	< 920	< 370	< 370	< 370	< 920	< 370	< 370	< 370	< 370	< 370	< 370	< 920	< 370	< 370	< 370	< 920
RISB-6	13	15	< 390	< 980	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 980
RISB-7	0	1	< 450	< 1100	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 1100
RISB-7	1	5	< 400	< 1000	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 1000
RISB-8	0	1	< 380	< 970	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 970
RISB-8	5	8	< 350	< 890	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 890
RISB-9	0	1	< 380	< 950	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 950
RISB-9	5	9	< 400	< 1000	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 1000
RISB-10	5	9	< 400	< 1000	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 1000
RISB-11	0	1	< 350	< 890	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 890
RISB-11	1	5	< 410	< 1000	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 1000
RISB-11	5	9	< 390	< 980	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 980
RISB-12	0	1	< 380	< 940	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 940
RISB-12	1	5	< 440	< 1100	< 440	< 440	< 440	< 1100	< 440	< 440	< 440	< 440	1000	170 J2	< 1100	< 440	< 440	< 440	< 1100
RISB-12	17	21	< 390	< 980	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 980
RISB-13	0	1	< 390	< 990	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 990
RISB-13	5	9	< 450	< 1100	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 1100
RISB-13-DUP	5	9	< 440	< 1100	< 440	< 440	< 440	< 1100	< 440	< 440	< 440	< 440	< 440	< 440	< 1100	< 440	< 440	< 440	< 1100
RISB-14	0	1	< 390	< 980	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 980
RISB-14	5	9	< 380	< 940	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 940
RISB-14-DUP	5	9	< 380	< 970	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 970
RISB-14	9	13	< 380	< 970	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 970
RISB-15	0	1	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100
RISB-15	9	13	< 380	< 950	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 950
RISB-16	0	1	< 430	< 1100	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 1100
RISB-16	1	5	< 360	< 910	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 910
RISB-17	0	1	< 430	< 1100	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 1100
RISB-17	9	13	< 440	< 1100	< 440	< 440	< 440	< 1100	< 440	< 440	< 440	< 440	< 440	< 440	< 1100	< 440	< 440	< 440	< 1100
RISB-18	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-18	1	5	< 380	< 950	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 950
RISB-19	0	1	< 400	< 1000	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 1000
RISB-20	5	9	< 380	< 940	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 940
RISB-21	0	1	< 440	< 1100	< 440	< 440	< 440	< 1100	< 440	< 440	< 440	< 440	< 440	< 440	< 1100	< 440	< 440	< 440	< 1100

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																
			1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-21	5	9	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100
RISB-22	0	1	< 370	< 930	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 930
RISB-23	0	1	< 340	< 850	< 340	< 340	< 340	< 850	< 340	< 340	< 340	< 340	< 340	< 340	< 850	< 340	< 340	< 340	< 850
RISB-23	9	11	< 380	< 970	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 970
RISB-24	0	1	< 500	< 1300	< 500	< 500	< 500	< 1300	< 500	< 500	< 500	< 500	< 500	< 500	< 1300	< 500	< 500	< 500	< 1300
RISB-25	0	1	< 340	< 850	< 340	< 340	< 340	< 850	< 340	< 340	< 340	< 340	< 340	< 340	< 850	< 340	< 340	< 340	< 850
RISB-25	9	13	< 450	< 1100	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 1100
RISB-25	17	20	< 450	< 1100	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 1100
RISB-26	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-26	1	5	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100
RISB-27	0	1	< 410	< 1000	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 1000
RISB-27	5	9	< 380	< 970	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 970
RISB-28	0	1	< 470	< 1200	< 470	< 470	< 470	< 1200	< 470	< 470	< 470	< 470	< 470	< 470	< 1200	< 470	< 470	< 470	< 1200
RISB-28	5	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-28	9	13	< 350	< 870	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 870
RISB-29	0	1	< 430	< 1100	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 1100
RISB-29	1	5	< 410	< 1000	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 410	800 MJ	< 410	< 1000	< 410	< 410	< 410	< 1000
RISB-29	9	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-30	0	1	< 340	< 850	< 340	< 340	< 340	< 850	< 340	< 340	< 340	< 340	< 340	< 340	< 850	< 340	< 340	< 340	< 850
RISB-30	9	13	< 380	< 940	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 940
RISB-31	0	1	< 360	< 910	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 910
RISB-31	9	13	< 370	< 930	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 930
RISB-32	0	1	< 360	< 910	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 910
RISB-33	5	9	< 400	< 1000	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 1000
RISB-33	17	20	< 380	< 940	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380	< 940
RISB-33-DUP	17	20	< 380	< 950	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 950
RISB-34	11	13	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100
RISB-35	0	1	< 350	< 890	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 890
RISB-35	5	9	< 410	< 1000	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 1000
RISB-35-DUP	5	9	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100
RISB-36	0	1	< 350	< 880	< 350	< 350	< 350	< 880	< 350	< 350	< 350	< 350	< 350	< 350	< 880	< 350	< 350	< 350	< 880
RISB-36	13	16	< 380	< 950	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 950
RISB-37	0	1	< 380	< 970	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 970
RISB-37	9	13	< 430	< 1100	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 1100
RISB-38	0	1	< 330	< 840	< 330	< 330	< 330	< 840	< 330	< 330	< 330	< 330	< 330	< 330	< 840	< 330	< 330	< 330	< 840
RISB-38	17	21	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100
RISB-39	0	1	< 400	< 1000	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 1000
RISB-39	13	17	< 430	< 1100	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 1100
RISB-40	0	1	< 400	< 1000	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 1000
RISB-40	9	13	< 370	< 930	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 930
RISB-41	0	1	< 380	< 970	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 970
RISB-42	0	1	< 380	< 970	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380	< 970
RISB-43	0	1	< 350	< 880	< 350	< 350	< 350	< 880	< 350	< 350	< 350	< 350	< 350	< 350	< 880	< 350	< 350	< 350	< 880
RISB-44	0	1	< 390	< 980	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 980

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																
			1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-44	5	8.5	< 480	< 1200	< 480	< 480	< 480	< 1200	< 480	< 480	< 480	< 480	< 480	< 480	< 1200	< 480	< 480	< 480	< 1200
RISB-45	0	1	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100
RISB-45	1	5	< 390	< 990	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 990
RISB-46	0	1	< 470	< 1200	< 470	< 470	< 470	< 1200	< 470	< 470	< 470	< 470	< 470	< 470	< 1200	< 470	< 470	< 470	< 1200
RISB-46-DUP	0	1	< 450	< 1100	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 450	350 J	< 450	< 1100	< 450	< 450	< 450	< 1100
RISB-46	1	5	< 460	< 1200	< 460	< 460	< 460	< 1200	< 460	< 460	< 460	< 460	< 460	< 460	< 1200	< 460	< 460	< 460	< 1200
RISB-47	0	1	< 350	< 880	< 350	< 350	< 350	< 880	< 350	< 350	< 350	< 350	< 350	< 350	< 880	< 350	< 350	< 350	< 880
RISB-47	9	13	< 490	< 1200	< 490	< 490	< 490	< 1200	< 490	< 490	< 490	< 490	< 490	< 490	< 1200	< 490	< 490	< 490	< 1200
RISB-48	0	1	< 390	< 990	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 990
RISB-48	13	15	< 350	< 890	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 890
RISB-49	0	1	< 350	< 870	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 870
RISB-49	13	17	< 480	< 1200	< 480	< 480	< 480	< 1200	< 480	< 480	< 480	< 480	110000	< 480	< 1200	< 480	< 480	< 480	< 1200
RISB-50	9	13	< 350	< 890	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 890
RISB-51	9	13	< 410	< 1000	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 1000
RISB-51-DUP	9	13	< 410	< 1000	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 1000
RISB-52	0	1	< 350	< 890	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350	< 890
RISB-52	9	13	< 380	< 950	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380	< 950
RI-BCK1	0	1	< 400	< 1000	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400	< 1000
RI-BCK1	3	4	< 390	< 990	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390	< 990
RI-BCK2	0	1	< 350	< 870	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350	< 870
RI-BCK2	3	4	< 370	< 920	< 370	< 370	< 370	< 920	< 370	< 370	< 370	< 370	< 370	< 370	< 920	< 370	< 370	< 370	< 920
RISS-1	0	1	< 490	< 1200	< 490	< 490	< 490	< 1200	< 490	< 490	< 490	< 490	< 490	< 490	< 1200	< 490	< 490	< 490	< 1200
RISS-2	0	1	< 360	< 910	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 910
RISS-3	0	1	< 1900	< 4800	< 1900	< 1900	< 1900	< 4800	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 4800	< 1900	< 1900	< 1900	< 4800
RISS-4	0	1	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100
RISS-5	0	1	< 360	< 910	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 910
RISS-6	0	1	< 370	< 930	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370	< 930
RISS-7	0	1	< 390	< 980	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 980
RISS-8	0	1	< 410	< 1000	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 1000
RISS-9	0	1	< 370	< 920	< 370	< 370	< 370	< 920	< 370	< 370	< 370	< 370	< 370	< 370	< 920	< 370	< 370	< 370	< 920
RISS-10	0	1	< 370	< 920	< 370	< 370	< 370	< 920	< 370	< 370	< 370	< 370	< 370	< 370	< 920	< 370	< 370	< 370	< 920
RISS-10-DUP	0	1	< 360	< 910	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360	< 910

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																
			4,6-Dinitro-o-cresol	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-1	0	1	< 990	< 390	< 390	< 390	< 990	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-2	0	1	< 870	< 350	< 350	< 350	< 870	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-2-DUP	0	1	< 860	< 340	< 340	< 340	< 860	< 860	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340
RISB-2	9	13	< 1200	< 460	< 460	< 460	< 1200	< 1200	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
RISB-2	17	21	< 930	< 370	< 370	< 370	< 930	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISB-3	0	1	< 970	< 380	< 380	< 380	< 970	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-3	9	13	< 870	< 350	< 350	< 350	< 870	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-4	0	1	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-4	5	9	< 1000	< 400	< 400	< 400	< 1000	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-5	0	1	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-5	5	9	< 950	< 380	< 380	< 380	< 950	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-6	0	1	< 920	< 370	< 370	< 370	< 920	< 920	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISB-6	13	15	< 980	< 390	< 390	< 390	< 980	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-7	0	1	< 1100	< 450	< 450	< 450	< 1100	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450
RISB-7	1	5	< 1000	< 400	< 400	< 400	< 1000	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-8	0	1	< 970	< 380	< 380	< 380	< 970	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-8	5	8	< 890	< 350	< 350	< 350	< 890	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-9	0	1	< 950	< 380	< 380	< 380	< 950	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-9	5	9	< 1000	< 400	< 400	< 400	< 1000	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-10	5	9	< 1000	< 400	< 400	< 400	< 1000	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-11	0	1	< 890	< 350	< 350	< 350	< 890	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-11	1	5	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-11	5	9	< 980	< 390	< 390	< 390	< 980	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-12	0	1	< 940	< 380	< 380	< 380	< 940	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-12	1	5	< 1100	< 440	< 440	< 440	< 1100	< 1100	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440
RISB-12	17	21	< 980	< 390	< 390	< 390	< 980	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-13	0	1	< 990	< 390	< 390	< 390	< 990	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-13	5	9	< 1100	< 450	< 450	< 450	< 1100	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450
RISB-13-DUP	5	9	< 1100	< 440	< 440	< 440	< 1100	< 1100	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440
RISB-14	0	1	< 980	< 390	< 390	< 390	< 980	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-14	5	9	< 940	< 380	< 380	< 380	< 940	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-14-DUP	5	9	< 970	< 380	< 380	< 380	< 970	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-14	9	13	< 970	< 380	< 380	< 380	< 970	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-15	0	1	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-15	9	13	< 950	< 380	< 380	< 380	< 950	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-16	0	1	< 1100	< 430	< 430	< 430	< 1100	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-16	1	5	< 910	< 360	< 360	< 360	< 910	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISB-17	0	1	< 1100	< 430	< 430	< 430	< 1100	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-17	9	13	< 1100	< 440	< 440	< 440	< 1100	< 1100	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440
RISB-18	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-18	1	5	< 950	< 380	< 380	< 380	< 950	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-19	0	1	< 1000	< 400	< 400	< 400	< 1000	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-20	5	9	< 940	< 380	< 380	< 380	< 940	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-21	0	1	< 1100	< 440	< 440	< 440	< 1100	< 1100	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																
			4,6-Dinitro-o-cresol	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-21	5	9	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-22	0	1	< 930	< 370	< 370	< 370	< 930	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISB-23	0	1	< 850	< 340	< 340	< 340	< 850	< 850	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340
RISB-23	9	11	< 970	< 380	< 380	< 380	< 970	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-24	0	1	< 1300	< 500	< 500	< 500	< 1300	< 1300	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
RISB-25	0	1	< 850	< 340	< 340	< 340	< 850	< 850	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340
RISB-25	9	13	< 1100	< 450	< 450	< 450	< 1100	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450
RISB-25	17	20	< 1100	< 450	< 450	< 450	< 1100	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450
RISB-26	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-26	1	5	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-27	0	1	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-27	5	9	< 970	< 380	< 380	< 380	< 970	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-28	0	1	< 1200	< 470	< 470	< 470	< 1200	< 1200	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470
RISB-28	5	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-28	9	13	< 870	< 350	< 350	< 350	< 870	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-29	0	1	< 1100	< 430	< 430	< 430	< 1100	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-29	1	5	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-29	9	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-30	0	1	< 850	< 340	< 340	< 340	< 850	< 850	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340
RISB-30	9	13	< 940	< 380	< 380	< 380	< 940	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-31	0	1	< 910	< 360	< 360	< 360	< 910	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISB-31	9	13	< 930	< 370	< 370	< 370	< 930	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISB-32	0	1	< 910	< 360	< 360	< 360	< 910	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISB-33	5	9	< 1000	< 400	< 400	< 400	< 1000	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-33	17	20	< 940	< 380	< 380	< 380	< 940	< 940	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-33-DUP	17	20	< 950	< 380	< 380	< 380	< 950	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-34	11	13	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-35	0	1	< 890	< 350	< 350	< 350	< 890	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-35	5	9	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-35-DUP	5	9	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-36	0	1	< 880	< 350	< 350	< 350	< 880	< 880	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-36	13	16	< 950	< 380	< 380	< 380	< 950	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-37	0	1	< 970	< 380	< 380	< 380	< 970	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-37	9	13	< 1100	< 430	< 430	< 430	< 1100	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-38	0	1	< 840	< 330	< 330	< 330	< 840	< 840	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330
RISB-38	17	21	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-39	0	1	< 1000	< 400	< 400	< 400	< 1000	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-39	13	17	< 1100	< 430	< 430	< 430	< 1100	< 1100	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-40	0	1	< 1000	< 400	< 400	< 400	< 1000	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-40	9	13	< 930	< 370	< 370	< 370	< 930	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISB-41	0	1	< 970	< 380	< 380	< 380	< 970	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-42	0	1	< 970	< 380	< 380	< 380	< 970	< 970	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-43	0	1	< 880	< 350	< 350	< 350	< 880	< 880	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-44	0	1	< 980	< 390	< 390	< 390	< 980	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																
			4,6-Dinitro-o-cresol	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-44	5	8.5	< 1200	< 480	< 480	< 480	< 1200	< 1200	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480
RISB-45	0	1	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-45	1	5	< 990	< 390	< 390	< 390	< 990	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-46	0	1	< 1200	< 470	< 470	< 470	< 1200	< 1200	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470
RISB-46-DUP	0	1	< 1100	< 450	< 450	< 450	< 1100	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450
RISB-46	1	5	< 1200	< 460	< 460	< 460	< 1200	< 1200	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
RISB-47	0	1	< 880	< 350	< 350	< 350	< 880	< 880	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-47	9	13	< 1200	< 490	< 490	< 490	< 1200	< 1200	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490
RISB-48	0	1	< 990	< 390	< 390	< 390	< 990	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-48	13	15	< 890	< 350	< 350	< 350	< 890	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-49	0	1	< 870	< 350	< 350	< 350	< 870	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-49	13	17	< 1200	< 480	< 480	< 480	< 1200	< 1200	9200	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480
RISB-50	9	13	< 890	< 350	< 350	< 350	< 890	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-51	9	13	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-51-DUP	9	13	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-52	0	1	< 890	< 350	< 350	< 350	< 890	< 890	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-52	9	13	< 950	< 380	< 380	< 380	< 950	< 950	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RI-BCK1	0	1	< 1000	< 400	< 400	< 400	< 1000	< 1000	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RI-BCK1	3	4	< 990	< 390	< 390	< 390	< 990	< 990	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RI-BCK2	0	1	< 870	< 350	< 350	< 350	< 870	< 870	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RI-BCK2	3	4	< 920	< 370	< 370	< 370	< 920	< 920	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISS-1	0	1	< 1200	< 490	< 490	< 490	< 1200	< 1200	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490
RISS-2	0	1	< 910	< 360	< 360	< 360	< 910	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISS-3	0	1	< 4800	< 1900	< 1900	< 1900	< 4800	< 4800	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900
RISS-4	0	1	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISS-5	0	1	< 910	< 360	< 360	< 360	< 910	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISS-6	0	1	< 930	< 370	< 370	< 370	< 930	< 930	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISS-7	0	1	< 980	< 390	< 390	< 390	< 980	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISS-8	0	1	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISS-9	0	1	< 920	< 370	< 370	< 370	< 920	< 920	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISS-10	0	1	< 920	< 370	< 370	< 370	< 920	< 920	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISS-10-DUP	0	1	< 910	< 360	< 360	< 360	< 910	< 910	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																
			Biphenyl	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)-anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-1	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-2	0	1	< 350	< 350	< 350	< 350	2100	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-2-DUP	0	1	< 340	< 340	< 340	< 340	2500	450	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340
RISB-2	9	13	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
RISB-2	17	21	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISB-3	0	1	< 380	< 380	< 380	< 380	370 J2	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	240 J2	< 380	< 380	< 380
RISB-3	9	13	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-4	0	1	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-4	5	9	< 400	< 400	< 400	< 400	640	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-5	0	1	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-5	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-6	0	1	< 370	< 370	< 370	< 370	1500	360 J2	220 J2	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISB-6	13	15	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-7	0	1	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450
RISB-7	1	5	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-8	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-8	5	8	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-9	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-9	5	9	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-10	5	9	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-11	0	1	< 350	< 350	< 350	< 350	410	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-11	1	5	< 410	< 410	< 410	< 410	850	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-11	5	9	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-12	0	1	< 380	< 380	< 380	< 380	950	360 J2	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-12	1	5	< 440	< 440	< 440	< 440	8900	1400	< 440	< 440	< 440	< 440	< 440	< 440	< 440	920	< 440	< 440	< 440
RISB-12	17	21	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-13	0	1	< 390	< 390	< 390	< 390	29000	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	240 J2	< 390	< 390	< 390
RISB-13	5	9	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450
RISB-13-DUP	5	9	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440
RISB-14	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-14	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-14-DUP	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-14	9	13	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-15	0	1	2700	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-15	9	13	< 380	< 380	< 380	< 380	410	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-16	0	1	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-16	1	5	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISB-17	0	1	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-17	9	13	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440
RISB-18	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-18	1	5	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	260 MJ	< 380	< 380	< 380
RISB-19	0	1	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-20	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-21	0	1	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																
			Biphenyl	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)-anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-21	5	9	< 420	< 420	< 420	< 420	530	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-22	0	1	< 370	< 370	< 370	< 370	260 J	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	230 J	< 370	< 370	< 370
RISB-23	0	1	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340
RISB-23	9	11	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-24	0	1	< 500	< 500	< 500	< 500	3100	550	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
RISB-25	0	1	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340
RISB-25	9	13	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	310 J	< 450	< 450	< 450
RISB-25	17	20	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450
RISB-26	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-26	1	5	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	270 J	< 420	< 420	< 420
RISB-27	0	1	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-27	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-28	0	1	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470
RISB-28	5	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-28	9	13	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-29	0	1	< 430	< 430	< 430	< 430	370 J	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-29	1	5	< 410	< 410	< 410	< 410	6300 MJ	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	260 MJ	< 410	< 410	< 410
RISB-29	9	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-30	0	1	< 340	< 340	< 340	< 340	270 J2	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340
RISB-30	9	13	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-31	0	1	< 360	< 360	< 360	< 360	340 J2	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISB-31	9	13	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISB-32	0	1	< 360	< 360	< 360	< 360	1900	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISB-33	5	9	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-33	17	20	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-33-DUP	17	20	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-34	11	13	< 420	< 420	< 420	< 420	1400	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-35	0	1	< 350	< 350	< 350	< 350	600	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-35	5	9	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-35-DUP	5	9	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-36	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-36	13	16	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-37	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-37	9	13	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-38	0	1	< 330	< 330	< 330	< 330	540	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330
RISB-38	17	21	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-39	0	1	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-39	13	17	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-40	0	1	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RISB-40	9	13	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISB-41	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-42	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RISB-43	0	1	< 350	< 350	< 350	< 350	400	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-44	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																
			Biphenyl	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)-anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-44	5	8.5	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480
RISB-45	0	1	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-45	1	5	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-46	0	1	310 J	< 470	< 470	< 470	1900	610	< 470	< 470	< 470	< 470	< 470	< 470	< 470	2000	< 470	< 470	< 470
RISB-46-DUP	0	1	610	< 450	< 450	< 450	4500	830	< 450	< 450	< 450	< 450	< 450	< 450	< 450	2800	< 450	< 450	< 450
RISB-46	1	5	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
RISB-47	0	1	< 350	< 350	< 350	< 350	920	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	230 J2	< 350	< 350	< 350
RISB-47	9	13	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490
RISB-48	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-48	13	15	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-49	0	1	< 350	< 350	< 350	< 350	670	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-49	13	17	15000	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	1200	15000
RISB-50	9	13	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-51	9	13	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-51-DUP	9	13	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-52	0	1	< 350	< 350	< 350	< 350	1000	320 J2	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RISB-52	9	13	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
RI-BCK1	0	1	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
RI-BCK1	3	4	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RI-BCK2	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350
RI-BCK2	3	4	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISS-1	0	1	< 490	< 490	< 490	< 490	320 J2	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490
RISS-2	0	1	< 360	< 360	< 360	< 360	230 J2	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISS-3	0	1	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900
RISS-4	0	1	< 420	< 420	< 420	< 420	270 J2	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISS-5	0	1	< 360	< 360	< 360	< 360	230 J2	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360
RISS-6	0	1	< 370	< 370	< 370	< 370	240 J2	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISS-7	0	1	< 390	< 390	< 390	< 390	250 J2	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISS-8	0	1	< 410	< 410	< 410	< 410	260 J2	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISS-9	0	1	< 370	< 370	< 370	< 370	230 J2	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISS-10	0	1	< 370	< 370	< 370	< 370	240 J2	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370
RISS-10-DUP	0	1	< 360	< 360	< 360	< 360	230 J2	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs														
			Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclo-pentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-1	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390
RISB-2	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350
RISB-2-DUP	0	1	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 860	< 340	< 340	< 340
RISB-2	9	13	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 1200	< 460	< 460	< 460
RISB-2	17	21	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370
RISB-3	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380
RISB-3	9	13	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350
RISB-4	0	1	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420
RISB-4	5	9	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400
RISB-5	0	1	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410
RISB-5	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380
RISB-6	0	1	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 920	< 370	< 370	< 370
RISB-6	13	15	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390
RISB-7	0	1	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	< 450
RISB-7	1	5	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400
RISB-8	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380
RISB-8	5	8	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350
RISB-9	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380
RISB-9	5	9	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400
RISB-10	5	9	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400
RISB-11	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350
RISB-11	1	5	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410
RISB-11	5	9	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390
RISB-12	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380
RISB-12	1	5	< 440	< 440	< 440	< 440	< 440	< 440	570	< 440	< 440	< 440	< 440	< 1100	< 440	< 440	< 440
RISB-12	17	21	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390
RISB-13	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390
RISB-13	5	9	< 450	< 450	< 450	< 450	< 450	< 450	< 450	830	< 450	< 450	< 450	< 1100	< 450	< 450	< 450
RISB-13-DUP	5	9	< 440	< 440	< 440	< 440	< 440	< 440	< 440	510	< 440	< 440	< 440	< 1100	< 440	< 440	< 440
RISB-14	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390
RISB-14	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380
RISB-14-DUP	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380
RISB-14	9	13	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380
RISB-15	0	1	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420
RISB-15	9	13	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380
RISB-16	0	1	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430
RISB-16	1	5	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360
RISB-17	0	1	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430
RISB-17	9	13	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 1100	< 440	< 440	< 440
RISB-18	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-18	1	5	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	940	< 380
RISB-19	0	1	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400
RISB-20	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380
RISB-21	0	1	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 440	< 1100	< 440	< 440	< 440

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs														
			Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclo-pentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-21	5	9	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420
RISB-22	0	1	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370
RISB-23	0	1	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 850	< 340	< 340	< 340
RISB-23	9	11	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380
RISB-24	0	1	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 1300	< 500	< 500	< 500
RISB-25	0	1	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 850	< 340	< 340	< 340
RISB-25	9	13	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	< 450
RISB-25	17	20	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	< 450
RISB-26	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-26	1	5	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420
RISB-27	0	1	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410
RISB-27	5	9	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380
RISB-28	0	1	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 1200	< 470	< 470	< 470
RISB-28	5	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-28	9	13	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350
RISB-29	0	1	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430
RISB-29	1	5	< 410	< 410	< 410	< 410	< 410	< 410	3500 MJ	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410
RISB-29	9	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-30	0	1	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 340	< 850	< 340	< 340	< 340
RISB-30	9	13	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380
RISB-31	0	1	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360
RISB-31	9	13	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370
RISB-32	0	1	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360
RISB-33	5	9	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400
RISB-33	17	20	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 940	< 380	< 380	< 380
RISB-33-DUP	17	20	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380
RISB-34	11	13	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420
RISB-35	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350
RISB-35	5	9	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410
RISB-35-DUP	5	9	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420
RISB-36	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 880	< 350	< 350	< 350
RISB-36	13	16	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380
RISB-37	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380
RISB-37	9	13	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430
RISB-38	0	1	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 330	< 840	< 330	< 330	< 330
RISB-38	17	21	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420
RISB-39	0	1	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400
RISB-39	13	17	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430
RISB-40	0	1	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400
RISB-40	9	13	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370
RISB-41	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380
RISB-42	0	1	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 970	< 380	< 380	< 380
RISB-43	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 880	< 350	< 350	< 350
RISB-44	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs														
			Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclo-pentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-44	5	8.5	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 1200	< 480	< 480	< 480
RISB-45	0	1	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420
RISB-45	1	5	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390
RISB-46	0	1	330 J	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 1200	< 470	< 470	< 470
RISB-46-DUP	0	1	< 450	< 450	< 450	< 450	< 450	< 450	230 J	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	< 450
RISB-46	1	5	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 1200	< 460	< 460	< 460
RISB-47	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 880	< 350	< 350	< 350
RISB-47	9	13	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 1200	< 490	< 490	< 490
RISB-48	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390
RISB-48	13	15	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350
RISB-49	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350
RISB-49	13	17	< 480	< 480	< 480	< 480	< 480	< 480	27000	13000	< 480	< 480	< 480	< 1200	31000	< 480	4200
RISB-50	9	13	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350
RISB-51	9	13	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410
RISB-51-DUP	9	13	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410
RISB-52	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 890	< 350	< 350	< 350
RISB-52	9	13	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 950	< 380	< 380	< 380
RI-BCK1	0	1	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 1000	< 400	< 400	< 400
RI-BCK1	3	4	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 990	< 390	< 390	< 390
RI-BCK2	0	1	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 350	< 870	< 350	< 350	< 350
RI-BCK2	3	4	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 920	< 370	< 370	< 370
RISS-1	0	1	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 490	< 1200	< 490	< 490	< 490
RISS-2	0	1	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360
RISS-3	0	1	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 1900	< 4800	< 1900	< 1900	< 1900
RISS-4	0	1	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420
RISS-5	0	1	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360
RISS-6	0	1	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 930	< 370	< 370	< 370
RISS-7	0	1	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390
RISS-8	0	1	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410
RISS-9	0	1	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 920	< 370	< 370	< 370
RISS-10	0	1	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 370	< 920	< 370	< 370	< 370
RISS-10-DUP	0	1	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 360	< 910	< 360	< 360	< 360

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	PCBs							Metals												
			Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RISB-1	0	1	NA	NA	NA	NA	NA	NA	NA	23000	< 7.1	1.7	76	1	< 0.59	2400	15	46	96	58000	7.7
RISB-2	0	1	NA	NA	NA	NA	NA	NA	NA	32000	< 6.3	1.5	56	0.21 J2	0.75	24000	45	24	52	20000	40
RISB-2-DUP	0	1	NA	NA	NA	NA	NA	NA	NA	26000	< 6.3	1.8	53	0.29 J2	0.53	17000	35	30	86	20000	40
RISB-2	9	13	NA	NA	NA	NA	NA	NA	NA	24000	< 8.5	2	280	1.4	< 0.7	2700	77	51	110	28000	5.9
RISB-2	17	21	NA	NA	NA	NA	NA	NA	NA	10000	< 6.8	< 1.1	160	0.32 J2	< 0.56	5100	98	19	120	16000	1.8
RISB-3	0	1	NA	NA	NA	NA	NA	NA	NA	20000	< 6.9	1.2	150	1.1	< 0.58	3700	27	38	49	42000	10
RISB-3	9	13	NA	NA	NA	NA	NA	NA	NA	9300	< 6.3	< 1.1	83	0.41 J2	< 0.53	4500	16	18	76	17000	1.5
RISB-4	0	1	NA	NA	NA	NA	NA	NA	NA	32000	< 7.7	1.4	92	1.4	0.4 J2	3200	73	40	77	52000	9
RISB-4	5	9	NA	NA	NA	NA	NA	NA	NA	16000	< 7.3	2.8	120	1	< 0.61	1700	26	21	23	29000	20
RISB-5	0	1	NA	NA	NA	NA	NA	NA	NA	25000	< 7.5	1.4	93	1.1	< 0.63	1500	33	18	44	50000	10
RISB-5	5	9	NA	NA	NA	NA	NA	NA	NA	13000	< 6.9	0.95 J2	130	1.1	< 0.57	9100	26	22	31	25000	3.7
RISB-6	0	1	NA	NA	NA	NA	NA	NA	NA	20000	< 6.6	1 J2	83	0.33 J2	0.14 J2	15000	20	24	34	20000	29
RISB-6	13	15	NA	NA	NA	NA	NA	NA	NA	10000	< 7	< 1.2	100	0.48 J2	< 0.59	4800	2.8	41	130	34000	1.4
RISB-7	0	1	NA	NA	NA	NA	NA	NA	NA	35000	< 8.2	1.3 J2	96	1.3	0.52 J2	7600	23	31	92	86000	18
RISB-7	1	5	NA	NA	NA	NA	NA	NA	NA	29000	< 7.3	1.6	130	0.66	< 0.61	23000	5.2	38	150	39000	4.7
RISB-8	0	1	NA	NA	NA	NA	NA	NA	NA	29000	< 7	< 1.2	94	0.27 J2	0.56 J2	20000	30	29	69	30000	7.1
RISB-8	5	8	NA	NA	NA	NA	NA	NA	NA	11000	< 6.5	< 1.1	190	0.33 J2	0.48 J2	7700	11	39	190	43000	1.3
RISB-9	0	1	NA	NA	NA	NA	NA	NA	NA	11000	< 6.9	< 1.2	110	0.47 J2	0.28 J2	7200	14	23	84	29000	3.6
RISB-9	5	9	NA	NA	NA	NA	NA	NA	NA	16000	< 7.2	< 1.2	230	0.63	0.32 J2	9600	24	31	110	34000	4.5
RISB-10	5	9	NA	NA	NA	NA	NA	NA	NA	7100	< 7.3	0.9 J2	660	0.61	< 0.61	3200	16	56	20	13000	6.4
RISB-11	0	1	NA	NA	NA	NA	NA	NA	NA	28000	< 6.5	1.2	100	0.86	< 0.54	7600	34	17	40	32000	6.9
RISB-11	1	5	NA	NA	NA	NA	NA	NA	NA	18000	< 7.4	1.3	87	1.4	< 0.62	2000	48	41	36	66000	11
RISB-11	5	9	NA	NA	NA	NA	NA	NA	NA	18000	< 7	1.5	100	0.78	< 0.59	11000	12	27	67	35000	3.3
RISB-12	0	1	NA	NA	NA	NA	NA	NA	NA	28000	< 6.8	1.7	670	0.67	0.34 J2	16000	38	300	47	39000	52
RISB-12	1	5	NA	NA	NA	NA	NA	NA	NA	16000	< 8	1.5	98	0.98	< 0.66	1600	43	56	37	49000	9.2
RISB-12	17	21	NA	NA	NA	NA	NA	NA	NA	14000	< 7	< 1.2	60	0.23 J2	0.12 J2	6100	61	11	87	15000	2.1
RISB-13	0	1	NA	NA	NA	NA	NA	NA	NA	37000	< 7.1	1.4	170	0.83	< 0.59	2300	49	26	82	39000	14
RISB-13	5	9	NA	NA	NA	NA	NA	NA	NA	21000	< 8.2	< 1.4	98	0.63 J2	< 0.68	3000	34	30	98	30000	3.4
RISB-13-DUP	5	9	NA	NA	NA	NA	NA	NA	NA	20000	< 8	0.72 J2	100	0.54 J2	< 0.67	2900	36	32	110	33000	3.2
RISB-14	0	1	NA	NA	NA	NA	NA	NA	NA	23000	< 7	1.3	110	0.9	< 0.58	8500	18	48	82	47000	10
RISB-14	5	9	NA	NA	NA	NA	NA	NA	NA	11000	< 6.8	< 1.1	110	0.61	< 0.57	4700	1.1	31	160	48000	1.8
RISB-14-DUP	5	9	NA	NA	NA	NA	NA	NA	NA	12000	< 7	< 1.2	160	0.57 J2	< 0.58	5300	2	46	150	46000	2
RISB-14	9	13	NA	NA	NA	NA	NA	NA	NA	13000	< 7	< 1.2	130	0.54 J2	< 0.58	6800	2.8	34	160	43000	2.2
RISB-15	0	1	NA	NA	NA	NA	NA	NA	NA	23000	< 7.7	2.6	140	1.3	< 0.64	1200	26	13	22	39000	9.5
RISB-15	9	13	NA	NA	NA	NA	NA	NA	NA	9800	< 6.9	< 1.2	140	0.45 J2	< 0.58	5500	0.63 J2	55	150	33000	2.1
RISB-16	0	1	NA	NA	NA	NA	NA	NA	NA	21000	< 7.8	1.8	90	1.6	< 0.65	1600	30	130	85	99000	14
RISB-16	1	5	NA	NA	NA	NA	NA	NA	NA	10000	< 6.6	0.55 J2	190	0.59	< 0.55	3300	14	7.9	75	33000	2
RISB-17	0	1	NA	NA	NA	NA	NA	NA	NA	17000	< 7.8	1.7	79	1.6	< 0.65	3100	23	21	6.8	51000	7.9
RISB-17	9	13	NA	NA	NA	NA	NA	NA	NA	9100	< 8	1.2 J2	72	0.91	< 0.67	1900	47	29	19	47000	9
RISB-18	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-18	1	5	< 38	< 38	< 38	< 38	< 38	< 38	< 38	15000	< 6.9	0.92 J2	79	0.56 J2	< 0.58	3800	32	31	57	21000	4.2
RISB-19	0	1	< 40	< 40	< 40	< 40	< 40	< 40	< 40	17000	< 7.3	1.5	100	0.91	0.13 J2	3500	37	81	59	29000	9.2
RISB-20	5	9	NA	NA	NA	NA	NA	NA	NA	21000	< 6.8	1.4	130	0.72	< 0.57	11000	4.1	42	82	37000	3.5
RISB-21	0	1	NA	NA	NA	NA	NA	NA	NA	16000	< 8	1.1 J2	200	1.5	< 0.67	500 J2	5.6	23	25	42000	7.2

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	PCBs							Metals											
			Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RISB-21	5	9	NA	NA	NA	NA	NA	NA	NA	7900	< 7.6	0.7 J2	22 J2	0.35 J2	< 0.64	1000	8.4	11	14	23000	4.2
RISB-22	0	1	NA	NA	NA	NA	NA	NA	NA	21000	< 6.7	1.5	110	0.58	0.78	10000	27	30	50	31000	20
RISB-23	0	1	NA	NA	NA	NA	NA	NA	NA	26000	< 6.1	1.8	53	0.08 J2	1.7	19000	35	19	44	16000	28
RISB-23	9	11	NA	NA	NA	NA	NA	NA	NA	14000	< 7	< 1.2	100	0.26 J2	0.2 J2	4300	56	16	99	21000	1.4
RISB-24	0	1	NA	NA	NA	NA	NA	NA	NA	44000	< 9.1	6.1	290	0.56 J2	2.6	27000	74	58	96	39000	170
RISB-25	0	1	NA	NA	NA	NA	NA	NA	NA	30000	< 6.1	2.1	62	0.14 J2	0.77	20000	25	30	52	19000	20
RISB-25	9	13	< 45	< 45	< 45	< 45	< 45	< 45	< 45	19000	< 8.1	2.8	100	0.99	< 0.67	2300	31	46	38	22000	6.1
RISB-25	17	20	NA	NA	NA	NA	NA	NA	NA	18000	< 8.3	< 1.4	130	0.54 J2	< 0.69	6300	34	21	70	22000	2.8
RISB-26	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-26	1	5	< 42	< 42	< 42	< 42	< 42	< 42	< 42	33000	< 7.7	1.9	110	1.5	< 0.64	3300	50	14	91	45000	5.6
RISB-27	0	1	NA	NA	NA	NA	NA	NA	NA	17000	< 7.4	0.74 J2	170	0.68	0.23 J2	1800	6.4	18	84	31000	2.9
RISB-27	5	9	NA	NA	NA	NA	NA	NA	NA	7700	< 7	0.59 J2	64	0.17 J2	< 0.58	4500	29	8.5	92	8500	< 1.2
RISB-28	0	1	NA	NA	NA	NA	NA	NA	NA	43000	< 8.6	1.3 J2	200	1.2	0.49 J2	2000	100	23	130	49000	5
RISB-28	5	9	NA	NA	NA	NA	NA	NA	NA	14000	< 6.5	< 1.1	160	0.59	< 0.54	5900	7.8	120	130	37000	2.5
RISB-28	9	13	NA	NA	NA	NA	NA	NA	NA	20000	< 6.3	< 1.1	160	0.58	0.45 J2	6800	10	38	150	47000	2
RISB-29	0	1	NA	NA	NA	NA	NA	NA	NA	37000	< 7.9	8.9	150	1.3	0.58 J2	1700	54	85	120	72000	9.1
RISB-29	1	5	NA	NA	NA	NA	NA	NA	NA	42000	< 7.4	1.9	160	0.81	0.44 J2	3000	68	16	140	40000	4.2
RISB-29	9	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-30	0	1	NA	NA	NA	NA	NA	NA	NA	58000	< 6.1	0.97 J2	53	0.13 J2	0.47 J2	38000	61	27	37	24000	12
RISB-30	9	13	NA	NA	NA	NA	NA	NA	NA	7600	< 6.8	< 1.1	75	0.8	0.19 J2	2300	9.1	10	16	22000	6.3
RISB-31	0	1	NA	NA	NA	NA	NA	NA	NA	9800	< 6.6	2.7	110	0.89	0.51 J2	990	43	42	25	43000	22
RISB-31	9	13	NA	NA	NA	NA	NA	NA	NA	9700	< 6.7	0.69 J2	170	0.29 J2	0.25 J2	7400	15	12	51	22000	1.7
RISB-32	0	1	NA	NA	NA	NA	NA	NA	NA	8900	< 6.6	1.8	170	0.45 J2	0.29 J2	2800	42	19	25	18000	130
RISB-33	5	9	NA	NA	NA	NA	NA	NA	NA	12000	< 7.3	0.74 J2	82	0.68	0.35 J2	910	29	6.7	12	50000	9
RISB-33	17	20	NA	NA	NA	NA	NA	NA	NA	9100	< 6.8	< 1.1	150	0.37 J2	0.2 J2	9100	16	23	58	20000	3.1
RISB-33-DUP	17	20	NA	NA	NA	NA	NA	NA	NA	11000	< 6.9	< 1.1	150	0.38 J2	0.18 J2	8500	13	24	58	18000	3.5
RISB-34	11	13	NA	NA	NA	NA	NA	NA	NA	15000	< 7.7	1.7	130	1.4	0.29 J2	18000	3.2	39	60	42000	4
RISB-35	0	1	NA	NA	NA	NA	NA	NA	NA	31000	< 6.5	1.3	49	0.46 J2	< 0.54	13000	28	11	18	20000	6.8
RISB-35	5	9	NA	NA	NA	NA	NA	NA	NA	15000	< 7.5	0.67 J2	140	1.1	< 0.62	8100	6.5	29	89	50000	3.5
RISB-35-DUP	5	9	NA	NA	NA	NA	NA	NA	NA	15000	< 7.6	0.76 J2	150	0.99	< 0.63	8300	6	31	87	49000	3.4
RISB-36	0	1	NA	NA	NA	NA	NA	NA	NA	18000	< 6.4	1.5	150	0.42	0.1	9000	12	14	28	29000	2.3
RISB-36	13	16	NA	NA	NA	NA	NA	NA	NA	13000	< 6.9	0.78 J2	110	0.67	< 0.57	14000	0.76 J2	36	130	54000	2.6
RISB-37	0	1	NA	NA	NA	NA	NA	NA	NA	15000	< 7	2.9	130	1	0.4 J2	1300	16	20	15	30000	19
RISB-37	9	13	NA	NA	NA	NA	NA	NA	NA	11000	< 7.8	1.2 J2	110	0.92	< 0.65	2300	22	3.9 J2	19	8700	9.3
RISB-38	0	1	NA	NA	NA	NA	NA	NA	NA	40000	< 6.1	0.82 J2	53	0.12 J2	0.43 J2	24000	37	21	34	19000	32
RISB-38	17	21	NA	NA	NA	NA	NA	NA	NA	12000	< 7.6	< 1.3	110	0.41 J2	0.48 J2	6000	6.6	41	150	48000	2
RISB-39	0	1	NA	NA	NA	NA	NA	NA	NA	29000	< 7.3	1.8	120	1	0.48 J2	7900	40	27	40	46000	10
RISB-39	13	17	NA	NA	NA	NA	NA	NA	NA	8700	< 7.8	0.93 J2	170	0.66	0.16 J2	1200	18	17	7.2	17000	6.6
RISB-40	0	1	NA	NA	NA	NA	NA	NA	NA	21000	< 7.2	2.1	130	1.1	< 0.6	2700	27	24	43	39000	12
RISB-40	9	13	NA	NA	NA	NA	NA	NA	NA	12000	< 6.7	0.68 J2	100	0.22 J2	< 0.56	4500	17	9.4	55	9000	1.7
RISB-41	0	1	NA	NA	NA	NA	NA	NA	NA	20000	< 7	1.5	79	1.2	< 0.58	3900	25	86	75	78000	12
RISB-42	0	1	NA	NA	NA	NA	NA	NA	NA	21000	< 7	2.1	96	1.2	< 0.58	2300	13	44	45	37000	7.1
RISB-43	0	1	NA	NA	NA	NA	NA	NA	NA	32000	< 6.4	1.2	70	0.25 J2	0.91	19000	71	25	41	24000	11
RISB-44	0	1	NA	NA	NA	NA	NA	NA	NA	19000	< 7	2.6	50	0.71	0.49 J2	1000	53	5.1 J2	21	57000	7.6

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	PCBs							Metals											
			Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RISB-44	5	8.5	NA	NA	NA	NA	NA	NA	NA	35000	< 8.7	1.2 J2	130	0.96	0.2 J2	1700	20	60	44	32000	5.7
RISB-45	0	1	NA	NA	NA	NA	NA	NA	NA	15000	< 7.6	1.6	58	1.1	< 0.63	4200	5.8	30	71	54000	4.2
RISB-45	1	5	NA	NA	NA	NA	NA	NA	NA	14000	< 7.1	1.4	130	0.65	< 0.59	14000	2.1	40	70	37000	2.8
RISB-46	0	1	< 47	< 47	< 47	< 47	< 47	< 47	< 47	34000	< 8.5	2	210	0.59 J2	< 0.71	7000	99	54	110	55000	3.4
RISB-46-DUP	0	1	< 45	< 45	< 45	< 45	< 45	< 45	< 45	33000	< 8.2	1.8	260	0.56 J2	< 0.68	3100	68	64	120	54000	3.3
RISB-46	1	5	< 46	< 46	< 46	< 46	< 46	< 46	< 46	13000	< 8.4	0.85 J2	140	0.68 J2	0.1 J2	4900	31	38	73	20000	6.9
RISB-47	0	1	NA	NA	NA	NA	NA	NA	NA	31000	< 6.4	3.1	180	0.3 J2	1.2	20000	40	35	92	23000	46
RISB-47	9	13	NA	NA	NA	NA	NA	NA	NA	35000	< 8.8	< 1.5	110	0.87	< 0.74	5000	96	74	110	56000	3.5
RISB-48	0	1	NA	NA	NA	NA	NA	NA	NA	18000	< 7.1	0.93 J2	64	0.57 J2	0.32 J2	7700	18	13	24	27000	9.7
RISB-48	13	15	NA	NA	NA	NA	NA	NA	NA	11000	< 6.5	< 1.1	92	0.18 J2	0.13 J2	6200	44	13	87	14000	1.2
RISB-49	0	1	NA	NA	NA	NA	NA	NA	NA	25000	< 6.3	2.1	71	0.4 J2	0.48 J2	16000	33	32	44	25000	25
RISB-49	13	17	NA	NA	NA	NA	NA	NA	NA	8000	< 8.7	< 1.4	71	0.21 J2	< 0.72	6200	33	10	84	11000	2
RISB-50	9	13	NA	NA	NA	NA	NA	NA	NA	7300	< 6.5	< 1.1	60	0.17 J2	< 0.54	5100	32	12	84	13000	1.1
RISB-51	9	13	NA	NA	NA	NA	NA	NA	NA	33000	< 7.5	< 1.3	140	0.32 J2	0.23 J2	18000	20	31	130	24000	3
RISB-51-DUP	9	13	NA	NA	NA	NA	NA	NA	NA	33000	< 7.4	< 1.2	150	0.44 J2	< 0.62	17000	36	31	150	31000	3.3
RISB-52	0	1	NA	NA	NA	NA	NA	NA	NA	36000	< 6.4	0.79 J2	76	0.37 J2	< 0.54	24000	41	32	39	25000	19
RISB-52	9	13	NA	NA	NA	NA	NA	NA	NA	12000	< 6.9	< 1.2	69	0.16 J2	< 0.58	5700	28	15	55	11000	2.7
RI-BCK1	0	1	NA	NA	NA	NA	NA	NA	NA	25000	< 7.4	1.3	99	1.9	< 0.61	1400	4	9.7	7	52000	8.4
RI-BCK1	3	4	NA	NA	NA	NA	NA	NA	NA	10000	< 7.1	1.6	50	0.46 J2	< 0.59	260 J2	22	5.6 J2	13	29000	7.2
RI-BCK2	0	1	NA	NA	NA	NA	NA	NA	NA	7600	< 6.3	1.2	52	0.58	< 0.53	150 J2	15	18	19	23000	14
RI-BCK2	3	4	NA	NA	NA	NA	NA	NA	NA	26000	< 6.7	0.84 J2	460	1.2	< 0.56	1200	7.2	12	1.3 J2	29000	11
RISS-1	0	1	NA	NA	NA	NA	NA	NA	NA	5000	< 9	2	33	0.38 J2	< 0.75	290 J2	20	7.7	3 J2	9800	30
RISS-2	0	1	NA	NA	NA	NA	NA	NA	NA	5900	< 6.6	0.99 J2	58	0.51 J2	< 0.55	640	9.9	5.8	6.4	8700	8.5
RISS-3	0	1	NA	NA	NA	NA	NA	NA	NA	9800	< 7	2.3	27	0.4 J2	< 0.58	1100	20	1.9 J2	12	27000	17
RISS-4	0	1	NA	NA	NA	NA	NA	NA	NA	11500	< 6	2.5	120	0.95	< 0.65	950	26	8.8	18	19000	35
RISS-5	0	1	NA	NA	NA	NA	NA	NA	NA	8200	< 6.6	2.2	56	0.41 J2	< 0.55	440 J2	23	8.6	7.5	14000	19
RISS-6	0	1	NA	NA	NA	NA	NA	NA	NA	9900	< 6.7	1.7	44	0.42 J2	< 0.56	400 J2	17	5.2 J2	8	24000	25
RISS-7	0	1	NA	NA	NA	NA	NA	NA	NA	11000	< 7	2.1	83	0.69	< 0.59	1100	19	11	13	16000	25
RISS-8	0	1	NA	NA	NA	NA	NA	NA	NA	18000	< 7.5	1.9	59	1.2	< 0.63	590 J2	28	8.9	16	53000	23
RISS-9	0	1	NA	NA	NA	NA	NA	NA	NA	8100	< 6.6	2.2	87	0.6	< 0.55	610	37	13	7.6	13000	20
RISS-10	0	1	NA	NA	NA	NA	NA	NA	NA	5400	< 6.6	1.8	62	0.51 J2	< 0.55	200 J2	11	5.7	5.4	8000	18
RISS-10-DUP	0	1	NA	NA	NA	NA	NA	NA	NA	4600	< 6.6	1.4	58	0.45 J2	< 0.55	170 J2	6.6	5.2 J2	4.8	6800	16

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	Metals										
			Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RISB-1	0	1	3700	290	< 0.12	27	450 J2	3 J2	< 1.2	150 J2	65	270	32
RISB-2	0	1	17000	440	0.18 J2	96	320 J2	1.9 J2	< 1.1	3300	22	32	43
RISB-2-DUP	0	1	17000	460	< 0.1	96	290 J2	1.6 J2	< 1	2700	20	32	47
RISB-2	9	13	6500	1100	< 0.14	80	300 J2	< 4.9	< 1.4	150 J2	32	59	41
RISB-2	17	21	5600	540	< 0.11	61	1600	2 J2	< 1.1	170 J2	17	33	25
RISB-3	0	1	4300	1200	< 0.12	19	1200	2.4 J2	< 1.2	500 J2	42	160	39
RISB-3	9	13	8500	250	< 0.11	41	1300	1.8 J2	< 1.1	390 J2	17	46	32
RISB-4	0	1	4500	670	< 0.13	46	770	2.8 J2	< 1.3	260 J2	55	220	28
RISB-4	5	9	1800	700	0.17	11	600 J2	< 4.3	< 1.2	270 J2	29	94	38
RISB-5	0	1	2900	520	0.083 J2	12	1200	< 4.4	< 1.3	190 J2	48	180	28
RISB-5	5	9	6400	630	< 0.11	34	350 J2	2.7 J2	< 1.1	170 J2	26	55	36
RISB-6	0	1	12000	490	< 0.11	60	590	2.3 J2	< 1.1	2000	21	60	32
RISB-6	13	15	2000	310	< 0.12	20	96 J2	2.6 J2	< 1.2	280 J2	36	180	19
RISB-7	0	1	6300	520	< 0.14	39	180 J2	4.9	< 1.4	820	91	390	30
RISB-7	1	5	8500	280	< 0.12	8.6	98 J2	2.3 J2	< 1.2	520 J2	41	150	68
RISB-8	0	1	13000	300	< 0.12	86	280 J2	1.9 J2	< 1.2	2800	33	100	100
RISB-8	5	8	4600	390	< 0.11	67	350 J2	3.2 J2	< 1.1	540	49	190	37
RISB-9	0	1	4300	290	< 0.12	39	360 J2	2.9 J2	< 1.2	240 J2	32	110	29
RISB-9	5	9	5100	460	< 0.12	69	460 J2	2.8 J2	< 1.2	290 J2	36	110	45
RISB-10	5	9	3300	3300	< 0.12	60	53 J2	< 4.3	< 1.2	79 J2	15	72	12
RISB-11	0	1	4800	380	< 0.11	43	500 J2	3.1 J2	< 1.1	1400	38	100	18
RISB-11	1	5	1600	820	< 0.12	17	210 J2	2.6 J2	< 1.2	170 J2	68	270	15
RISB-11	5	9	5200	530	< 0.12	29	56 J2	2.4 J2	< 1.2	140 J2	36	110	30
RISB-12	0	1	7500	7300	< 0.11	53	690	3.6 J2	< 1.1	2500	35	160	35
RISB-12	1	5	1300	920	< 0.13	23	68 J2	2.1 J2	< 1.3	90 J2	52	210	11
RISB-12	17	21	5500	280	< 0.12	32	660	2.2	< 1.2	720	16	32	20
RISB-13	0	1	4800	630	< 0.12	65	87 J2	2.5 J2	< 1.2	140 J2	45	120	26
RISB-13	5	9	6600	670	< 0.14	60	51 J2	2.5 J2	< 1.4	150 J2	31	68	40
RISB-13-DUP	5	9	6800	660	< 0.13	63	77 J2	1.6 J2	< 1.3	170 J2	35	72	40
RISB-14	0	1	7000	360	< 0.12	51	690	3.1 J2	< 1.2	1300	55	200	36
RISB-14	5	9	3300	230	< 0.11	26	300 J2	< 4	< 1.1	300 J2	47	250	31
RISB-14-DUP	5	9	3300	500	< 0.12	33	170 J2	2.2 J2	< 1.2	300 J2	48	220	32
RISB-14	9	13	4500	280	< 0.12	31	460 J2	2.7 J2	< 1.2	370 J2	45	200	40
RISB-15	0	1	6300	310	< 0.13	15	3500	< 4.5	< 1.3	170 J2	41	120	41
RISB-15	9	13	3800	610	< 0.12	27	360 J2	2.4 J2	< 1.2	330 J2	35	140	37
RISB-16	0	1	1300	2200	< 0.13	33	85 J2	3 J2	< 1.3	110 J2	99	510	24
RISB-16	1	5	2600	60	< 0.11	30	65 J2	< 3.8	< 1.1	150 J2	32	180	20
RISB-17	0	1	2300	700	0.09 J2	6.5	440 J2	3.1 J2	< 1.3	340 J2	53	180	33
RISB-17	9	13	1700	990	< 0.13	15	32 J2	< 4.7	< 1.3	180 J2	49	240	12
RISB-18	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-18	1	5	13000	830	< 0.12	66	150 J2	< 4	< 1.2	200 J2	22	42	58
RISB-19	0	1	5100	1700	< 0.12	48	750	1.9 J2	< 1.2	830	29	82	34
RISB-20	5	9	4800	380	< 0.11	4.5 J2	65 J2	2.5 J2	< 1.1	130 J2	37	160	54
RISB-21	0	1	4800	520	< 0.13	8.3	3600	< 4.7	< 1.3	36 J2	43	150	54

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	Metals										
			Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RISB-21	5	9	1400	280	< 0.13	2.4 J2	35 J2	< 4.4	< 1.3	57 J2	25	110	5.8 J2
RISB-22	0	1	7700	550	0.074 J2	46	720	3.2 J2	< 1.1	1500	38	110	55
RISB-23	0	1	15000	250	0.076 J2	90	380 J2	2.5 J2	0.42 J2	2900	21	16	70
RISB-23	9	11	2900	470	< 0.12	53	120 J2	2.1 J2	< 1.2	410 J2	28	60	20
RISB-24	0	1	23000	1100	0.16 J2	150	850	3.3 J2	< 1.5	4400	47	97	230
RISB-25	0	1	25000	370	< 0.1	130	330 J2	1.8 J2	< 1	3400	19	13	63
RISB-25	9	13	5400	340	< 0.13	32	130 J2	< 4.7	< 1.3	110 J2	20	63	27
RISB-25	17	20	8500	340	< 0.14	52	250 J2	3 J2	< 1.4	230 J2	25	26	29
RISB-26	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-26	1	5	6300	640	< 0.13	64	140 J2	< 4.5	< 1.3	380 J2	42	130	33
RISB-27	0	1	2200	110	< 0.12	16	67 J2	2 J2	< 1.2	190 J2	39	160	25
RISB-27	5	9	2400	210	< 0.12	21	470 J2	1.9 J2	< 1.2	260 J2	9.3	19	11
RISB-28	0	1	3000	370	< 0.14	43	150 J2	3.1 J2	< 1.4	140 J2	66	200	29
RISB-28	5	9	4900	830	< 0.11	32	160 J2	2 J2	< 1.1	250 J2	37	160	47
RISB-28	9	13	5400	380	< 0.11	27	250 J2	3.1 J2	< 1.1	320 J2	61	220	50
RISB-29	0	1	2000	540	0.1 J2	32	230 J2	3.8 J2	< 1.3	87 J2	87	290	33
RISB-29	1	5	4800	870	< 0.12	43	250 J2	2.9 J2	< 1.2	230 J2	51	120	36
RISB-29	9	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-30	0	1	28000	400	< 0.1	140	496 J2	< 3.6	< 1	6800	33	23	39
RISB-30	9	13	2800	77	< 0.11	11	92 J2	1.9 J2	< 1.1	130 J2	31	62	17
RISB-31	0	1	640	1500	0.087 J2	11	230 J2	2.7 J2	< 1.1	42 J2	57	210	27
RISB-31	9	13	3800	120	< 0.11	37	980	2.5 J2	< 1.1	200 J2	29	83	28
RISB-32	0	1	1900	890	< 0.11	9.1	280 J2	1.8 J2	< 1.1	280 J2	25	64	33
RISB-33	5	9	620	480	< 0.12	3.4 J2	99 J2	2.7 J2	< 1.2	19 J2	56	170	8.4
RISB-33	17	20	4300	340	< 0.11	45	800	2.5 J2	< 1.1	150 J2	23	78	30
RISB-33-DUP	17	20	4500	380	< 0.11	41	680	2.2 J2	< 1.1	160 J2	19	64	29
RISB-34	11	13	4200	190	< 0.13	6.5	430 J2	2.3 J2	< 1.3	110 J2	42	180	51
RISB-35	0	1	8400	250	< 0.11	34	960	1.9 J2	< 1.1	2700	22	40	25
RISB-35	5	9	8300	250	< 0.12	20	990	2.7 J2	< 1.2	160 J2	47	240	52
RISB-35-DUP	5	9	8800	300	< 0.13	21	1100	3.2 J2	< 1.3	160 J2	50	240	54
RISB-36	0	1	13000	470	< 0.11	34	5000	2.3 J2	< 1.1	1000	32	66	53
RISB-36	13	16	4700	170	< 0.11	9.8	430 J2	3.1 J2	< 1.1	280 J2	51	260	46
RISB-37	0	1	1300	1000	0.088 J2	8.7	470 J2	2 J2	< 1.2	76 J2	42	100	40
RISB-37	9	13	2300	110	< 0.13	9.6	540 J2	< 4.5	< 1.3	72 J2	13	61	39
RISB-38	0	1	18000	400	0.094 J2	87	360 J2	1.9 J2	< 1	4800	24	29	58
RISB-38	17	21	4600	300	< 0.13	30	380 J2	3.4 J2	< 1.3	270 J2	65	230	39
RISB-39	0	1	9900	600	< 0.12	51	1500	3.6 J2	< 1.2	1200	60	150	52
RISB-39	13	17	1200	1100	< 0.13	7.6	170 J2	< 4.5	< 1.3	220 J2	23	54	26
RISB-40	0	1	4100	460	< 0.12	19	1400	2.5 J2	< 1.2	240 J2	46	130	31
RISB-40	9	13	4300	190	< 0.11	24	100 J2	1.8 J2	< 1.1	720	9.5	12	13
RISB-41	0	1	3200	1200	< 0.12	30	140 J2	2.5 J2	< 1.2	510 J2	74	400	20
RISB-42	0	1	3100	670	< 0.12	22	93 J2	2.1 J2	< 1.2	130 J2	43	150	21
RISB-43	0	1	17000	440	< 0.11	100	520 J2	2.2 J2	< 1.1	3500	26	47	29
RISB-44	0	1	< 590	80	< 0.12	6.3	110 J2	3.4 J2	< 1.2	15 J2	66	250	9

Table D-1
Phase I Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	Metals										
			Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RISB-44	5	8.5	5400	610	0.089 J2	48	180 J2	< 5.1	< 1.5	130 J2	32	100	23
RISB-45	0	1	5500	200	< 0.13	9.2	860	2.8 J2	< 1.3	150 J2	58	260	47
RISB-45	1	5	4300	250	< 0.12	6.2	110 J2	2.7 J2	< 1.2	190 J2	39	170	38
RISB-46	0	1	17000	1200	< 0.14	180	750	3 J2	< 1.4	630 J2	54	100	54
RISB-46-DUP	0	1	19000	200	< 0.14	180	380 J2	< 4.8	< 1.4	600 J2	52	93	46
RISB-46	1	5	6200	840	< 0.14	59	160 J2	2.2 J2	< 1.4	620 J2	21	37	37
RISB-47	0	1	17000	870	0.14 J2	100	420 J2	2.2 J2	< 1.1	3300	26	38	77
RISB-47	9	13	12000	620	< 0.15	140	140 J2	3.4 J2	< 1.5	160 J2	62	63	41
RISB-48	0	1	6400	280	< 0.12	28	920	2.8 J2	< 1.2	650	32	88	28
RISB-48	13	15	4700	170	< 0.11	40	380 J2	1.9 J2	< 1.1	1100	16	20	14
RISB-49	0	1	13000	990	0.41	72	400 J2	1.9 J2	< 1.1	2700	24	69	57
RISB-49	13	17	3500	93	< 0.14	22	330 J2	2.6 J2	< 1.4	450 J2	12	19	16
RISB-50	9	13	3200	230	< 0.11	26	200 J2	1.8 J2	< 1.1	380 J2	15	28	16
RISB-51	9	13	9400	820	< 0.13	70	220 J2	2.4 J2	< 1.3	1400	26	35	35
RISB-51-DUP	9	13	10000	740	< 0.12	77	220 J2	2 J2	< 1.2	1400	30	62	43
RISB-52	0	1	18000	660	0.071 J2	91	660	< 3.7	< 1.1	4100	22	52	42
RISB-52	9	13	3600	360	< 0.12	29	150 J2	1.8 J2	< 1.2	1100	12	17	15
RI-BCK1	0	1	3500	240	< 0.12	1.8 J2	2000	2 J2	< 1.2	47 J2	55	170	50
RI-BCK1	3	4	560 J2	170	< 0.12	6.5	230 J2	< 4.2	< 1.2	20 J2	31	77	9.9
RI-BCK2	0	1	650	840	< 0.11	6	320 J2	< 3.7	< 1.1	14 J2	23	77	15
RI-BCK2	3	4	7200	1000	< 0.11	6.3	4300	< 3.9	< 1.1	42 J2	30	78	88
RISS-1	0	1	180 J2	440	< 0.15	3.6 J2	200 J2	< 5.3	< 1.5	16 J2	9.5	24	11
RISS-2	0	1	480 J2	410	< 0.11	3.4 J2	280 J2	< 3.8	< 1.1	14 J2	8.7	27	12
RISS-3	0	1	520 J2	140	0.078 J2	4.2 J2	300 J2	< 4.1	< 1.2	41 J2	27	72	28
RISS-4	0	1	1300	220	0.12 J2	8.6	270 J2	< 4.5	< 1.3	40 J2	18	74	40
RISS-5	0	1	260 J2	890	0.085 J2	4.4 J2	260 J2	< 3.9	< 1.1	13 J2	14	39	14
RISS-6	0	1	1200	390	0.084 J2	3.6 J2	1200	< 3.9	< 1.1	17 J2	24	61	18
RISS-7	0	1	890	560	0.1 J2	5.7	440 J2	< 4.1	< 1.2	24 J2	16	56	29
RISS-8	0	1	880	350	0.1 J2	4.8 J2	460 J2	< 4.4	< 1.3	25 J2	50	160	26
RISS-9	0	1	350 J2	800	0.071 J2	5.3	310 J2	< 3.9	< 1.1	11 J2	13	34	17
RISS-10	0	1	290 J2	210	< 0.11	5	190 J2	< 3.9	< 1.1	16 J2	8.6	23	14
RISS-10-DUP	0	1	260 J2	180	< 0.11	4.5	170 J2	< 3.8	< 1.1	13 J2	6.9	20	12

D-2 Phase I Sediment

Table D-2
Phase I Sediment Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	VOCs																	
	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-pentanone
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISD-1	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19
RISD-2	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
RISD-3	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	5.7 J2	< 15	< 15
RISD-4	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940
RISD-4-DUP	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100
RISD-5	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21
RICB-3	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740
RISD-FCBK	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14
RISD-WCBK	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17
RI-WASTE	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	640 J2	< 1600	< 1600	< 1600	< 1600	230 J2	< 1600	820 J2

Table D-2
Phase I Sediment Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	VOCs																	
	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichloro-difluoromethane	Ethylbenzene
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISD-1	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19
RISD-2	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	0.76 J2	< 12	< 12	< 12	< 12	< 12	< 12	< 12
RISD-3	230	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
RISD-4	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940
RISD-4-DUP	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100
RISD-5	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21
RICB-3	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740	< 740
RISD-FCBK	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14
RISD-WCBK	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17
RI-WASTE	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	< 1600	3600

Table D-2
Phase I Sediment Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	VOCs													
	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether	Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISD-1	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19
RISD-2	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
RISD-3	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
RISD-4	< 940	1400	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940	< 940
RISD-4-DUP	< 1100	1300	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100	< 1100
RISD-5	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21	< 21
RICB-3	< 740	630 J2	< 740	< 740	< 740	< 740	< 740	71 J2	< 740	< 740	< 740	< 740	< 740	< 740
RISD-FCBK	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14	< 14
RISD-WCBK	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17
RI-WASTE	730 J2	920 J2	< 1600	< 1600	< 1600	< 1600	370 J2	270 J2	< 1600	< 1600	< 1600	< 1600	< 1600	20000

Table D-2
Phase I Sediment Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	SVOCs																	
	1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline	4,6-Dinitro-o-cresol
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISD-1	< 530	< 1300	< 530	< 530	< 530	< 1300	< 530	< 530	< 530	< 530	< 530	< 530	< 1300	< 530	< 530	< 530	< 1300	< 1300
RISD-2	< 450	< 1100	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	< 450	< 1100	< 1100
RISD-3	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100	< 1100
RISD-4	< 630	< 1600	< 630	< 630	< 630	< 1600	< 630	< 630	< 630	< 630	< 630	< 630	< 1600	< 630	< 630	< 630	< 1600	< 1600
RISD-4-DUP	< 600	< 1500	< 600	< 600	< 600	< 1500	< 600	< 600	< 600	< 600	< 600	< 600	< 1500	< 600	< 600	< 600	< 1500	< 1500
RISD-5	< 610	< 1500	< 610	< 610	< 610	< 1500	< 610	< 610	< 610	< 610	< 610	< 610	< 1500	< 610	< 610	< 610	< 1500	< 1500
RICB-3	< 470	< 1200	< 470	< 470	< 470	< 1200	< 470	< 470	< 470	< 470	< 470	< 470	< 1200	< 470	< 470	< 470	< 1200	< 1200
RISD-FCBK	< 480	< 1200	< 480	< 480	< 480	< 1200	< 480	< 480	< 480	< 480	< 480	< 480	< 1200	< 480	< 480	< 480	< 1200	< 1200
RISD-WCBK	< 490	< 1200	< 490	< 490	< 490	< 1200	< 490	< 490	< 490	< 490	< 490	< 490	< 1200	< 490	< 490	< 490	< 1200	< 1200
RI-WASTE	< 3100	< 7800	< 3100	< 3100	< 3100	< 7800	< 3100	< 3100	< 3100	< 3100	15000	< 3100	< 7800	< 3100	< 3100	< 3100	< 7800	< 7800

Table D-2
Phase I Sediment Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	SVOCs																	
	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Biphenyl	Bis(2-chloroethoxy)methane
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISD-1	< 530	< 530	< 530	< 1300	< 1300	< 530	< 530	< 530	< 530	< 530	< 530	430 J2	< 530	380 J2	< 530	< 530	< 530	< 530
RISD-2	< 450	< 450	< 450	< 1100	< 1100	< 450	< 450	< 450	< 450	< 450	< 450	260 J2	280 J2	< 450	< 450	< 450	< 450	< 450
RISD-3	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	480	540	510	300 J2	< 420	< 420	< 420
RISD-4	< 630	< 630	< 630	< 1600	< 1600	< 630	< 630	< 630	< 630	< 630	< 630	< 630	420 J2	< 630	< 630	< 630	< 630	< 630
RISD-4-DUP	< 600	< 600	< 600	< 1500	< 1500	< 600	< 600	< 600	< 600	< 600	< 600	< 600	360 J2	< 600	< 600	< 600	< 600	< 600
RISD-5	< 610	< 610	< 610	< 1500	< 1500	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610
RICB-3	< 470	< 470	< 470	< 1200	< 1200	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470
RISD-FCBK	< 480	< 480	< 480	< 1200	< 1200	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480
RISD-WCBK	< 490	< 490	< 490	< 1200	< 1200	< 490	< 490	< 490	< 490	< 490	< 490	720	740	610	390 J2	< 490	< 490	< 490
RI-WASTE	< 3100	< 3100	< 3100	< 7800	< 7800	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	2200 J2	< 3100

Table D-2
Phase I Sediment Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	SVOCs																	
	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)-anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclo-pentadiene
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISD-1	< 530	< 530	380 J2	< 530	< 530	< 530	390 J2	< 530	< 530	< 530	< 530	< 530	< 530	720	< 530	< 530	< 530	< 530
RISD-2	< 450	< 450	320 J2	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	340 J2	< 450	< 450	< 450	< 450
RISD-3	< 420	< 420	360 J2	< 420	< 420	< 420	460	< 420	< 420	< 420	< 420	< 420	< 420	670	< 420	< 420	< 420	< 420
RISD-4	< 630	< 630	< 630	< 630	< 630	< 630	350 J2	< 630	< 630	< 630	< 630	< 630	< 630	450 J2	< 630	< 630	< 630	< 630
RISD-4-DUP	< 600	< 600	< 600	< 600	< 600	< 600	300 J2	< 600	< 600	< 600	< 600	< 600	< 600	390 J2	< 600	< 600	< 600	< 600
RISD-5	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610
RICB-3	< 470	< 470	700	330 J2	< 470	< 470	< 470	< 470	< 470	< 470	260 J2	< 470	< 470	< 470	< 470	630	< 470	< 470
RISD-FCBK	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480
RISD-WCBK	< 490	< 490	< 490	< 490	< 490	< 490	650	< 490	< 490	< 490	< 490	< 490	< 490	1100	< 490	< 490	< 490	< 490
RI-WASTE	< 3100	< 3100	21000	3400	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	< 3100	2100 J2	< 3100	< 3100	< 3100

Table D-2
Phase I Sediment Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	SVOCs											
	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISD-1	< 530	< 530	< 530	< 530	< 530	< 530	< 530	< 530	< 1300	470 J2	< 530	940
RISD-2	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 450	< 1100	< 450	< 450	420 J2
RISD-3	< 420	260 J2	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	230 J2	< 420	870
RISD-4	< 630	< 630	< 630	< 630	< 630	< 630	< 630	< 630	< 1600	< 630	< 630	610 J2
RISD-4-DUP	< 600	< 600	< 600	< 600	< 600	< 600	< 600	< 600	< 1500	< 600	< 600	510 J2
RISD-5	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 610	< 1500	< 610	< 610	< 610
RICB-3	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 470	< 1200	< 470	< 470	< 470
RISD-FCBK	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 480	< 1200	< 480	< 480	< 480
RISD-WCBK	< 490	330 J2	< 490	< 490	< 490	< 490	< 490	< 490	< 1200	550	< 490	1500
RI-WASTE	< 3100	< 3100	< 3100	3300	< 3100	< 3100	< 3100	< 3100	< 7800	4900	< 3100	< 3100

Table D-2
Phase I Sediment Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Metals																	
	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RISD-1	7900	< 9.7	2.6	98	0.69 J2	< 0.81	1800	21	12	16	21000	18	1400	730	< 0.16	8.1	450 J2	< 5.6
RISD-2	10000	< 8.2	2.3	90	0.73	< 0.68	1800	34	15	18	23000	29	1800	1100	0.13 J2	9.9	600 J2	< 4.8
RISD-3	14000	< 7.7	3.2	170	0.91	< 0.64	2200	33	22	27	29000	32	2300	2900	0.12 J2	13	820	< 4.5
RISD-4	10000	< 12	2.9	190	0.83 J2	< 0.97	7900	27	19	25	25000	27	1800	2900	0.21	10	760 J2	< 6.8
RISD-4-DUP	11000	< 11	3.3	190	0.87 J2	0.2 J2	3100	30	20	26	27000	28	1900	2700	0.25	11	810 J2	< 6.3
RISD-5	11000	< 11	1.3 J2	110	0.68 J2	< 0.93	1500	18	13	16	20000	8	1500	710	< 0.19	8.4	560 J2	< 6.5
RICB-3	53000	< 8.5	16	240	0.65 J2	23	31000	95	48	270	45000	540	26000	750	2.3	170	920	3 J2
RISD-FCBK	1600	< 8.7	0.95 J2	92	0.39 J2	< 0.72	280 J2	18	7.9	2 J2	13000	3.3	190 J2	910	< 0.14	2.2 J2	97 J2	< 5.1
RISD-WCBK	4300	< 9	1.5 J2	52	0.55 J2	< 0.75	970	49	7.7	7.8	20000	14	780	630	< 0.15	4.3 J2	340 J2	< 5.3
RI-WASTE	7000	32	10	180	0.19 J2	4	11000	180	23	600	160000	140	3500	1100	1.5	140	1400	4.9 J2

Table D-2
Phase I Sediment Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Metals				
	Silver	Sodium	Thallium	Vanadium	Zinc
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
RISD-1	< 1.6	100 J2	23	53	61
RISD-2	< 1.4	110 J2	25	71	81
RISD-3	< 1.3	140 J2	27	82	100
RISD-4	< 1.9	120 J2	25	69	95
RISD-4-DUP	< 1.8	120 J2	28	78	100
RISD-5	< 1.9	86 J2	20	65	32
RICB-3	4.8	5400	43	71	1400
RISD-FCBK	< 1.4	15 J2	14	43	10
RISD-WCBK	< 1.5	46 J2	22	62	42
RI-WASTE	4.2	1900	160	16	1800

D-3 Phase I Groundwater

Table D-3
Phase I Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	VOCs																
	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RITW-12	< 1000	< 1000	< 1000	< 1000	1000	89 J2	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	2500	< 1000
RITW-28	51000	< 1000	333 J2	154 J2	1600	6600	< 1000	< 1000	< 1000	< 1000	< 1000	15000	< 1000	< 1000	< 1000	444 J2	478 J2
RITW-34	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RITW-38	< 10	< 10	< 10	< 10	460	130	< 10	< 10	< 10	< 10	< 10	1.14 J2	< 10	< 10	< 10	< 10	< 10

Table D-3
Phase I Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	VOCs																
	4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RITW-12	7100	3000	410 J2	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	1200	< 1000	< 1000	< 1000
RITW-28	11000	< 1000	69 J2	< 1000	< 1000	< 1000	< 1000	< 1000	11000	123 J2	< 1000	882 J2	< 1000	235 J2	< 1000	< 1000	< 1000
RITW-34	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	24	< 10	< 10	< 10
RITW-38	< 10	< 10	2.39 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.39 J2	< 10	< 10	490	< 10	1.1 J2	< 10

Table D-3
Phase I Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	VOCs															
	Dichloro- difluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether	Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2- Dichloroethene	trans-1,3- Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RITW-12	< 1000	710 J2	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	1400	28000	< 1000	< 1000	82 J2	< 1000	40 J2	2700
RITW-28	< 1000	3000	34 J2	< 1000	< 1000	223 J2	7900	< 1000	428 J2	51000	< 1000	< 1000	1200	987 J2	< 1000	10000
RITW-34	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	0.96 J2	< 10	< 10	3.45 J2	< 10	1.8 J2	0.41 J2
RITW-38	< 10	< 10	1.21 J2	< 10	< 10	2.59 J2	< 10	< 10	190	0.89 J2	0.86 J2	< 10	34	< 10	43	1.02 J2

D-4 ColorTec

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values** Min (ug/L)	Approximate GC/MS Correlated Values** Max (ug/L)	Laboratory Results*** (ppb)
Phase I						
TW-28			10	239	2,990	1,628
TW-38			>6.0	176	1,110	267
TW-12			14	129	3,240	1,522
TW-34			0.3	2	46	5.25
TW-15			0.3	2	46	NA
RISB-1	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
RISB-2	0-1	2	0	0	0	61
	1-3	4	0	0	0	
	3-5	4	0	0	0	
	5-7	3	0.1	1	5	
	7-9	3	0.15	2	20	
	9-11	13	0.2	2	34	87
	11-13	13	1.1	9	229	
	13-15	10	1.2	10	223	
	13-15 (Dup)	10	1.4	12	212	
	15-17	10	1	8	234	
	17-19	60	0.25	2	40	BDL
	19-21	60	0.2	2	34	
	21-23	60	0.05	1	3	
	23-24	60	0.35	2	53	
RISB-3	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	BDL
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
RISB-4	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	14	0	0	0	2
	7-9	3	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
	17-19	0	0	0	0	
	19-21	0	0	0	0	
	21-23	0	0	0	0	
	23-25	0	0	0	0	

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values** Min (ug/L)	Max (ug/L)	Laboratory Results*** (ppb)
RISB-5	0-1	2	0	0	0	BDL
	1-3	1.5	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	BDL
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
RISB-6	0-1	2.9	0.35	2	53	3,000
	1-3	9	>3.0	15	400	
	3-5	13	3	15	400	
	5-7	3	0.25	2	40	
	7-9	1	3.6	59	471	
	9-11	3	3.4	44	447	
	11-13	12	3	15	400	
	13-15	38	1.5	13	207	1,039
RISB-7	0-1	0.8	0	0	0	37.8
	1-3	0.5	0.05	0.5	2.5	52
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0.3	0	0	0	
	9-11	0	0	0	0	
	11-12	0	0	0	0	
RISB-8	0-1	0	0	0	0	1.6
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	BDL
	7-8	0	0	0	0	
RISB-9	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	4
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
RISB-10	5-7	0.1	0	0	0	2
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0	0	0	
RISB-11	0-1	0	0	0	0	6.6
	1-3	0	1	8	234	5
	3-5	0	10	239	2,990	
	5-7	0	6	176	1,108	1,022
	7-9	0	2	18	180	
	7-9 (Dup)	0	1	8	234	
	9-11	0.5	0	0	0	
	11-13	0.5	0	0	0	
	13-14	0.5	0	0	0	

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values**		Laboratory Results*** (ppb)
				Min (ug/L)	Max (ug/L)	
RISB-12	0-1	12	0	0	0	BDL
	1-3	533	0	0	0	540
	3-5	498	0	0	0	
	5-7	563	0	0	0	
	7-9	441	0	0	0	
	9-11	253	0	0	0	
	11-13	319	0.3	2	46	
	13-15	140	0.3	2	46	
	15-17	78	0.1	1	5	
	17-19	18	0.3	2	46	60
	19-21	11	1.6	14	202	
RISB-13	1-3	12	0.05	1	3	
	3-5	0	0	0	0	
	5-7	12	0	0	0	5
	7-9	4	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0.3	2	46	
	13-14.5	0	0.15	2	20	
RISB-14	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	2
	7-9	0	0	0	0	
	9-11	0	0.15	2	20	3
	11-13	0	0.2	2	34	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
RISB-15	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0.05	0.5	2.5	
	9-11	0	0.1	1	5	1
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0.15	2	20	
	17-19	0	0	0	0	
	19-21	0	0.25	2	40	
RISB-16	1-3	0	7	192	1,578	891
	3-5	0	0.1	1	5	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0.05	0.5	2.5	
	13-15	0	0.1	1	5	

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values**		Laboratory Results*** (ppb)
				Min (ug/L)	Max (ug/L)	
RISB-17	0-1	2	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0.1	1	5	
	5-7	0	0.2	2	34	
	7-9	0	0	0	0	
	9-11	0	0	0	0	BDL
	11-13	0	0.05	0.5	2.5	
	13-15	1.5	0.1	1	5	
	15-17	1.5	0	0	0	
	17-19	0	0	0	0	
	19-20	0	0	0	0	
RISB-18	0-1	0	3.4	44	447	29.94
	1-3	0	10	239	2,990	483
	3-5	0	10	239	2,990	
	5-7	3	1.3	11	218	
	7-9	14	1.2	10	223	
	9-11	10.3	1	8	234	
	9-11 (Dup)	10.3	0.9	8	193	
	11-13	14.2	0.2	2	34	
	13-15	3	0	0	0	
	15-17	0.5	0	0	0	
RISB-19	0-1	0	0.5	2	71	65
	1-3	0	0.2	2	34	
	3-5	10	1	8	234	
	5-7	6	0	0	0	
	7-9	8	0	0	0	
	9-11	11	0	0	0	
	11-13	7	0.5	2	71	
	13-15	10	0	0	0	
	15-17	30	0.05	0.5	2.5	
	17-19	10	0	0	0	
	19-20	12	0	0	0	
RISB-20	5-7	23	20	196	23,150	2,440
	7-9	23	14	129	3,238	
	9-11	3.2	0.15	2	20	
	11-13	3.2	0.5	2	71	
	13-15	8	0.5	2	71	
	15-17	8	0.4	2	59	
RISB-21	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	110	0	0	0	BDL
	7-9	110	0	0	0	
	9-11	40	0	0	0	
	11-13	40	0	0	0	
	13-15	1	0	0	0	
	15-17	1	0	0	0	
	17-19	0	0	0	0	

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values** Min (ug/L)	Approximate GC/MS Correlated Values** Max (ug/L)	Laboratory Results*** (ppb)
RISB-22	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0.2	0	0	0	
	7-9	0	0	0	0	
	9-10	0	0	0	0	
RISB-23	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0.25	2	40	
	5-7	0	0.4	2	59	
	7-9	0	0	0	0	
	9-11	0	1.2	10	223	358.6
	9-11 (Dup)	0	1.5	13	207	
RISB-24	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
RISB-25	0-1	0	0.1	1	5	12.2
	1-3	0	0.1	1	5	
	3-5	0	4.8	146	613	
	5-7	2	0.3	2	46	
	7-9	2	1.9	17	185	
	9-11	3	12	184	3,114	590
	11-13	3	25	290	43,000	
	13-15	7	8	207	2,049	
	15-17	7	24	271	39,030	
	17-19	10	11	211	3,052	770
	17-19 (Dup)	10	10	239	2,990	
	19-20	10	22	233	31,090	
RISB-26	0-1	0	0.1	1	5	18.1
	1-3	0	3.2	30	424	149
	3-5	0	0.15	2	20	
	5-7	0	0.9	8	193	
	7-9	0	3	15	400	
	9-11	0	0.1	1	5	
	11-13	0	2.3	17	246	
	13-15	0	0.05	0.5	2.5	
	15-17	0	0.1	1	5	
	17-19	0	0.1	1	5	

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values** Min (ug/L)	Approximate GC/MS Correlated Values** Max (ug/L)	Laboratory Results*** (ppb)
RISB-27	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	BDL
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0	0	0	
RISB-28	0-1	0	0.1	1	5	6.6
	1-3	2	0.15	2	20	
	3-5	2	0.25	2	40	
	5-7	0	0.4	2	59	63
	7-9	0	0	0	0	
	9-11	0	0	0	0	BDL
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-16.5	0	0	0	0	
RISB-29	0-1	2	0	0	0	BDL
	1-3	4	0	0	0	BDL
	3-5	0	0.3	2	46	
	5-7	15	0	0	0	
	7-9	10	0	0	0	
	9-11	5	0	0	0	BDL
	11-13	30	0.15	2	20	
	13-15	0	0	0	0	
	15-16.5	4	0	0	0	
RISB-30	0-1	5	0	0	0	7.68
	1-3	0	0.6	6	91	
	3-5	0	1.05	9	231	
	5-7	0	1.6	14	202	
	7-9	0	4	88	519	
	9-11	0	8	207	2,050	1,117
	11-13	0	0.3	2	46	
	13-15	2	1.6	14	202	
	15-17	0	2	18	180	
	17-19	0	2.3	17	246	
	19-20	0	0	0	0	
	9-11 (Dup)	0	7.5	200	1,814	
RISB-31	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	BDL
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
	17-19	0	0	0	0	

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values** Min (ug/L)	Approximate GC/MS Correlated Values** Max (ug/L)	Laboratory Results*** (ppb)
RISB-32	0-1	0	0	0	0	BDL
	1-3	0.5	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	9-11	0	0	0	0	
	11-14	0	0	0	0	
RISB-33	0-1	0	0	0	0	
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	BDL
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
	17-19	0	0	0	0	BDL
	19-20	0	0	0	0	
RISB-34	0-1	0	0	0	0	
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	68	0	0	0	2.1
	13-15	94	0	0	0	
	15-17	2	0	0	0	
	17-19	0	0	0	0	
	19-20	0	0	0	0	
RISB-35	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	BDL
	7-9	0	0.05	0.5	2.5	
	9-11		0.15	2	20	
	11-13		0	0	0	
	13-14.4		0.2	2	34	
RISB-36	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0.15	2	20	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0	0	0	BDL
	15-16	0	0.25	2	41	

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values** Min (ug/L)	Approximate GC/MS Correlated Values** Max (ug/L)	Laboratory Results*** (ppb)
RISB-37	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	BDL
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
	17-19	0	0	0	0	
	19-21	0	0	0	0	
	21-23	0	0	0	0	
	23-24	0	0	0	0	
RISB-38	0-1	0	0	0	0	BDL
	1-3	1	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	1	0.1	1	5	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0.1	1	5	
	15-17	0	0	0	0	
	17-19	0	0.3	2	46	55
	17-19 (Dup)	0	0.4	2	59	
	19-21	0	0.15	2	20	
	21-23	0	0	0	0	
	23-25	0	0	0	0	
RISB-39	0-1	0	0	0	0	BDL
	1-3	2	0	0	0	
	3-5	5	0	0	0	
	5-7	40	0	0	0	
	7-9	159	0.4	2	59	
	9-11	13	0.2	2	34	
	11-13	2	0.8	9	152	
	13-15	4	0.8	9	152	BDL
	15-17	0	1.2	10	223	
	17-19	4	0.3	2	46	
	19-21	8	0	0	0	
	21-23	12	0	0	0	
RISB-40	0-1	0	0	0	0	BDL
	1-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	BDL
	11-13	0	0	0	0	

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values** Min (ug/L)	Max (ug/L)	Laboratory Results*** (ppb)
RISB-41	0-1	2	0	0	0	BDL
	1-3	2	0	0	0	
	3-4	2	0	0	0	
	4-6	2	0	0	0	
	6-8	2	0	0	0	
RISB-42	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-8.5	0	0	0	0	
RISB-43	0-1	0	0	0	0	1.4
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
RISB-44	0-1	1.6	0	0	0	BDL
	1-3	0.3	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	BDL
	7-8.5	0	0	0	0	
RISB-45	0-1	120	1.8	16	191	293
	1-3	120	1.5	13	207	450
	3-5	116	0.5	2	71	
	5-7	23	0.6	6	91	
	7-9	38	1	8	234	
	9-11	57	0.9	8	193	
	11-13	27	0.8	9	152	
	13-15	12	0.1	1	5	
RISB-46	0-1	9	0.5	2	71	BDL
	1-3	5	1	8	234	BDL
	3-5	10	0	0	0	
	5-7	3	0.05	0.5	2.5	
	7-9	5	0	0	0	
	9-11	0	0.05	0.5	2.5	
	11-13	0	0.05	0.5	2.5	
	13-15	0	0.05	0.5	2.5	
	15-17	0	0.05	0.5	2.5	
	17-19	0	0	0	0	
	19-21	0	0.05	0.5	2.5	
	21-23	0	0.05	0.5	2.5	
	23-25	0	0	0	0	

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values** Min (ug/L)	Approximate GC/MS Correlated Values** Max (ug/L)	Laboratory Results*** (ppb)
RISB-47	0-1	0	0	0	0	BDL
	1-3	0	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0.2	2	34	
	7-9	0	0.35	2	53	
	9-11	0	0.5	2	71	41
	11-13	0	1	8	234	
	13-15	0	1.8	16	191	
	15-17	0	0.05	0.5	2.5	
RISB-48	0-1	0.6	0	0	0	BDL
	1-3	0.2	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	
	11-13	0	0	0	0	
	13-15	0	0	0	0	BDL
RISB-49	0-1	0	0	0	0	BDL
	1-3	3	0	0	0	
	3-5	2	0	0	0	
	5-7	5	0	0	0	
	7-9	5	0	0	0	
	9-11	3	0.25	2	40	
	11-13	76	0.05	0.5	2.5	
	13-15	110	0.5	2	34	BDL
	15-17	110	0.5	2	34	
RISB 50	9-11		0	0	0	2
	11-13		0	0	0	
RISB-51	0-1	1.5	0	0	0	
	1-3	0.3	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0	0	0	0	BDL
	11-13	1.1	0.55	4	81	
	11-13 (Dup)	0	0	0	0	
	13-15	0	0	0	0	
RISB-52	0-1	1	0	0	0	BDL
	1-3	0.1	0	0	0	
	3-5	0	0	0	0	
	5-7	0	0	0	0	
	7-9	0	0	0	0	
	9-11	0.5	0	0	0	5
	11-13	0	0	0	0	
	13-15	0	0	0	0	
	15-17	0	0	0	0	
Phase II						
RIMW-18	44-56		2.2	17	224	78
	56-68		2.4	17	268	101
RIMW-19	63-75		5	160	637	223
	76-88		4.6	131	590	150

Table D-4
ColorTec Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Vertical Profile ID	Depth (ft bls)	PID Reading	Corrected Result* (unitless)	Approximate GC/MS Correlated Values** Min (ug/L)	Approximate GC/MS Correlated Values** Max (ug/L)	Laboratory Results*** (ppb)
Phase III						
RIMW-15	70-77.5		11	211	3,050	341
	77.5-85		10	239	2,990	
	85-92.5		10	239	2,990	
	92.5-100		16	120	7,270	489

Notes:
Highlighted rows show samples that were sent to an offsite laboratory for analysis.
* Corrected result based on purge volume used during Color-Tec detection. 1:1 correction for 100 cc purge, 2:1 for 200 cc purge, 0.5:1 for 50 cc purge.
** Approximate ***aqueous*** GC/MS correlated values obtained from Ecology & Environment, Inc. (2004)
*** Laboratory results include sum of tetrachloroethene, trichloroethene, 1,2-dichloroethene, and vinyl chloride.
"BDL" means that the specified chlorinated VOCs were not detected at this depth interval.

D-5 Phase II Soil

Table D-5
Phase II Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																							
			1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RIMW-1	10	12	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	1.81 J2	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	6.87 J2	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	26	< 8.5	< 8.5	< 8.5	< 8.5
RIMW-1	12	14	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	1.26 J2	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	1.16 J2	< 8.1	< 8.1	< 8.1	< 8.1
RIMW-13	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	8	10	< 9.1	< 9.1	< 9.1	< 9.1	25	2.77 J2	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	2.11 J2	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	1.07 J2	< 9.1	< 9.1	< 9.1	< 9.1
RIMW-19	12	14	< 20	< 20	< 20	< 20	4.57 J2	< 20	< 20	< 20	< 20	< 20	< 20	.59 J2	< 20	< 20	< 20	< 20	< 20	< 20	7 J2	< 20	< 20	< 20	< 20	< 20
RIMW-19	16	18	< 8.3	< 8.3	< 8.3	< 8.3	6.71 J2	.67 J2	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	1.15 J2	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3
RIMW-1-DUP	12	14	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	3.04 J2	< 8	< 8	< 8	< 8	< 8	< 8	< 8	4.01 J2	< 8	< 8	< 8	< 8
RIMW-5	0	1	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	.36 J2	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8
RIMW-5	4	6	< 9.9	< 9.9	33	< 9.9	1.57 J2	19	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	2.52 J2	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9
RIMW-5	12	14	< 9.1	< 9.1	1.01 J2	1.2 J2	< 9.1	1.07 J2	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	1700	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1
RIMW-5	18	20	< 8.3	< 8.3	< 8.3	.65 J2	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	870	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3
RIMW-6	0	1	< 7.7	< 7.7	< 7.7	< 7.7	2.13 J2	5.15 J2	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	22	< 7.7	6.09 J2	130	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7
RIMW-6	4	6	< 9.6	< 9.6	< 9.6	< 9.6	18	79	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	.37 J2	< 9.6	< 9.6	< 9.6	11	< 9.6	170	160	1.01 J2	< 9.6	< 9.6	< 9.6	< 9.6
RIMW-6	8	10	< 10	< 10	< 10	< 10	2.22 J2	1.81 J1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	500	39	5500	7100	< 10	< 10	< 10	< 10	< 10
RIMW-6	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	18	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	0	1	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RIMW-7	4	6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6
RIMW-7	8	10	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RIMW-8	0	1	4.38 J2	< 9.7	< 9.7	< 9.7	9.38 J2	1.07 J2	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	1.57 J2	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RIMW-8	2	4	110	< 9.3	1.56 J2	< 9.3	1600	90	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	390	< 9.3	< 9.3	< 9.3	3.21 J2	< 9.3	< 9.3	19	.55 J2	< 9.3	< 9.3	< 9.3	< 9.3
RIMW-8	4	6	2400	< 9	3.2 J2	23	170	120	< 9	< 9	< 9	< 9	1.36 J2	1500	< 9	< 9	< 9	130	< 9	55	220	< 9	< 9	< 9	< 9	< 9
RIMW-8	6	8	2600	< 8.4	< 8.4	6.99 J2	48	14	< 8.4	< 8.4	< 8.4	< 8.4	.78 J2	1900	< 8.4	< 8.4	< 8.4	1000	9	240	1800	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
RIMW-8	8	10	3600	< 9.1	6.15 J2	30	100	160	< 9.1	< 9.1	< 9.1	< 9.1	1.01 J2	1900	< 9.1	< 9.1	< 9.1	2100	22	630	3300	3.06 J2	< 9.1	< 9.1	< 9.1	< 9.1
RIMW-8	10	12	240	< 9	< 9	11	12	6.77 J2	< 9	< 9	< 9	< 9	< 9	910	< 9	< 9	< 9	1100	12	440	1700	.49 J2	< 9	< 9	< 9	< 9
RIMW-8	12	14	1100	< 8.5	< 8.5	42	59	110	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	1700	< 8.5	< 8.5	< 8.5	890	13	400	1600	2.63 J2	< 8.5	< 8.5	< 8.5	< 8.5
RIMW-8	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	25	27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8-DUP	10	12	260 J2	< 8.8	< 8.8	12	7.16 J2	5.31 J2	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	610 J2	< 8.8	< 8.8	< 8.8	1200 J2	13	450 J2	1700 J2	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8
RIPZ-3	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3	18	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	0	1	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	.79 J2	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-56	4	6	< 8.9	< 8.9	< 8.9	< 8.9	1.66 J2	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	.43 J2	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-56	8	10	< 9.9	< 9.9	< 9.9	< 9.9	.62 J2	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	1.31 J2	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	140	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9
RISB-56	12	14	< 8.7	< 8.7	< 8.7	< 8.7	2.05 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	5.06 J2	< 8.7	< 8.7	< 8.7	6200	56	910	12000	< 8.7	< 8.7	< 8.7	< 8.7	1.93 J2

Table D-5
Phase II Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																							
			1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-57	0	1	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7
RISB-57	3	5	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	51 J	2.25 J2J	< 15	< 15	< 15	< 15
RISB-57	10	14	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	1.63 J2J	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	25 J	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	11 J	< 9.8	< 9.8	< 9.8	< 9.8
RISB-57	14	18	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	1.15 J2J	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	30 J	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	3.8 J2J	9 J	< 8.3	< 8.3	< 8.3	< 8.3
RISB-57	18	22	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	4.78 J2	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	.52 J2	< 8.9	< 8.9	< 8.9	< 8.9
RISB-58	0	1	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.8	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-58	4	6	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 9.9	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-58	10	12	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9
RISB-58	14	16	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-58	18	20	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.4	< 9.7	< 9.7	< 9.4	< 9.7	< 9.7	< 9.4	< 9.4	< 9.7	< 9.7	< 9.7	< 9.4	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-59	0	1	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 10	< 9.7	< 9.7	< 9.7	< 10	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-59	4	6	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.3	< 8.2	< 8.2	< 8.2	< 8.3	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-59	10	12	7.68 J2	< 8	6.43 J2	< 8	1.14 J2	12	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8
RISB-59	12	14	4.78 J2	< 8.7	< 8.7	< 8.7	< 8.7	.99 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	2.91 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7
RISB-59-DUP	12	14	1.52 J2	< 8.2	< 8.2	< 8.2	< 8.2	1.33 J2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	.3 J2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-61	10	12	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	.53 J2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2
RISB-61	16	18	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 8.6	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 8.6	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7
RISB-61	20	22	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 9.7	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-62	0	1	< 11	< 11	< 11	7.42 J2	< 11	< 11	1.42 J2	3.58 J2	< 11	< 11	7.03 J2	< 11	< 11	< 11	4.86 J2	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
RISB-62	4	6	< 9.7	< 9.1	< 9.1	210	.54 J2	5.11 J2	2.08 J2	8.88 J2	< 9.1	< 9.1	8200	720	3.12 J2	110	1700	< 9.1	< 9.1	< 9.7	< 9.1	4.25 J2	< 9.1	< 9.1	< 9.1	< 9.1
RISB-62	8	10	< 9.2	< 9.2	< 9.2	280	< 9.2	1.64 J2	1.84 J2	5.11 J2	< 9.2	< 9.2	5900	880	2.35 J2	75	1200	< 9.2	< 9.2	4.47 J2	< 9.2	2.56 J2	< 9.2	< 9.2	< 9.2	< 9.2
RISB-62	12	14	< 9.5	< 9.5	< 9.5	120	< 9.5	< 9.5	< 9.5	1.39 J2	< 9.5	< 9.5	1100	610	.66 J2	8.73 J2	130	< 9.5	< 9.5	4.64 J2	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5
RISB-62-DUP	12	14	< 8.5	< 8.5	< 8.5	210 J2	.44 J2	2.99 J2	1.35 J2	2.79 J2	< 8.5	< 8.5	970 J2	770 J2	1.65 J2	30	380 J2	< 8.5	< 8.5	5.66 J2	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RISB-63	0	1	< 10	< 10	< 10	< 10	.6 J2	4.81 J2	1.95 J2	2.96 J2	< 10	< 10	19	8.87 J2	< 10	< 10	3.23 J2	2.81 J2	< 10	< 10	270	.64 J2	< 10	< 10	< 10	< 10
RISB-63	4	6	< 9.3	< 9.3	< 9.3	1.54 J2	4.02 J2	6.1 J2	< 9.3	< 9.3	< 9.3	< 9.3	120	360	< 9.3	2.23 J2	27	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3
RISB-63	8	10	< 10	< 10	< 10	4.21 J2	3.93 J2	3.88 J2	< 10	1.26 J2	< 10	< 10	360	940	< 10	3.31 J2	41	< 10	< 10	< 10	< 10	1.49 J2	< 10	< 10	< 10	< 10
RISB-63	14	16	< 8.9	< 8.9	< 8.9	10	3.55 J2	1.51 J2	< 8.9	< 8.9	< 8.9	< 8.9	130	910	< 8.9	2.38 J2	30	< 8.9	< 8.9	< 8.9	< 8.9	1.31 J2	< 8.9	< 8.9	< 8.9	< 8.9
RISB-63	16	18	< 8.7	< 8.7	< 8.7	2.69 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	19	530	< 8.7	< 8.7	3.11 J2	< 8.7	< 8.7	< 8.7	5.17 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7
RISB-64	0	5	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	1100	930	< 500	< 500	227 J2	510	< 500	1800	3900	155 J2	< 500	< 500	< 500	< 500
RISB-64	5	10	< 550	< 550	< 550	< 550	< 550	80.3 J2	< 550	< 550	< 550	< 550	3600	11000	< 550	55.6 J2	640	5000	< 550	17000	24000	2100	< 550	< 550	< 550	< 550
RISB-64	10	15	< 620	< 620	< 620	< 620	< 620	< 620	< 620	< 620	< 620	< 620	41.7 J2	9300	< 620	< 620	< 620	2800	< 620	6700	36000	281 J2	< 620	< 620	< 620	< 620
RISB-65	0	5	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	< 540	8000	< 540	10000	9800	329 J2	< 540	< 540	< 540	< 540
RISB-65	5	10	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	23000	< 550	12000	31000	24.8 J2	< 550	< 550	< 550	< 550
RISB-65	10	15	< 550	< 550	< 550	< 550	155 J2	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	< 550	18000	< 550	16000	28000	118 J2	< 550	< 550	< 550	< 550
RISB-65	15	20	< 10	< 10	< 10	< 10	281 J2	12	< 10	< 10	< 10	< 10	.27 J2	5.48 J2	< 10	< 10	< 10	520	39	2000	1200	91	< 10	< 10	< 10	< 10
RISB-66	0	5	< 9.3	< 9.3	< 9.3	< 9.3	1.62 J2	10	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	17	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3
RISB-66	5	9	< 10	< 10	< 10	< 10	3.83 J2	33	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.44 J2	< 10	< 10	< 10	< 10
RISB-67	0	5	< 10	< 10	< 10	< 10	< 10	8.04 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-67	5	10	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4

Table D-5
Phase II Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																							
			Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether	Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RIMW-1	10	12	< 8.5	< 8.5	2.41 J2	< 8.5	1.78 J2	< 8.5	1100	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	.98 J2	2.37 J2	< 8.5	71	1.41 J2	1.64 J2	< 8.5	1700	< 8.5
RIMW-1	12	14	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	81	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	< 8.1	3.16 J2	< 8.1	< 8.1	< 8.1	83	< 8.1
RIMW-13	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	8	10	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	310	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	2.61 J2	< 9.1	< 9.1	24	< 9.1	< 9.1	< 9.1	29	< 9.1
RIMW-19	12	14	< 20	< 20	< 20	< 20	< 20	< 20	140	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	4.92 J2	< 20	< 20	< 20	4.55 J2	< 20
RIMW-19	16	18	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	63	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	.96 J2	< 8.3	< 8.3	6.81 J2	< 8.3	< 8.3	< 8.3	7.23 J2	< 8.3
RIMW-1-DUP	12	14	< 8	< 8	< 8	< 8	< 8	< 8	460	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	.99 J2	< 8	7.17 J2	.52 J2	< 8	< 8	590	< 8
RIMW-5	0	1	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	< 8.8	.61 J2	< 8.8
RIMW-5	4	6	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	1.44 J2	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	8.51 J2	< 9.9	< 9.9	< 9.9	32	27
RIMW-5	12	14	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	< 9.1	2.95 J2	.91 J2
RIMW-5	18	20	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	.8 J2	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	.69 J2	< 8.3
RIMW-6	0	1	2.85 J2	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	3400	< 7.7	< 7.7	< 7.7	< 7.7	1.88 J2	1.19 J2	< 7.7	< 7.7	6.86 J2	< 7.7	< 7.7	800	7.44 J2	19	< 7.7	31	< 7.7
RIMW-6	4	6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	23000	< 9.6	< 9.6	< 9.6	< 9.6	3.07 J2	.72 J2	< 9.6	< 9.6	3.91 J2	.72 J2	< 9.6	3700	91	70	< 9.6	3200	< 9.6
RIMW-6	8	10	1.92 J2	< 10	< 10	< 10	< 10	< 10	3200	< 10	< 10	< 10	< 10	.52 J2	< 10	< 10	< 10	< 10	< 10	< 10	4.69 J2	7.08 J2	3.28 J2	< 10	16	< 10
RIMW-6	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	18	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	0	1	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	4.78 J2	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
RIMW-7	4	6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6	.71 J2	< 8.6	< 8.6	< 8.6	< 8.6	< 8.6
RIMW-7	8	10	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	1.1 J2	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5
RIMW-8	0	1	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	.57 J2	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	7.05 J2	< 9.7	< 9.7	< 9.7	< 9.7
RIMW-8	2	4	< 9.3	< 9.3	1.62 J2	72	< 9.3	< 9.3	30	< 9.3	.79 J2	< 9.3	< 9.3	79	3.85 J2	< 9.3	< 9.3	6.3 J2	24	< 9.3	15	25	< 9.3	< 9.3	2.54 J2	< 9.3
RIMW-8	4	6	< 9	< 9	8.83 J2	4.83 J2	4.06 J2	< 9	11	< 9	< 9	< 9	< 9	350	8.94 J2	< 9	< 9	13	130	< 9	87	7100	< 9	< 9	39	3.64 J2
RIMW-8	6	8	< 8.4	< 8.4	4.69 J2	1.09 J2	2.33 J2	< 8.4	4.91 J2	< 8.4	< 8.4	< 8.4	< 8.4	110	2.57 J2	< 8.4	< 8.4	< 8.4	100	< 8.4	16	7700	< 8.4	< 8.4	12	< 8.4
RIMW-8	8	10	< 9.1	< 9.1	7.05 J2	2.18 J2	6.24 J2	< 9.1	9.01 J2	< 9.1	< 9.1	< 9.1	< 9.1	280	8.21 J2	< 9.1	< 9.1	18	210	< 9.1	120	9000	< 9.1	< 9.1	57	7.37 J2
RIMW-8	10	12	< 9	< 9	1.09 J2	< 9	1.24 J2	< 9	1.31 J2	< 9	< 9	< 9	< 9	29	.7 J2	< 9	< 9	< 9	42	< 9	7.54 J2	1200	< 9	< 9	4.59 J2	< 9
RIMW-8	12	14	< 8.5	< 8.5	1.42 J2	< 8.5	8.19 J2	< 8.5	6.17 J2	< 8.5	< 8.5	< 8.5	< 8.5	96	1.8 J2	< 8.5	< 8.5	4.23 J2	< 8.5	< 8.5	49	2500	< 8.5	< 8.5	32	2.81 J2
RIMW-8	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	25	27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8-DUP	10	12	< 8.8	< 8.8	.84 J2	< 8.8	.88 J2	< 8.8	.94 J2	< 8.8	< 8.8	< 8.8	< 8.8	23	.64 J2	< 8.8	< 8.8	.96 J2	30	< 8.8	7.2 J2	690 J2	< 8.8	< 8.8	3.15 J2	< 8.8
RIPZ-3	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3	18	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	0	1	< 8.9	< 8.9	2.59 J2	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-56	4	6	< 8.9	< 8.9	.51 J2	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9
RISB-56	8	10	< 9.9	< 9.9	< 9.9	2.79 J2	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9
RISB-56	12	14	< 8.7	< 8.7	< 8.7	6.96 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	3.3 J2	< 8.7	< 8.7	< 8.7	< 8.7	13	< 8.7	< 8.7	66	< 8.7	< 8.7	< 8.7	< 8.7

Table D-5
Phase II Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs																							
			Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether	Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-57	0	1	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	.82 J2J	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7
RISB-57	3	5	3.8 J2J	< 15	< 15	< 15	< 15	< 15	180 J	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	2.13 J2J	< 15	< 15	2.78 J2J	< 15	< 15	< 15	25 J	< 15
RISB-57	10	14	< 9.8	< 9.8	2.54 J2J	< 9.8	< 9.8	< 9.8	600 J	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	.91 J2J	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	220 J	2.34 J2J	.69 J2J	< 9.8	320 J	< 9.8
RISB-57	14	18	< 8.3	< 8.3	2.07 J2J	< 8.3	< 8.3	< 8.3	740 J	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	.8 J2J	< 8.3	< 8.3	< 8.3	< 8.3	< 8.3	260 J	2.09 J2J	.9 J2J	< 8.3	340 J	< 8.3
RISB-57	18	22	< 8.9	< 8.9	.39 J2	< 8.9	< 8.9	< 8.9	68	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	83	< 8.9	< 8.9	< 8.9	47	< 8.9
RISB-58	0	1	< 9.4	< 9.4	< 9.4	< 9.4	.85 J2	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4
RISB-58	4	6	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RISB-58	10	12	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9
RISB-58	14	16	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
RISB-58	18	20	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.4	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-59	0	1	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
RISB-59	4	6	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-59	10	12	< 8	< 8	< 8	< 8	< 8	< 8	.57 J2	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	3.3 J2	< 8	< 8	1.54 J2	< 8	< 8	< 8	< 8	3.67 J2
RISB-59	12	14	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	.98 J2	< 8.7	< 8.7	2.12 J2	< 8.7	< 8.7	< 8.7	< 8.7
RISB-59-DUP	12	14	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2	< 8.2
RISB-61	10	12	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	.59 J2	< 9.2	< 9.2	< 9.2	1.05 J2	< 9.2
RISB-61	16	18	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	< 7.7	1.12 J2	< 7.7
RISB-61	20	22	< 10	< 10	< 10	< 10	< 10	< 10	.58 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5.77 J2	< 10
RISB-62	0	1	< 11	< 11	1.42 J2	< 11	1.23 J2	< 11	3.26 J2	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	5.37 J2	.87 J2	< 11	< 11	2.99 J2	< 11
RISB-62	4	6	< 9.1	< 9.1	320	< 9.1	17	< 9.1	27	< 9.1	< 9.1	< 9.1	< 9.1	.54 J2	< 9.1	< 9.1	< 9.1	< 9.1	1.16 J2	< 9.1	14	13	< 9.1	< 9.1	78	< 9.1
RISB-62	8	10	< 9.2	< 9.2	310	< 9.2	14	< 9.2	26	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	< 9.2	1.33 J2	< 9.2	6.2 J2	4.3 J2	< 9.2	< 9.2	40	< 9.2
RISB-62	12	14	< 9.5	< 9.5	15	< 9.5	5.24 J2	< 9.5	7.87 J2	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	.96 J2	< 9.5	.83 J2	.47 J2	< 9.5	< 9.5	6.35 J2	< 9.5
RISB-62-DUP	12	14	< 8.5	< 8.5	44	< 8.5	15	< 8.5	26	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	1.35 J2	< 8.5	7.81 J2	.9 J2	< 8.5	< 8.5	38	< 8.5
RISB-63	0	1	< 10	< 10	4.01 J2	< 10	< 10	< 10	5.71 J2	< 10	< 10	< 10	< 10	.54 J2	< 10	< 10	< 10	1.29 J2	< 10	< 10	< 10	.71 J2	< 10	< 10	1.98 J2	< 10
RISB-63	4	6	< 9.3	< 9.3	3.39 J2	< 9.3	4.07 J2	< 9.3	93	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	.91 J2	< 9.3	.54 J2	.91 J2	< 9.3	< 9.3	50	< 9.3
RISB-63	8	10	< 10	< 10	3.3 J2	< 10	8.28 J2	< 10	81	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.26 J2	< 10	< 10	.56 J2	< 10	< 10	58	< 10
RISB-63	14	16	< 8.9	< 8.9	2.2 J2	< 8.9	5.15 J2	< 8.9	39	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	1.16 J2	< 8.9	< 8.9	< 8.9	< 8.9	< 8.9	24	< 8.9
RISB-63	16	18	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	2.32 J2	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	< 8.7	.61 J2	< 8.7
RISB-64	0	5	< 500	< 500	< 500	< 500	< 500	< 500	11000	< 500	< 500	< 500	< 500	1100	138 J2	< 500	< 500	3100	45.2 J2	< 500	1900	17000	< 500	< 500	2700	< 500
RISB-64	5	10	< 550	< 550	207 J2	< 550	750	< 550	58000	< 550	< 550	< 550	< 550	33000	4400	< 550	< 550	85000	402 J2	< 550	72000	370000	39.1 J2	< 550	150000	< 550
RISB-64	10	15	< 620	< 620	62.2 J2	< 620	150 J2	< 620	5200	< 620	< 620	< 620	< 620	62.1 J2	< 620	< 620	< 620	< 620	237 J2	< 620	1200	2500	< 620	< 620	16000	< 620
RISB-65	0	5	< 540	< 540	< 540	< 540	< 540	< 540	110 J2	< 540	< 540	< 540	< 540	3700	173 J2	< 540	< 540	570	< 540	< 540	< 540	45000	< 540	< 540	120 J2	< 540
RISB-65	5	10	< 550	< 550	< 550	< 550	< 550	< 550	39.6 J2	< 550	< 550	< 550	< 550	112 J2	< 550	< 550	< 550	< 550	< 550	< 550	< 550	2800	< 550	< 550	27 J2	< 550
RISB-65	10	15	< 550	< 550	< 550	< 550	< 550	< 550	302 J2	< 550	< 550	< 550	< 550	310 J2	< 550	< 550	< 550	< 550	< 550	< 550	< 550	12000	< 550	< 550	< 550	< 550
RISB-65	15	20	< 10	< 10	1.34 J2	15	< 10	< 10	436 J2	< 10	< 10	< 10	< 10	46 J2	9.22 J2	< 10	.86 J2	< 10	3.24 J2	< 10	4.1 J2	1500	4.06 J2	< 10	.56 J2	< 10
RISB-66	0	5	< 9.3	< 9.3	< 9.3	7.45 J2	< 9.3	< 9.3	.84 J2	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	< 9.3	1.41 J2	3.65 J2	< 9.3	< 9.3	.4 J2	< 9.3
RISB-66	5	9	< 10	< 10	< 10	< 10	< 10	< 10	4.07 J2	< 10	< 10	< 10	< 10	< 10	.61 J2	< 10	< 10	1.49 J2	< 10	< 10	11	1.94 J2	< 10	< 10	3.02 J2	< 10
RISB-67	0	5	< 10	< 10	< 10	< 10	< 10	< 10	.73 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	41	2.3 J2	< 10	< 10	12	< 10
RISB-67	5	10	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	< 9.4	.77 J2	1.03 J2	< 9.4	< 9.4	.64 J2	< 9.4

CDM

Table D-5
Phase II Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs		SVOCs																									
			Vinyl chloride	Xylenes (Total)	1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline	4,6-Dinitro-o-cresol	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol	Acenaphthene	Acenaphthylene	Acetophenone
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RIMW-1	10	12	9	< 8.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1	12	14	< 8.1	< 8.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-13	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	8	10	6.14 J2	< 9.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	12	14	2.41 J2	< 20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	16	18	< 8.3	< 8.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1-DUP	12	14	< 8	< 8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	0	1	< 8.8	< 8.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	4	6	< 9.9	< 9.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	12	14	< 9.1	< 9.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	18	20	< 8.3	< 8.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	0	1	4.68 J2	6.06 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	4	6	370	27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	8	10	7.47 J2	3.49 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	18	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	0	1	< 9.6	< 9.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	4	6	< 8.6	< 8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	8	10	< 8.5	< 8.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	0	1	< 9.7	1.64 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	2	4	< 9.3	300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	4	6	< 9	1400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	6	8	< 8.4	1200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	8	10	< 9.1	1100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	10	12	< 9	130	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	12	14	< 8.5	370 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	25	27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8-DUP	10	12	< 8.8	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3	18	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	0	1	< 8.9	< 8.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	4	6	< 8.9	< 8.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	8	10	< 9.9	< 9.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	12	14	< 8.7	15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-5
Phase II Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	VOCs		SVOCs																									
			Vinyl chloride	Xylenes (Total)	1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline	4,6-Dinitro-o-cresol	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol	Acenaphthene	Acenaphthylene	Acetophenone
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-57	0	1	< 8.7	< 8.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	3	5	8.54 J2J	< 15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	10	14	32 J	1.76 J2J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	14	18	22 J	1.79 J2J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	18	22	< 8.9	< 8.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	0	1	< 9.4	< 9.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	4	6	< 10	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	10	12	< 9.9	< 9.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	14	16	< 9	< 9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	18	20	< 9.7	< 9.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	0	1	< 9.7	< 9.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	4	6	< 8.2	< 8.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	10	12	< 8	< 8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	12	14	< 8.7	< 8.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59-DUP	12	14	< 8.2	< 8.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-61	10	12	< 9.2	< 9.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-61	16	18	< 7.7	< 7.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-61	20	22	< 10	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	0	1	< 11	< 11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	4	6	1 J2	2.27 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	8	10	< 9.2	1.35 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	12	14	< 9.5	< 9.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62-DUP	12	14	< 8.5	.68 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	0	1	< 10	1.81 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	4	6	1.31 J2	.78 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	8	10	1.04 J2	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	14	16	< 8.9	< 8.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	16	18	< 8.7	< 8.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-64	0	5	56.7 J2	5500	< 430	< 1100	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 430	300 J2	< 430	< 1100	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	< 430	< 1100	< 1100	< 430	< 430	< 430
RISB-64	5	10	85.8 J2	160000	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	380 J2	< 420	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420
RISB-64	10	15	< 620	306 J2	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420
RISB-65	0	5	< 540	16000	< 410	< 1000	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410	< 1000	< 1000	< 410	< 410	< 410
RISB-65	5	10	< 550	560	< 390	< 980	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390	< 980	< 980	< 390	< 390	< 390	< 980	< 980	< 390	< 390	< 390
RISB-65	10	15	< 550	1300	< 420	< 1100	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420	< 1100	< 1100	< 420	< 420	< 420
RISB-65	15	20	2.81 J2	174 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-66	0	5	5.32 J2	< 9.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-66	5	9	13	.73 J2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-67	0	5	< 10	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-67	5	10	< 9.4	< 9.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-5
Phase II Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																											
			Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Biphenyl	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RIMW-1	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-13	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	16	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1-DUP	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	18	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	18	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	2	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	6	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	25	27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8-DUP	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3	18	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-5
Phase II Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs																											
			Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Biphenyl	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
RISB-57	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	3	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	10	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	14	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	18	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	18	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59-DUP	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-61	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-61	16	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-61	20	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62-DUP	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	16	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-64	0	5	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	6800	< 430	< 430	< 430	1800	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430	< 430
RISB-64	5	10	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	4200	< 420	< 420	< 420	1800	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-64	10	15	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-65	0	5	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	300 J2	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410
RISB-65	5	10	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	990	260 J2	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390
RISB-65	10	15	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420
RISB-65	15	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-66	0	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-66	5	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-67	0	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-67	5	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-5
Phase II Soil Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs												Other
			Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	Total Organic Carbon
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	mg/kg
RIMW-1	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-13	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 101
RIMW-19	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	16	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1-DUP	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5	18	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	167
RIMW-6	18	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 104
RIMW-7	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-7	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	2	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	6	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-8	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 113
RIMW-8	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 108
RIMW-8	25	27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	415
RIMW-8-DUP	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4760
RIPZ-3	18	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 107
RISB-56	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-56	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-5

Phase II Soil Sampling Results

Remedial Investigation Report

September 2008

Rock Hill, South Carolina

Location	Start Depth (ft)	End Depth (ft)	SVOCs												Other
			Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	Total Organic Carbon
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	mg/kg
RISB-57	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	3	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	10	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	14	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-57	18	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-58	18	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-59-DUP	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-61	10	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-61	16	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-61	20	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-62-DUP	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	0	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	4	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	8	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	14	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-63	16	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-64	0	5	< 430	< 430	< 430	270 J2	< 430	< 430	< 430	< 430	< 1100	< 430	< 430	< 430	NA
RISB-64	5	10	< 420	< 420	< 420	640	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	NA
RISB-64	10	15	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	NA
RISB-65	0	5	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 410	< 1000	< 410	< 410	< 410	NA
RISB-65	5	10	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 390	< 980	< 390	< 390	< 390	NA
RISB-65	10	15	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 420	< 1100	< 420	< 420	< 420	NA
RISB-65	15	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-66	0	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-66	5	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-67	0	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RISB-67	5	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

D-6 Phase II Groundwater

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
BP-1A			< 10	< 10	< 10	< 10	.43 J2	.87 J2	< 10	< 10	< 10	< 10	.61 J2	.42 J2	< 10
BP-1B			1.63 J2	< 10	1.74 J2	.75 J2	6.18 J2	22	< 10	.84 J2	< 10	< 10	.36 J2	1.27 J2	< 10
EW-1			2.16 J2	< 10	2.83 J2	1.73 J2	72	94	< 10	< 10	< 10	< 10	3.25 J2	3200	< 10
EW-4			1.38 J2	< 10	< 10	< 10	82	22	< 10	< 10	< 10	< 10	3.06 J2	97	< 10
MW-100			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-101			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-102			< 10	< 10	< 10	< 10	.4 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-103			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-104			< 10	< 10	< 10	< 10	1.47 J2	.52 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-105			< 10	< 10	< 10	< 10	.35 J2	2.03 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-106			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-107			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-108			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-111			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.36 J2	< 10	< 10
MW-112			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-113A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-113B			< 10	< 10	< 10	< 10	.72 J2	2.82 J2	< 10	< 10	< 10	< 10	< 10	.18 J2	< 10
MW-114			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-115A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-115B			< 10	< 10	< 10	< 10	1.45 J2	6.68 J2	< 10	< 10	< 10	< 10	< 10	6.61 J2	< 10
MW-116			< 10	< 10	< 10	< 10	7.21 J2	< 10	< 10	< 10	< 10	< 10	< 10	8.88 J2	< 10
MW-117			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.29 J2	< 10	< 10
MW-117-DUP			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.19 J2	< 10	< 10
MW-118			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-119			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-120A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-120B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-122B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.46 J2	< 10
MW-123A			< 250	< 250	< 250	9 J2	21.5 J2	4.5 J2	< 250	< 250	< 250	< 250	2500	4900	< 250
MW-123B			< 10	< 10	< 10	7.74 J2	25	15	< 10	1.14 J2	< 10	< 10	1400	2300	< 10
OB-109			< 10	< 10	< 10	< 10	4.57 J2	1.28 J2	< 10	< 10	< 10	< 10	< 10	.33 J2	< 10
OB-109B			2.97 J2	< 10	< 10	< 10	15	39	< 10	< 10	< 10	< 10	< 10	1.57 J2	< 10
OB-11			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2.94 J2	< 10
OB-110A			55.3 J2	< 100	< 100	< 100	160	71.5 J2	< 100	< 100	< 100	< 100	1.9 J2	46.6 J2	< 100
OB-110B			< 10	< 10	< 10	< 10	2.47 J2	< 10	< 10	< 10	< 10	< 10	< 10	8.34 J2	< 10
OB-12			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.04 J2	< 10
OB-13			< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000
OB-21			< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
OB-22			< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000
OB-23			< 10	< 10	< 10	< 10	7.66 J2	< 10	< 10	< 10	< 10	< 10	< 10	2.77 J2	< 10
OB-8A			310	< 10	7.64 J2	4.98 J2	232.5 J2	71	< 10	< 10	< 10	< 10	14	540	.53 J2
OB-900			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
OB-901			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
OB-902			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
P-1			3.23 J2	< 10	< 10	1.07 J2	89	100	< 10	.2 J2	< 10	< 10	2.53 J2	2600	.66 J2
P-2			< 10	< 10	< 10	< 10	1.36 J2J1M	< 10	< 10	< 10	< 10	< 10	< 10	4.51 J2J1M	< 10
P-3			13	< 10	6.55 J2	2.38 J2	45	100	< 10	< 10	< 10	< 10	3.29 J2	6200	< 10
PW-1			< 10	< 10	< 10	< 10	< 10	< 10	< 10	.33 J2	< 10	< 10	< 10	< 10	< 10
PW-2A			< 500	< 500	< 500	< 500	< 500	< 500	374 J2	126 J2	< 500	< 500	27.5 J2	< 500	< 500
RIMW-1			9.44 J2	< 10	< 10	3.8 J2	177 J2	247 J2	< 10	< 10	< 10	< 10	3.71 J2	267 J2	< 10
RIMW-10			< 10	< 10	< 10	< 10	< 10	1.31 J2	< 10	< 10	< 10	< 10	< 10	1100	< 10
RIMW-11			< 10	< 10	< 10	< 10	310	2.3 J2	< 10	< 10	< 10	< 10	< 10	.41 J2	< 10
RIMW-12			7.73 J2	< 10	< 10	< 10	< 10	1.12 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RIMW-13			< 10	< 10	< 10	< 10	.51 J2	.22 J2	< 10	< 10	< 10	< 10	< 10	.79 J2	< 10
RIMW-14			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15			3.5 J2	< 10	< 10	1.17 J2	2.25 J2	12	< 10	< 10	< 10	< 10	< 10	2.31 J2	< 10
RIMW-15-DUP			3.28 J2	< 10	< 10	1.2 J2	2.34 J2	11	< 10	< 10	< 10	< 10	< 10	2.06 J2	< 10
RIMW-16			20	< 10	15	1.82 J2	20	69	< 10	< 10	< 10	< 10	3.96 J2	4.3 J2	< 10
RIMW-18			< 10	< 10	< 10	< 10	< 10	1.85 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-18	44	56	< 10	< 10	< 10	< 10	< 10	1.2 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-18	56	68	< 10	< 10	< 10	< 10	< 10	2.14 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-19			8.66 J2	< 10	1.13 J2	1.56 J2	15	45	< 10	< 10	< 10	< 10	< 10	28	< 10
RIMW-19	63	75	10	< 10	< 10	1.24 J2	18	60	< 10	< 10	< 10	< 10	< 10	460	< 10
RIMW-19	76	88	8.92 J2	< 10	< 10	1.24 J2	15	56	< 10	< 10	< 10	< 10	.56 J2	3000	< 10
RIMW-3			124 J2	< 10	< 10	1.77 J2	92	640	< 10	< 10	< 10	< 10	.36 J2	13000	< 10
RIMW-4			2.9 J2	< 10	35	7.41 J2	232 J2	245 J2	< 10	< 10	< 10	< 10	6.35 J2	7800	1.34 J2
RIMW-4-DUP			2.76 J2	< 10	32	7.15 J2	227 J2	233 J2	< 10	< 10	< 10	< 10	5.63 J2	7800	1.15 J2
RIMW-5			30 J1M	< 10	8.58 J1MJ2	6.86 J1MJ2	52 J1M	349 J2	< 10	< 10	< 10	< 10	8.03 J1MJ2	52000	< 10
RIMW-5-DUP			31 J1M	< 10	9.24 J1MJ2	7.34 J1MJ2	55 J1M	370	< 10	< 10	< 10	< 10	9.15 J1MJ2	53000 J	< 10
RIMW-6			35	< 10	< 10	2.79 J2	2.83 J2	35	< 10	< 10	< 10	< 10	< 10	3.18 J2	< 10
RIMW-7			< 10	< 10	< 10	< 10	1.07 J2	1.75 J2	< 10	< 10	< 10	< 10	< 10	.58 J2	< 10
RIMW-8			47000	< 2000	< 2000	140 J2	7000	9000	< 2000	< 2000	< 2000	< 2000	< 2000	19000	< 2000
RIMW-8-DUP			47000	< 2000	< 2000	146 J2	7400	7200	< 2000	< 2000	< 2000	< 2000	< 2000	19000	< 2000
RIMW-9			< 10	< 10	< 10	< 10	120	6.48 J2	< 10	< 10	< 10	< 10	.26 J2B	< 10	< 10
RIMW-9-DUP			< 10	< 10	< 10	< 10	110	5.07 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIPZ-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3			< 10	< 10	1.31 J2	1.05 J2	27	96	< 10	< 10	< 10	< 10	.71 J2	680	< 10
RIPZ-3-DUP			< 10	< 10	1.3 J2	1.83 J2	27	97	< 10	< 10	< 10	< 10	1.03 J2	660	< 10
RITW-64			< 10	< 10	< 10	.75 J2	470	20	< 10	< 10	< 10	< 10	2.13 J2	199.6 J2	< 10
RITW-65			14	< 10	< 10	5.15 J2	560	180 J2	< 10	< 10	< 10	< 10	1.07 J2	19	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
W-1			5.78 J2	< 10	< 10	1.37 J2	7.34 J2	24	< 10	< 10	< 10	< 10	< 10	1.17 J2	< 10
W-2			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W-4			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.34 J2	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
BP-1A			< 10	< 10	< 10	< 10	< 10	< 10	.45 J2	< 10	< 10	< 10	< 10	< 10	< 10
BP-1B			< 10	< 10	< 10	< 10	< 10	< 10	.34 J2	< 10	< 10	< 10	< 10	< 10	< 10
EW-1			.42 J2	< 10	< 10	< 10	< 10	< 10	1.94 J2	< 10	< 10	< 10	< 10	< 10	< 10
EW-4			< 10	< 10	< 10	< 10	< 10	< 10	6.41 J2	< 10	< 10	< 10	< 10	< 10	< 10
MW-100			< 10	< 10	< 10	< 10	< 10	.94 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-101			< 10	< 10	< 10	< 10	< 10	1.26 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-102			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-103			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-104			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-105			< 10	< 10	< 10	< 10	< 10	1.54 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-106			< 10	< 10	< 10	< 10	< 10	1.38 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-107			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-108			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-111			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-112			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-113A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-113B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-114			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-115A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-115B			< 10	< 10	< 10	< 10	< 10	< 10	.18 J2	< 10	< 10	< 10	< 10	< 10	< 10
MW-116			< 10	< 10	< 10	< 10	< 10	< 10	120	< 10	< 10	< 10	< 10	< 10	< 10
MW-117			.38 J2	< 10	< 10	< 10	< 10	< 10	2.39 J2	< 10	< 10	< 10	< 10	< 10	< 10
MW-117-DUP			.35 J2	< 10	< 10	< 10	< 10	< 10	2.43 J2	< 10	< 10	< 10	< 10	< 10	< 10
MW-118			.46 J2	< 10	< 10	< 10	< 10	< 10	23	< 10	< 10	< 10	< 10	< 10	< 10
MW-119			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-120A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-120B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-122B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-123A			101.5 J2	1300	190 J2	16.25 J2	51.25 J2	900	16.25 J2	< 250	< 250	< 250	< 250	< 250	< 250
MW-123B			110	1100	210	21	59	860	17	< 10	< 10	< 10	< 10	< 10	< 10
OB-109			< 10	< 10	< 10	< 10	< 10	1.65 J2	.66 J2	< 10	< 10	< 10	< 10	< 10	< 10
OB-109B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
OB-11			< 10	< 10	< 10	< 10	< 10	< 10	100	< 10	< 10	< 10	< 10	< 10	< 10
OB-110A			< 100	< 100	< 100	< 100	< 100	< 100	33.9 J2	< 100	< 100	< 100	< 100	< 100	< 100
OB-110B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
OB-12			< 10	< 10	< 10	12	< 10	4.13 J2	36	< 10	< 10	< 10	< 10	< 10	< 10
OB-13			< 10000	< 10000	< 10000	< 10000	< 10000	22000	18000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000
OB-21			< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	306 J2	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
OB-22			< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	1050 J2	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000
OB-23			< 10	< 10	< 10	< 10	< 10	< 10	69	< 10	< 10	< 10	< 10	< 10	< 10
OB-8A			< 10	.61 J2	550	55	900	810	20	< 10	< 10	< 10	< 10	< 10	< 10
OB-900			< 10	< 10	< 10	< 10	< 10	9.82 J1M	60	< 10	< 10	< 10	< 10	< 10	< 10
OB-901			< 10	< 10	6.02 J2	< 10	2.62 J2	32	13	< 10	< 10	< 10	< 10	< 10	< 10
OB-902			< 10	< 10	< 10	< 10	< 10	< 10	2.88 J2	< 10	< 10	< 10	< 10	< 10	< 10
P-1			.52 J2	1.02 J2	< 10	< 10	< 10	< 10	1.08 J2	< 10	< 10	< 10	< 10	< 10	< 10
P-2			< 10	< 10	< 10	< 10	< 10	< 10	91 J1M	< 10	< 10	< 10	< 10	1.22 J2J1M	< 10
P-3			< 10	.76 J2	< 10	< 10	< 10	< 10	1.5 J2	< 10	< 10	< 10	< 10	< 10	< 10
PW-1			.55 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
PW-2A			< 500	< 500	< 500	< 500	< 500	< 500	54 J2	< 500	< 500	< 500	< 500	< 500	< 500
RIMW-1			.48 J2	1.07 J2	< 10	< 10	< 10	< 10	45	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-10			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-11			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	6.27 J2	< 10	< 10	< 10	< 10
RIMW-12			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RIMW-13			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-14			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15			< 10	< 10	< 10	< 10	< 10	< 10	1.95 J2	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15-DUP			< 10	< 10	< 10	< 10	< 10	< 10	1.76 J2	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-16			< 10	1.05 J2	< 10	< 10	4.26 J2	3.53 J2J	16	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-18			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	3.23 J2	< 10	< 10	< 10	< 10
RIMW-18	44	56	< 10	< 10	< 10	< 10	5.23 J2	< 10	< 10	< 10	3.77 J2	< 10	< 10	< 10	< 10
RIMW-18	56	68	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	3.86 J2	< 10	< 10	< 10	< 10
RIMW-19			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-19	63	75	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-19	76	88	< 10	< 10	< 10	< 10	< 10	< 10	.36 J2	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-3			.37 J2	< 10	< 10	< 10	< 10	< 10	12	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-4			.43 J2	1.43 J2	< 10	< 10	< 10	2.33 J2	31	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-4-DUP			.38 J2	.55 J2	< 10	< 10	< 10	< 10	30	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-5			.49 J1MJ2	1.97 J1MJ2	< 10	< 10	< 10	< 10	5.27 J1MJ2	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-5-DUP			.52 J1MJ2	2.72 J1MJ2	< 10	< 10	< 10	< 10	5.69 J1MJ2	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-6			< 10	< 10	< 10	< 10	130	880	6.82 J2	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-7			.32 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-8			< 2000	< 2000	3200	178 J2	1810 J2	4400	58 J2	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000
RIMW-8-DUP			< 2000	< 2000	3100	108 J2	1774 J2	4400	58 J2	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000
RIMW-9			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-9-DUP			< 10	< 10	< 10	< 10	< 10	1.32 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIPZ-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3			< 10	< 10	12	< 10	< 10	< 10	1.03 J2	< 10	< 10	< 10	< 10	< 10	< 10
RIPZ-3-DUP			< 10	.61 J2	12	< 10	< 10	< 10	1.05 J2	< 10	< 10	< 10	< 10	< 10	< 10
RITW-64			< 10	.5 J2	8.52 J2	< 10	20	75	25	< 10	2.45 J2	< 10	< 10	< 10	< 10
RITW-65			< 10	.69 J2	87	< 10	74	130	14	< 10	< 10	< 10	< 10	< 10	< 10

CDM

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
W-1			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W-2			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W-4			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
BP-1A			1.02 J2	< 10	< 10	< 10	39	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BP-1B			1.13 J2	< 10	.38 J2	< 10	670	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EW-1			71	31	1.29 J2	< 10	148 J2	< 10	< 10	< 10	< 10	.14 J2	.72 J2	< 10	.52 J2
EW-4			110	400	< 10	< 10	6.58 J2	< 10	< 10	< 10	< 10	140	7.4 J2	< 10	.41 J2
MW-100			.52 J2B	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-101			.54 J2B	< 10	< 10	< 10	1.87 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-102			< 10	< 10	1.34 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-103			< 10	< 10	< 10	< 10	.92 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-104			< 10	< 10	< 10	< 10	2.93 J2	< 10	< 10	< 10	< 10	< 10	2 J2	< 10	< 10
MW-105			.52 J2B	< 10	.51 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-106			.51 J2B	< 10	.52 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-107			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-108			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-111			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-112			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-113A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-113B			< 10	< 10	< 10	< 10	41	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-114			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-115A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-115B			< 10	< 10	< 10	< 10	11	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-116			< 10	5.1 J2	< 10	< 10	5.22 J2	< 10	15	< 10	< 10	67	29	< 10	35
MW-117			6.62 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.21 J2	51	< 10	< 10
MW-117-DUP			6.69 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.2 J2	51	< 10	< 10
MW-118			72	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.55 J2	4.16 J2	< 10	13
MW-119			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	6.45 J2	< 10	2.14 J2
MW-120A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-120B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B			< 10	< 10	< 10	< 10	1.75 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-122B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-123A			3000	42.5 J2	< 250	< 250	1100	< 250	< 250	< 250	< 250	4 J2	< 250	< 250	< 250
MW-123B			3500	35	4.17 J2	< 10	680	< 10	< 10	< 10	< 10	4.56 J2	.95 J2	< 10	< 10
OB-109			< 10	< 10	< 10	< 10	41	< 10	< 10	< 10	< 10	< 10	.38 J2	< 10	.58 J2
OB-109B			< 10	< 10	1.12 J2	< 10	34	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
OB-11			< 10	< 10	< 10	< 10	.45 J2	< 10	7.7 J2	< 10	< 10	32	11	< 10	80
OB-110A			70.4 J2	1300	< 100	< 100	7.2 J2	< 100	< 100	< 100	< 100	640	32.4 J2	< 100	< 100
OB-110B			< 10	< 10	< 10	< 10	2.55 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
OB-12			< 10	< 10	< 10	< 10	.62 J2	< 10	7.34 J2	< 10	< 10	14	5.43 J2	< 10	43
OB-13			< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	63000	< 10000	< 10000	150000 J	100000	< 10000	< 10000
OB-21			< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	770 J2	< 1000	< 1000	3100	2900	< 1000	444 J2
OB-22			< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	< 10000	46000	36000	< 10000	< 10000
OB-23			1.45 J2	6.6 J2	< 10	< 10	< 10	< 10	15	< 10	< 10	91	41	< 10	100
OB-8A			460	1300	2.05 J2	14	23	< 10	< 10	< 10	< 10	310	9.97 J2	< 10	2.97 J2
OB-900			< 10	< 10	< 10	< 10	.57 J2	< 10	19	< 10	< 10	4.1 J2	56	< 10	8.7 J2
OB-901			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	11	8.15 J2	< 10	.42 J2
OB-902			< 10	< 10	< 10	< 10	.39 J2	< 10	< 10	< 10	< 10	6.83 J2	17	< 10	< 10
P-1			42	25	1.74 J2	< 10	120	< 10	< 10	< 10	< 10	.89 J2	.23 J2	< 10	< 10
P-2			< 10	12 J1M	< 10	< 10	.47 J2J1M	< 10	150 J1M	< 10	< 10	390 J1MJ	220 J1MJ	< 10	250 J1M
P-3			68	31	5.11 J2	< 10	205 J2	< 10	< 10	< 10	< 10	.14 J2	< 10	< 10	< 10
PW-1			< 10	< 10	< 10	< 10	4.69 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
PW-2A			14.5 J2	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	900	1300	< 500	302 J2
RIMW-1			20	< 10	16	< 10	3600	< 10	< 10	< 10	< 10	.54 J2	2.58 J2	< 10	< 10
RIMW-10			< 10	11	19	< 10	190 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-11			.28 J2	46	16	< 10	73	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-12			< 10	< 10	< 10	< 10	3.66 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RIMW-13			< 10	< 10	< 10	< 10	1.22 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-14			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15			< 10	< 10	< 10	< 10	3000	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15-DUP			< 10	< 10	< 10	< 10	2800	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-16			5.2 J2	< 10	< 10	3.83 J2	11000	< 10	< 10	< 10	< 10	1.64 J2	3.28 J2	< 10	< 10
RIMW-18			< 10	< 10	15	< 10	2.64 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-18	44	56	< 10	< 10	19	< 10	5.5 J2	< 10	< 10	< 10	< 10	1.78 J2	< 10	< 10	< 10
RIMW-18	56	68	< 10	< 10	19	< 10	6.06 J2	< 10	< 10	< 10	< 10	1.15 J2	< 10	< 10	< 10
RIMW-19			< 10	< 10	1.99 J2	< 10	69	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-19	63	75	< 10	< 10	2.18 J2	< 10	70	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-19	76	88	3.76 J2	5.89 J2	2.07 J2	< 10	50	< 10	< 10	< 10	< 10	.34 J2	< 10	< 10	< 10
RIMW-3			1.28 J2	1.14 J2	3.24 J2	< 10	151 J2	< 10	< 10	< 10	< 10	< 10	.92 J2	< 10	< 10
RIMW-4			110	31	21	3.95 J2	1100	< 10	15	< 10	< 10	< 10	27	< 10	1.95 J2
RIMW-4-DUP			110	28	20	< 10	1100	< 10	15	< 10	< 10	< 10	26	< 10	1.92 J2
RIMW-5			1.26 J1MJ2	8.33 J1MJ2	19 J1M	< 10	90 J1M	< 10	< 10	< 10	< 10	< 10	1.52 J1MJ2	< 10	< 10
RIMW-5-DUP			1.64 J1MJ2	8.74 J1MJ2	20 J1M	< 10	93 J1M	< 10	< 10	< 10	< 10	< 10	1.52 J1MJ2	< 10	< 10
RIMW-6			< 10	< 10	< 10	< 10	13000	< 10	< 10	< 10	< 10	3.39 J2	2.64 J2	< 10	< 10
RIMW-7			< 10	< 10	< 10	< 10	1.84 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-8			540 J2	3000	140 J2	< 2000	1536 J2	< 2000	< 2000	< 2000	< 2000	3000	64 J2	< 2000	< 2000
RIMW-8-DUP			530 J2	2700	134 J2	< 2000	1506 J2	< 2000	< 2000	< 2000	< 2000	3000	60 J2	< 2000	< 2000
RIMW-9			.58 J2B	< 10	3.98 J2	< 10	20	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-9-DUP			.54 J2B	< 10	3.79 J2	< 10	14	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIPZ-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3			15	27	1.51 J2	< 10	280	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIPZ-3-DUP			15	27	1.59 J2	< 10	290	< 10	< 10	< 10	< 10	.21 J2	< 10	< 10	< 10
RITW-64			1.88 J2	7.1 J2	12.51 J2	< 10	930	< 10	2.23 J2	< 10	< 10	8.17 J2	.42 J2	< 10	< 10
RITW-65			2.35 J2	47	2.17 J2	< 10	1000	< 10	< 10	< 10	< 10	25	.89 J2	< 10	.55 J2

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs												
			Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
W-1			< 10	< 10	1.72 J2	< 10	31	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W-2			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W-4			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs										
			Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
BP-1A			< 10	< 10	< 10	1.37 J2	.15 J2B	< 10	< 10	9.07 J2	< 10	1.4 J2	< 10
BP-1B			< 10	< 10	< 10	170	.15 J2B	7.82 J2	< 10	620	< 10	2.06 J2	< 10
EW-1			1.21 J2	3.39 J2	< 10	44 J2	.24 J2B	1.22 J2	< 10	130	1.55 J2	38	< 10
EW-4			3.95 J2	8.91 J2	< 10	1.48 J2	540	.57 J2	< 10	2.5 J2	< 10	14	280
MW-100			< 10	< 10	< 10	< 10	.12 J2B	< 10	< 10	< 10	< 10	< 10	< 10
MW-101			< 10	< 10	< 10	< 10	.18 J2B	< 10	< 10	< 10	< 10	< 10	< 10
MW-102			< 10	< 10	< 10	.27 J2	.23 J2	< 10	< 10	< 10	< 10	< 10	< 10
MW-103			< 10	< 10	< 10	.41 J2	.15 J2B	< 10	< 10	1.15 J2	< 10	< 10	< 10
MW-104			2.58 J2	< 10	< 10	1.64 J2	.12 J2B	< 10	< 10	1.79 J2	< 10	< 10	< 10
MW-105			< 10	< 10	< 10	< 10	.16 J2B	< 10	< 10	.29 J2	< 10	< 10	< 10
MW-106			< 10	< 10	< 10	.29 J2	.19 J2B	< 10	< 10	.23 J2	< 10	< 10	< 10
MW-107			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-108			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-111			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-112			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-113A			< 10	< 10	< 10	< 10	.14 J2B	< 10	< 10	< 10	< 10	< 10	< 10
MW-113B			< 10	< 10	< 10	24	.22 J2B	< 10	< 10	16	< 10	< 10	< 10
MW-114			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-115A			< 10	< 10	< 10	< 10	.29 J2B	< 10	< 10	< 10	< 10	< 10	< 10
MW-115B			< 10	< 10	< 10	< 10	.19 J2B	< 10	< 10	.34 J2	< 10	.49 J2	< 10
MW-116			34	.88 J2	< 10	< 10	40	< 10	< 10	< 10	< 10	12	160
MW-117			3.77 J2	< 10	< 10	< 10	.32 J2B	< 10	< 10	< 10	< 10	< 10	.76 J2
MW-117-DUP			3.82 J2	< 10	< 10	< 10	.42 J2B	< 10	< 10	< 10	< 10	< 10	.74 J2
MW-118			1.96 J2	< 10	< 10	< 10	.3 J2	< 10	< 10	< 10	< 10	< 10	1.47 J2
MW-119			1.24 J2	< 10	< 10	< 10	.22 J2B	< 10	< 10	< 10	< 10	< 10	< 10
MW-120A			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-120B			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs										
			Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B			< 10	< 10	< 10	.57 J2	< 10	< 10	< 10	7.66 J2	< 10	< 10	< 10
MW-122B			< 10	< 10	< 10	< 10	.12 J2B	< 10	< 10	.25 J2	< 10	< 10	< 10
MW-123A			< 250	29.75 J2	< 250	< 250	96 J2	< 250	< 250	37 J2	< 250	140 J2	17.75 J2
MW-123B			1.74 J2	12	< 10	2.3 J2	90	5.82 J2	< 10	130	< 10	84	21
OB-109			< 10	< 10	< 10	.31 J2	.14 J2	.72 J2	< 10	15	< 10	4.97 J2	< 10
OB-109B			< 10	< 10	< 10	210	.16 J2	.74 J2	< 10	44	< 10	< 10	< 10
OB-11			16	< 10	< 10	< 10	1 J2	< 10	< 10	.32 J2	< 10	< 10	33
OB-110A			17.4 J2	29 J2	< 100	6.9 J2	2500	< 100	< 100	3.9 J2	< 100	34.4 J2	1700
OB-110B			< 10	< 10	< 10	< 10	.42 J2	< 10	< 10	< 10	< 10	< 10	< 10
OB-12			14	< 10	< 10	< 10	4.15 J2	< 10	< 10	.55 J2	< 10	< 10	250
OB-13			200000 J	< 10000	< 10000	< 10000	2290 J2	< 10000	< 10000	< 10000	< 10000	< 10000	570000 J
OB-21			4000	< 1000	< 1000	< 1000	401 J2	< 1000	< 1000	< 1000	< 1000	< 1000	17000
OB-22			19000	< 10000	< 10000	< 10000	3080 J2	< 10000	< 10000	< 10000	< 10000	< 10000	150000
OB-23			43	.37 J2	< 10	< 10	12	< 10	< 10	.22 J2	< 10	.56 J2	170
OB-8A			4.56 J2	330	< 10	19	5200	1 J2	< 10	15	1.59 J2	24	1000
OB-900			53	< 10	< 10	< 10	.96 J2B	< 10	< 10	< 10	< 10	< 10	3.33 J2
OB-901			15	< 10	< 10	< 10	1.66 J2	< 10	< 10	< 10	< 10	< 10	12
OB-902			13	< 10	< 10	< 10	.36 J2B	< 10	< 10	< 10	< 10	< 10	5.2 J2
P-1			< 10	3.08 J2	< 10	46	2.57 J2B	1.63 J2	< 10	84	2.2 J2	13	2.6 J2
P-2			540 J1MJ	< 10	< 10	< 10	10 J1M	< 10	< 10	< 10	< 10	< 10	330 J1M
P-3			< 10	2.6 J2	< 10	150	1.51 J2B	5.85 J2	< 10	196.5 J2	7.18 J2	6.61 J2	.69 J2
PW-1			< 10	< 10	< 10	< 10	.85 J2	< 10	< 10	.55 J2	< 10	< 10	< 10
PW-2A			136 J2	< 500	< 500	< 500	51.5 J2	< 500	< 500	< 500	< 500	< 500	5700
RIMW-1			4.88 J2	24	< 10	2600	1.3 J2	15	< 10	14000	< 10	34	3.18 J2
RIMW-10			< 10	.96 J2	< 10	96	< 10	.37 J2	< 10	87	< 10	7.26 J2	< 10
RIMW-11			< 10	.39 J2	< 10	220	< 10	.4 J2	< 10	31	< 10	< 10	< 10
RIMW-12			< 10	< 10	< 10	1.88 J2	.77 J2	< 10	< 10	1.42 J2	< 10	.45 J2	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs										
			Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RIMW-13			< 10	< 10	< 10	< 10	.12 J2B	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-14			< 10	< 10	< 10	< 10	< 10	< 10	< 10	.22 J2	< 10	< 10	< 10
RIMW-15			< 10	< 10	< 10	880	5.6 J2	13	< 10	700	< 10	166 J2	< 10
RIMW-15-DUP			< 10	< 10	< 10	710	5.25 J2	11	< 10	610	< 10	140	< 10
RIMW-16			15	.92 J2	< 10	13000	9.56 J2	32	< 10	1900	< 10	1100	10
RIMW-18			< 10	.36 J2	< 10	27	.21 J2	< 10	< 10	2.05 J2	< 10	< 10	< 10
RIMW-18	44	56	< 10	< 10	< 10	70	80	< 10	< 10	2.08 J2	< 10	< 10	3.48 J2
RIMW-18	56	68	< 10	< 10	< 10	93	36	< 10	< 10	2.32 J2	< 10	< 10	2.28 J2
RIMW-19			< 10	< 10	< 10	64	.59 J2	< 10	< 10	48	.83 J2	< 10	< 10
RIMW-19	63	75	< 10	< 10	< 10	85	.86 J2	< 10	< 10	68	1.75 J2	< 10	< 10
RIMW-19	76	88	< 10	< 10	< 10	57	1.43 J2	< 10	< 10	42	2.72 J2	.62 J2	< 10
RIMW-3			1.96 J2	12	< 10	234 J2	.46 J2	1.72 J2	< 10	120	< 10	18	.77 J2
RIMW-4			24	21	< 10	245 J2	1.53 J2	33	< 10	195 J2	29	67	1.11 J2
RIMW-4-DUP			25	20	< 10	261 J2	.93 J2	8.3 J2	< 10	193 J2	25	66	.61 J2
RIMW-5			< 10	7.59 J1MJ2	< 10	55 J1M	.21 J1MJ2	1.2 J1MJ2	< 10	83 J1M	8.51 J1MJ2	7.15 J1MJ2	< 10
RIMW-5-DUP			< 10	8.06 J1MJ2	< 10	56 J1M	.2 J1MJ2	2.3 J1MJ2	< 10	88 J1M	9.12 J1MJ2	7.86 J1MJ2	< 10
RIMW-6			4.12 J2	.97 J2	< 10	880	75	49	< 10	710	< 10	1200	9.79 J2
RIMW-7			< 10	< 10	< 10	24	.14 J2B	< 10	< 10	2.58 J2	< 10	< 10	< 10
RIMW-8			< 2000	3700	< 2000	960 J2	52000	< 2000	< 2000	580 J2	354 J2	844 J2B	11000
RIMW-8-DUP			< 2000	3700	< 2000	892 J2	52000	< 2000	< 2000	582 J2	344 J2	824 J2B	11000
RIMW-9			< 10	< 10	< 10	70	.16 J2B	< 10	< 10	23	< 10	< 10	< 10
RIMW-9-DUP			< 10	< 10	< 10	66	.17 J2B	< 10	< 10	17	< 10	< 10	< 10
RIPZ-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3			< 10	1.36 J2	< 10	220	.29 J2	.53 J2	< 10	340	< 10	4.39 J2	< 10
RIPZ-3-DUP			< 10	1.42 J2	< 10	220	< 10	.65 J2	< 10	330	< 10	4.36 J2	.93 J2
RITW-64			9.38 J2	16	< 10	1300	380	22	< 10	820	< 10	13	23
RITW-65			< 10	3.13 J2	< 10	5500	820	6.88 J2	< 10	246 J2	< 10	1.08 J2	81

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	VOCs										
			Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
W-1			< 10	< 10	< 10	160	< 10	< 10	< 10	17	< 10	< 10	< 10
W-2			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W-4			< 10	< 10	< 10	< 10	.11 J2B	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOC																					
			1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline	4,6-Dinitro-o-cresol	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
BP-1A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BP-1B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-100			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-101			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-102			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-103			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-104			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-105			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-106			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-107			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-108			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-111			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-112			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-114			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-115A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-115B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-116			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-118			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-119			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOC																						
			1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline	4,6-Dinitro-o-cresol	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-122B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-123A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-123B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-11			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-110A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-110B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-12			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-13			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-21			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-22			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-23			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-8A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-900			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-901			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-902			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-3			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-2A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-10			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-11			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-12			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOC																						
			1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline	4,6-Dinitro-o-cresol	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RIMW-13			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-14			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-15			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-15-DUP			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-16			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-18			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-18	44	56	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-18	56	68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-19	63	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	76	88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-3			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-4			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-4-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-5-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-7			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-8			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	150	< 10	91	< 25	< 10	< 10	52	< 25	< 25	< 10	30	< 10	< 25	< 25
RIMW-8-DUP			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	140	< 10	86	< 25	< 10	< 10	53	< 25	< 25	< 10	40	< 10	< 25	< 25
RIMW-9			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIMW-9-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3			< 10	< 25	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10	< 25	< 25	< 10	< 10	< 10	< 25	< 25
RIPZ-3-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-64			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-65			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOC																						
			1,2,4,5-Tetrachlorobenzene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	3,3'-Dichlorobenzidine	3+4-Methylphenol	3-Nitroaniline	4,6-Dinitro-o-cresol	4-Bromophenyl phenyl ether	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Nitroaniline	4-Nitrophenol
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
W-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOC																					
			Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Biphenyl	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl) ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Diethyl phthalate
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
BP-1A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BP-1B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-100			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-101			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-102			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-103			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-104			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-105			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-106			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-107			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-108			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-111			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-112			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-114			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-115A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-115B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-116			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-118			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-119			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOC																						
			Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Biphenyl	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl) ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Diethyl phthalate
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-122B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-123A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-123B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-11			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-110A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-110B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-12			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-13			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-21			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-22			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-23			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-8A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-900			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-901			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-902			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-3			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-2A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-10			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-11			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-12			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOC																						
			Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Biphenyl	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl) ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Diethyl phthalate
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RIMW-13			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	7 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-14			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15-DUP			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-16			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-18			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-18	44	56	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-18	56	68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-19	63	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	76	88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-3			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-4			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	6.1 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-4-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-5-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-7			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-8			< 10	< 10	60	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	10	22	< 10	< 10	< 10	< 10	< 10	7.1 J2
RIMW-8-DUP			< 10	< 10	60	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	19	50	< 10	< 10	< 10	< 10	< 10	6.6 J2
RIMW-9			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-9-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIPZ-3-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-64			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-65			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOC																						
			Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Biphenyl	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl) ether	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chrysene	Dibenzo(a,h)anthracene	Dibenzofuran	Diethyl phthalate
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
W-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOCs																			
			Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
BP-1A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BP-1B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-100			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-101			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-102			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-103			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-104			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-105			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-106			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-107			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-108			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-111			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-112			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-114			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-115A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-115B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-116			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-118			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-119			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOCs																			
			Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-122B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-123A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-123B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-11			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-110A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-110B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-12			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-13			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-21			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-22			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-23			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-8A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-900			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-901			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-902			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-3			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-2A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-10			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-11			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-12			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOCs																			
			Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RIMW-13			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-14			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-15			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-15-DUP			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-16			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5.1 J2	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-18			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-18	44	56	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-18	56	68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-19	63	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	76	88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-3			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-4			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-4-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-5-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	9.1 J2	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-7			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-8			19	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	16	33	< 10	< 10	< 10	< 10	< 25	< 10	44	< 10
RIMW-8-DUP			19	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	17	28	< 10	< 10	< 10	< 10	< 25	< 10	44	< 10
RIMW-9			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIMW-9-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25	< 10	< 10	< 10
RIPZ-3-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-64			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-65			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	SVOCs																			
			Dimethyl phthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone	Naphthalene	NDPA/DPA	Nitrobenzene	n-Nitrosodi-n-propylamine	p-Chloro-m-cresol	Pentachlorophenol	Phenanthrene	Phenol	Pyrene
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
W-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	Inorganic															
			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BP-1A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BP-1B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-100			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-101			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-102			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-103			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-104			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-105			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-106			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-107			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-108			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-111			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-112			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-114			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-115A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-115B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-116			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-118			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-119			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	Inorganic															
			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-121B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-122B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-123A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-123B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-11			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-110A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-110B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-12			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-13			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-21			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-22			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-23			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-8A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-900			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-901			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-902			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-3			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-2A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1			.051 J2B	< .05	< .01	0.02	.0005 J2B	< .005	54	< .01	.018 J2	< .02	1	< .01	22	6.1	< .0002	.016 J2
RIMW-10			.1 J2	< .05	< .01	0.15	< .005	< .005	64	< .01	< .05	< .02	0.1	< .01	25	0.42	.000057 J2	.017 J2B
RIMW-11			.053 J2	< .05	< .01	0.02	< .005	< .005	37	< .01	< .05	< .02	.037 J2	< .01	19	0.032	< .0002	.007 J2B
RIMW-12			.14 J2	< .05	< .01	0.03	< .005	< .005	33	< .01	< .05	< .02	.088 J2	< .01	16	0.04	< .0002	.004 J2B

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	Inorganic															
			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RIMW-13			0.2	< .05	< .01	.009 J2	.0006 J2	< .005	38	< .01	< .05	< .02	0.2	< .01	11	0.047	.000051 J2	< .02
RIMW-14			.14 J2B	< .05	< .01	.0094 J2	.0005 J2B	< .005	51	< .01	< .05	< .02	.085 J2	< .01	20	0.029	< .0002	< .02
RIMW-15			.14 J2B	< .05	< .01	0.03	.0008 J2	< .005	35	< .01	< .05	< .02	.097 J2	< .01	18	0.098	< .0002	< .02
RIMW-15-DUP			.16 J2	< .05	< .01	0.03	.0006 J2	< .005	37	< .01	< .05	< .02	0.1	< .01	19	0.11	.000071 J2	< .02
RIMW-16			0.2	< .05	< .01	0.03	.0005 J2	< .005	62	< .01	.02 J2	< .02	0.2	< .01	40	2.4	< .0002	0.05
RIMW-18			1.4	< .05	< .01	0.02	< .005	< .005	35	.0058 J2	< .05	.005 J2	1.4	< .01	8.2	0.046	< .0002	< .02
RIMW-18	44	56	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-18	56	68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19			.041 J2B	< .05	< .01	.0052 J2	.0007 J2B	< .005	36	< .01	< .05	< .02	< .1	< .01	17	.022 J2B	< .0002	.0054 J2
RIMW-19	63	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	76	88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-3			.067 J2B	< .05	< .01	0.02	.0005 J2B	< .005	51	< .01	.021 J2	< .02	.043 J2	< .01	24	0.7	< .0002	.013 J2
RIMW-4			.047 J2B	< .05	< .01	0.08	.0005 J2B	< .005	140	< .01	.012 J2	< .02	.023 J2	< .01	63	0.39	.000055 J2	.0077 J2
RIMW-4-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5			.038 J2B	< .05	< .01	0.02	.0005 J2B	< .005	57	< .01	.011 J2	< .02	< .1	< .01	30	0.55	< .0002	.01 J2
RIMW-5-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6			.098 J2B	< .05	< .01	0.08	.0005 J2	< .005	120	< .01	.1 J2	< .02	6.9	< .01	75	6	< .0002	.017 J2B
RIMW-7			.045 J2B	< .05	< .01	0.02	.0005 J2	< .005	38	< .01	< .05	< .02	< .1	< .01	20	0.14	< .0002	< .02
RIMW-8			.06 J2B	< .05	< .01	0.08	.0006 J2B	< .005	100	< .01	0.12	.01 J2	13	< .01	34	12	< .0002	0.04
RIMW-8-DUP			.15 J2B	< .05	< .01	0.08	.0005 J2B	< .005	100	< .01	0.12	.011 J2	12	< .01	34	12	< .0002	0.04
RIMW-9			0.6	< .05	< .01	0.04	< .005	< .005	28	< .01	< .05	.0043 J2	0.5	< .01	14	0.052	< .0002	< .02
RIMW-9-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-3			.061 J2B	< .05	< .01	0.03	.0005 J2	< .005	59	< .01	.0059 J2	< .02	0.4	< .01	20	1.1	< .0002	.0042 J2B
RIPZ-3-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-64			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-65			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	Inorganic															
			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
W-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	Inorganics							Other			
			Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Dissolved Organic Carbon	Methane	Ethene	Ethane
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L
BP-1A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BP-1B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EW-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-100			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-101			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-102			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-103			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-104			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-105			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-106			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-107			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-108			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-111			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-112			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-113B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-114			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-115A			NA	NA	NA	NA	NA	NA	NA	2	1.8	0.2	0.065
MW-115B			NA	NA	NA	NA	NA	NA	NA	2	22	0.24	0.1
MW-116			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-117-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-118			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-119			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-120B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	Inorganics							Other			
			Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Dissolved Organic Carbon	Methane	Ethene	Ethane
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L
MW-121B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-122B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-123A			NA	NA	NA	NA	NA	NA	NA	442	4700	7100	27
MW-123B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-109B			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-11			NA	NA	NA	NA	NA	NA	NA	52	15000	0.048	0.31
OB-110A			NA	NA	NA	NA	NA	NA	NA	11	5000	2400	110
OB-110B			NA	NA	NA	NA	NA	NA	NA	5	22	1.9	0.16
OB-12			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-13			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-21			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-22			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-23			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-8A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-900			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-901			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OB-902			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-3			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-1			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PW-2A			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-1			1.8	.028 J2	< .01	17	.001 J2B	< .05	.0075 J2B	NA	NA	NA	NA
RIMW-10			0.7	.023 J2	< .01	34	< .025	.0081 J2	< .02	NA	NA	NA	NA
RIMW-11			1.1	< .035	< .01	25	.00089 J2	.0037 J2	.0046 J2B	NA	NA	NA	NA
RIMW-12			1.6	< .035	< .01	18	.00081 J2	.0047 J2	0.03	NA	NA	NA	NA

CDM

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	Inorganics							Other			
			Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Dissolved Organic Carbon	Methane	Ethene	Ethane
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L
RIMW-13			1.2	.027 J2	< .01	17	< .025	< .05	.005 J2B	NA	NA	NA	NA
RIMW-14			1.1	.025 J2	< .01	16	< .025	< .05	.014 J2B	2	4.2	1.3	<.025
RIMW-15			1.6	.026 J2	< .01	13	< .025	.012 J2	< .02	1	23	1.6	1.9
RIMW-15-DUP			1.7	.022 J2	< .01	14	.00082 J2B	.012 J2	< .02	NA	NA	NA	NA
RIMW-16			1.5	.026 J2	< .01	26	< .025	.0085 J2	< .02	NA	NA	NA	NA
RIMW-18			1.9	.021 J2	< .01	29	< .025	.0055 J2	.0093 J2B	NA	NA	NA	NA
RIMW-18	44	56	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-18	56	68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19			1.4	.026 J2	< .01	16	< .025	.013 J2	.0051 J2B	NA	NA	NA	NA
RIMW-19	63	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-19	76	88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-3			1.1	.024 J2	< .01	16	< .025	.0039 J2	.0047 J2B	NA	NA	NA	NA
RIMW-4			1.7	.028 J2	< .01	36	.00072 J2B	.011 J2	.009 J2B	NA	NA	NA	NA
RIMW-4-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-5			1.6	.024 J2	< .01	19	< .025	.0081 J2	.0049 J2B	2	28	13	0.61
RIMW-5-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIMW-6			2.3	.033 J2	< .01	34	.00097 J2B	< .05	.005 J2B	16	81	6.5	0.73
RIMW-7			2.5	.026 J2	< .01	17	.00088 J2B	< .05	< .02	NA	NA	NA	NA
RIMW-8			0.95	.032 J2	< .01	21	< .025	< .05	< .02	NA	NA	NA	NA
RIMW-8-DUP			1	.032 J2	< .01	21	< .025	< .05	.0044 J2B	NA	NA	NA	NA
RIMW-9			0.3	< .035	< .01	11	.0011 J2	.0043 J2	.0045 J2B	NA	NA	NA	NA
RIMW-9-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RIPZ-1			NA	NA	NA	NA	NA	NA	NA	4	0.99	0.18	0.15
RIPZ-3			3.3	.028 J2	< .01	17	.0014 J2B	< .05	< .02	NA	NA	NA	NA
RIPZ-3-DUP			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-64			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RITW-65			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D-6
Phase II Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	Packer Test Start Depth (ft)	Packer Test End Depth (ft)	Inorganics							Other			
			Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Dissolved Organic Carbon	Methane	Ethene	Ethane
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L
W-1			NA	NA	NA	NA	NA	NA	NA	2	1.9	0.026	<.025
W-2			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W-4			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

D-7 Phase III Groundwater

Table D-7
Phase III Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	VOCs																				
	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromochloromethane
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-122B	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15	< 10	< 10	< 10	< 10	.31 J2	2.23 J2	< 10	< 10	< 10	< 10	< 10	1.26 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-20	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-21	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-22	< 10	< 10	< 10	< 10	.33 J2	.86 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-23	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-24	< 10	< 10	1.4 J2	< 10	6 J2	27	< 10	< 10	< 10	< 10	< 10	1.17 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.44 J2	< 10
RIMW-25	770	3.24 J2	100	36	950	540	< 10	< 10	< 10	< 10	58	4100	2.18 J2	< 10	1.63 J2	260	36	150	220	43	< 10
RIMW-25-DUI	720	2.93 J2	78	30	860	510	< 10	< 10	< 10	< 10	49	3700	1.8 J2	< 10	1.37 J2	270	33	130	180	35	< 10
RIMW-26	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-27	< 10	< 10	1.8 J2	1.49 J2	34	82	< 10	< 10	< 10	< 10	.44 J2	260	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.21 J2	< 10
RIMW-27-DUI	< 10	< 10	2.24 J2	1.31 J2	35	83	< 10	< 10	< 10	< 10	.5 J2	280	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.26 J2	< 10
RIMW-28	< 10	< 10	< 10	< 10	2.53 J2	4.7 J2	< 10	< 10	< 10	< 10	3.38 J2	37	< 10	< 10	.99 J2	< 10	< 10	< 10	9.03 J2	.76 J2	< 10
RIMW-29	< 10	< 10	< 10	< 10	8.93 J2	30	< 10	< 10	< 10	< 10	< 10	7.4 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.22 J2	< 10
RIMW-30	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table D-7
Phase III Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	VOCs																				
	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethylbenzene	Isopropylbenzene	Methyl acetate	Methyl tert butyl ether	Methylcyclohexane	Methylene chloride	Styrene	Tetrachloroethene
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.35 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.76 J2
MW-122B	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15	< 10	< 10	< 10	< 10	< 10	.62 J2	< 10	< 10	< 10	730	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	4.76 J2
RIMW-20	5.36 J2	< 10	< 10	< 10	< 10	< 10	< 10	18	< 10	.36 J2	< 10	< 10	3.85 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.79 J2
RIMW-21	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-22	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2.58 J2	< 10	59	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.74 J2
RIMW-23	< 10	< 10	< 10	< 10	< 10	< 10	< 10	3.77 J2	< 10	.33 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.73 J2
RIMW-24	< 10	< 10	< 10	.65 J2	< 10	< 10	< 10	.33 J2	< 10	570	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.71 J2	< 10	260
RIMW-25	< 10	< 10	< 10	1.35 J2	< 10	2200	2500	120	6.81 J2	1300	< 10	16	< 10	< 10	1000	50	< 10	< 10	31	1300	< 10	52
RIMW-25-DUI	< 10	< 10	< 10	1.06 J2	< 10	2200	2300	98	5.32 J2	1200	< 10	11	< 10	< 10	1000	40	< 10	< 10	24	1200	< 10	42
RIMW-26	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.98 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.41 J2
RIMW-27	< 10	< 10	< 10	< 10	< 10	6.11 J2	2.92 J2	2.09 J2	< 10	800	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.96 J2	< 10	400
RIMW-27-DUI	< 10	< 10	< 10	< 10	< 10	5.51 J2	3.23 J2	2.12 J2	< 10	860	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.14 J2	< 10	400
RIMW-28	2.58 J2	< 10	< 10	< 10	< 10	14	3.24 J2	24	< 10	19	< 10	< 10	3.27 J2	< 10	4.53 J2	< 10	< 10	< 10	< 10	1.02 J2	< 10	3.21 J2
RIMW-29	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.43 J2	< 10	370	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.5 J2	< 10	81
RIMW-30	3.83 J2	< 10	< 10	< 10	< 10	< 10	< 10	12	< 10	< 10	< 10	< 10	3.32 J2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	.33 J2

Table D-7
Phase III Groundwater Sampling Results
Remedial Investigation Report
September 2008
Rock Hill, South Carolina

Location	VOCs						
	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	Xylenes (Total)
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-121B	< 10	< 10	< 10	7.53 J2	< 10	< 10	< 10
MW-122B	.41 J2B	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-15	< 10	1.94 J2	< 10	610	< 10	.64 J2	< 10
RIMW-20	.58 J2B	< 10	< 10	.54 J2	< 10	< 10	< 10
RIMW-21	.28 J2B	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-22	.35 J2	< 10	< 10	54	< 10	< 10	< 10
RIMW-23	.78 J2B	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-24	.47 J2	1.22 J2	< 10	260	< 10	1.17 J2	< 10
RIMW-25	9700	3.02 J2	< 10	100	88	800	3200
RIMW-25-DUI	8500	2.26 J2	< 10	84	69	740	3100
RIMW-26	.72 J2B	< 10	< 10	< 10	< 10	< 10	< 10
RIMW-27	.32 J2	1.34 J2	< 10	370	< 10	15	< 10
RIMW-27-DUI	.38 J2	1.22 J2	< 10	370	1.27 J2	14	< 10
RIMW-28	41	< 10	< 10	6	< 10	2.64 J2	7.17 J2
RIMW-29	.26 J2	.62 J2	< 10	260	< 10	4.01 J2	< 10
RIMW-30	.23 J2B	< 10	< 10	.53 J2	< 10	< 10	< 10

Appendix E
Hydraulic Analysis Results

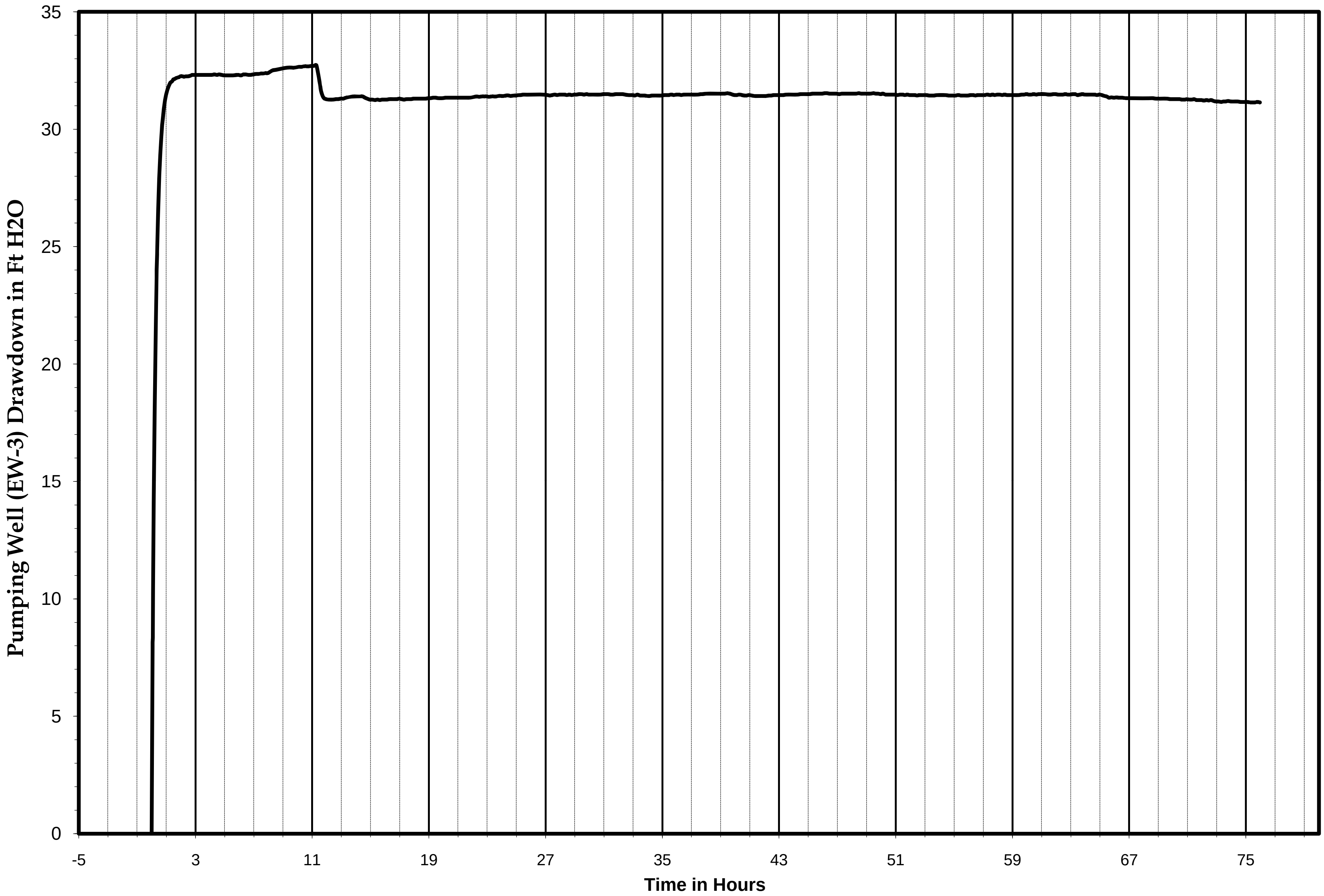


Figure E-1
EW-2 Hydrograph
EW-2 APT
Remedial Investigation Report
September 2008

CDM

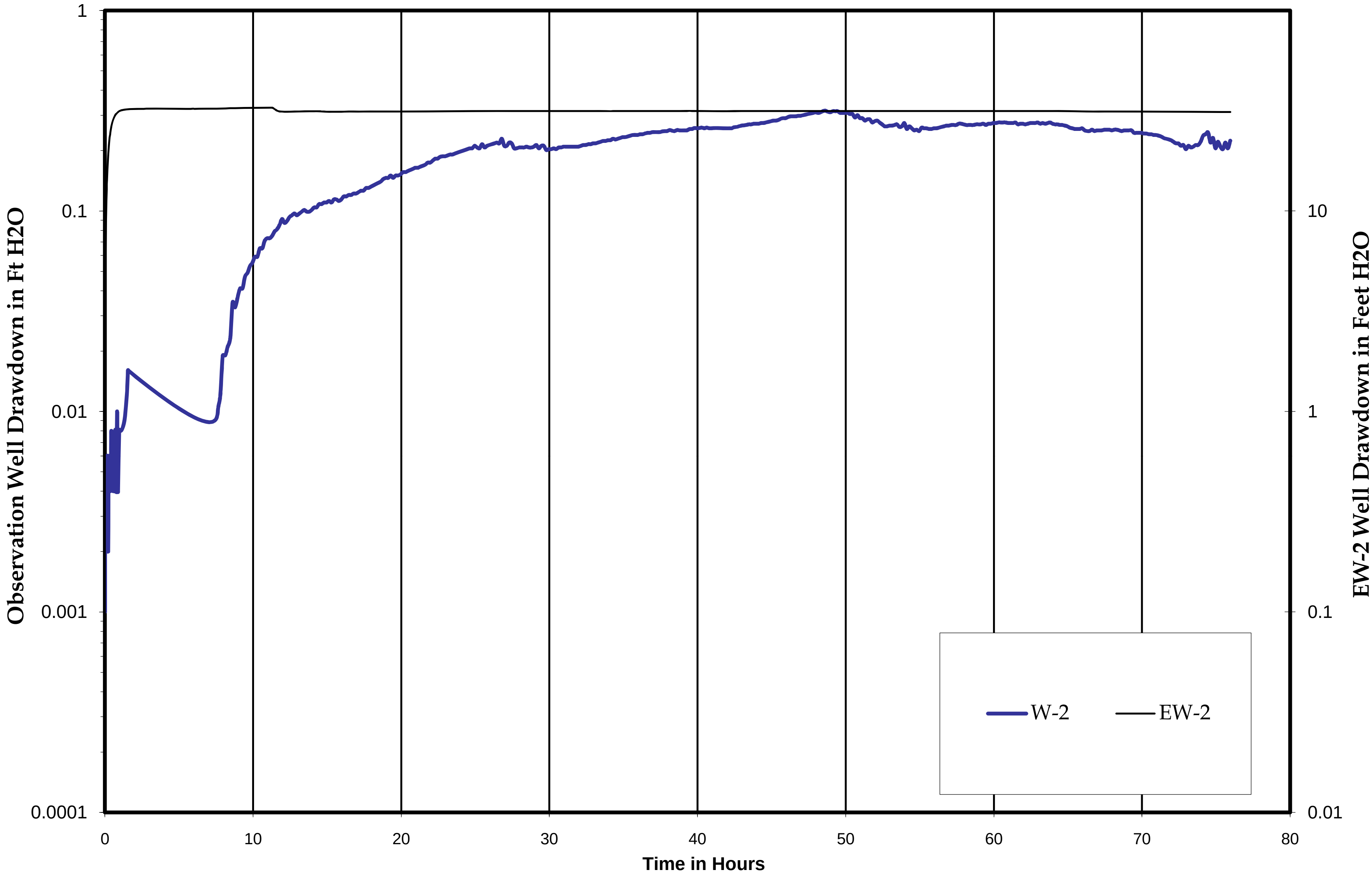


Figure E-2
W-2 Hydrograph
EW-2 APT
Remedial Investigation Report
September 2008

CDM

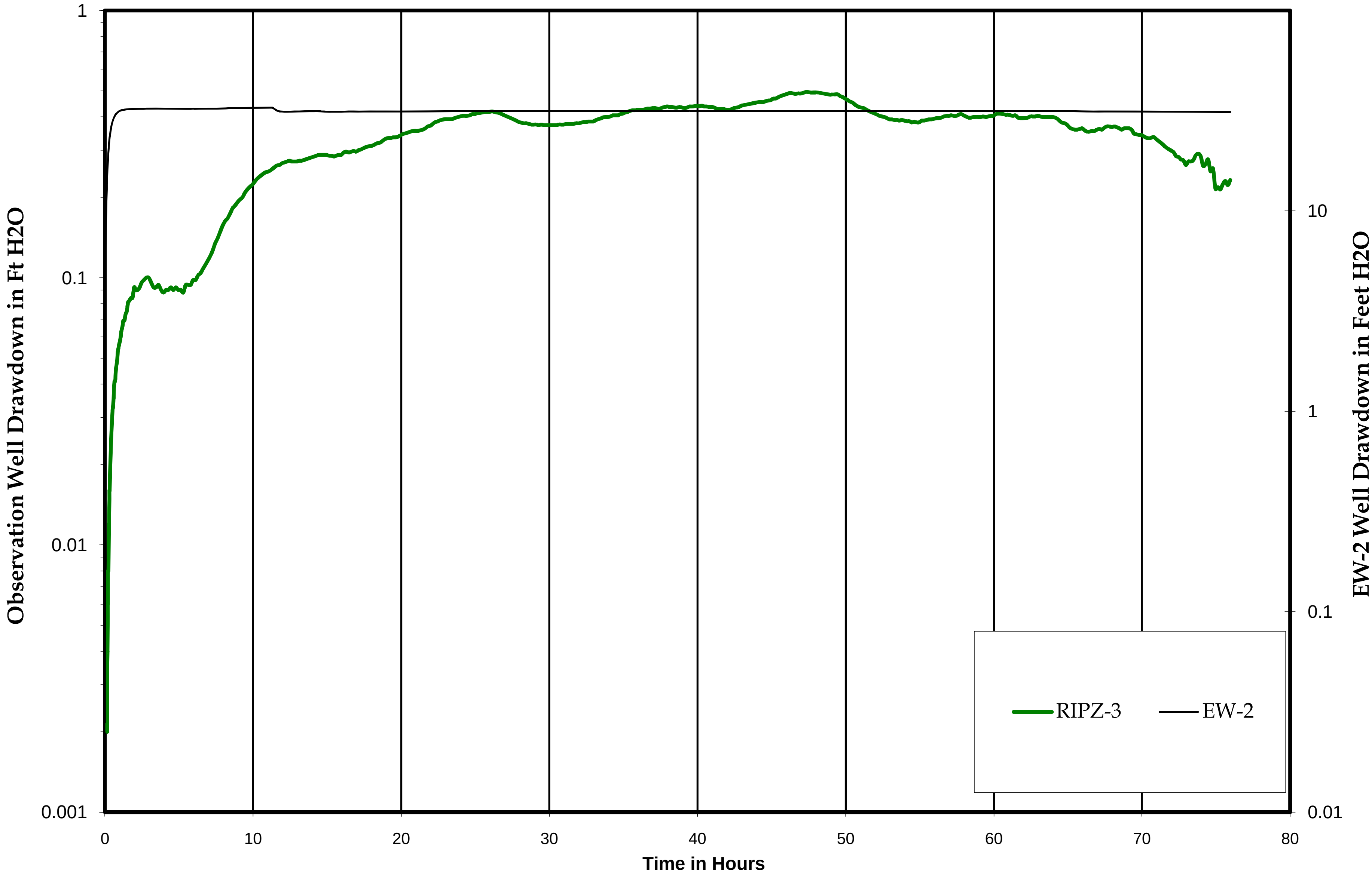


Figure E-3
RIPZ-3 Hydrograph
EW-2 APT
Remedial Investigation Report
September 2008

CDM

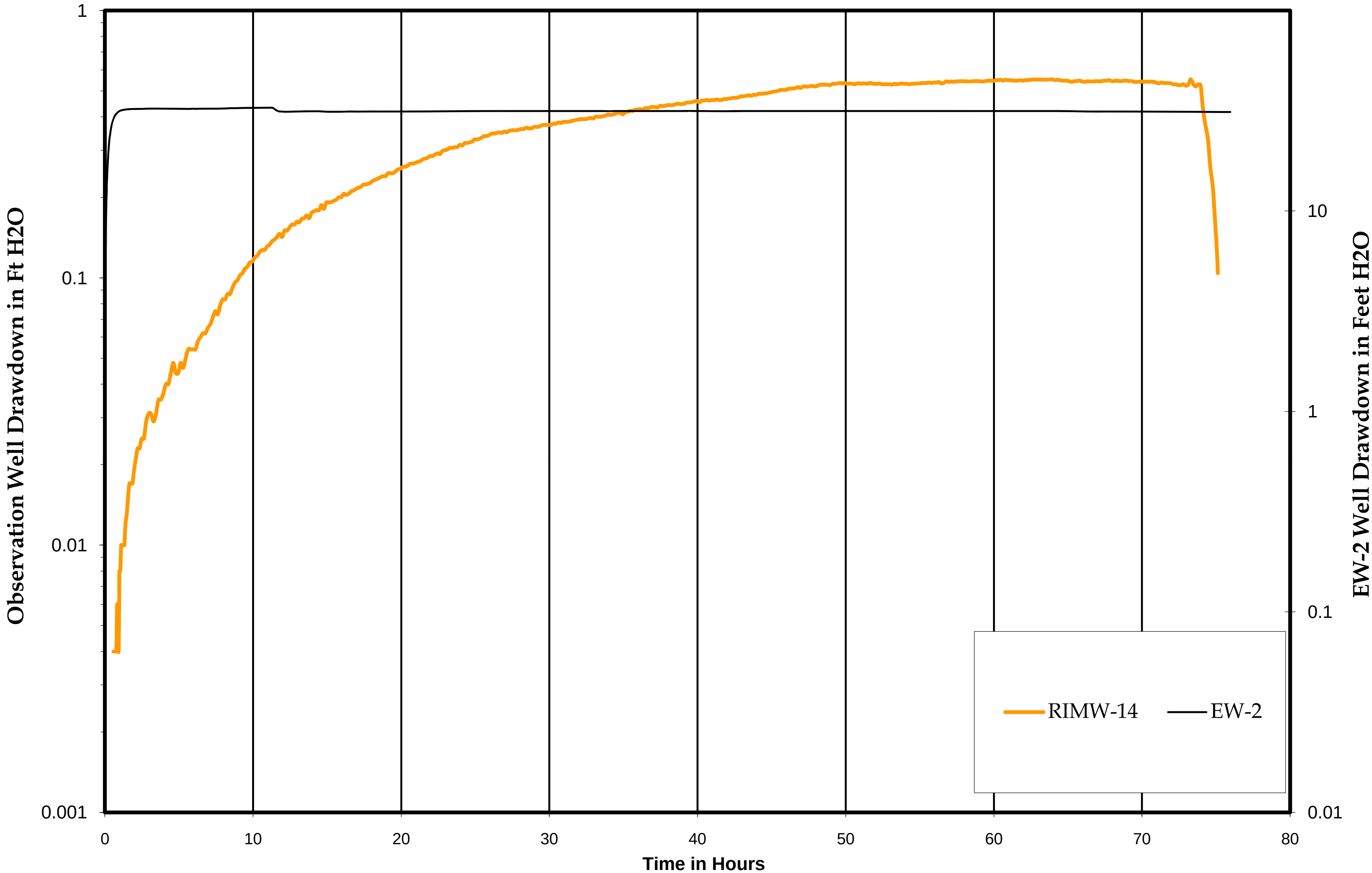


Figure E-4
RIMW-14 Hydrograph
EW-2 APT
Remedial Investigation Report
September 2008

CDM

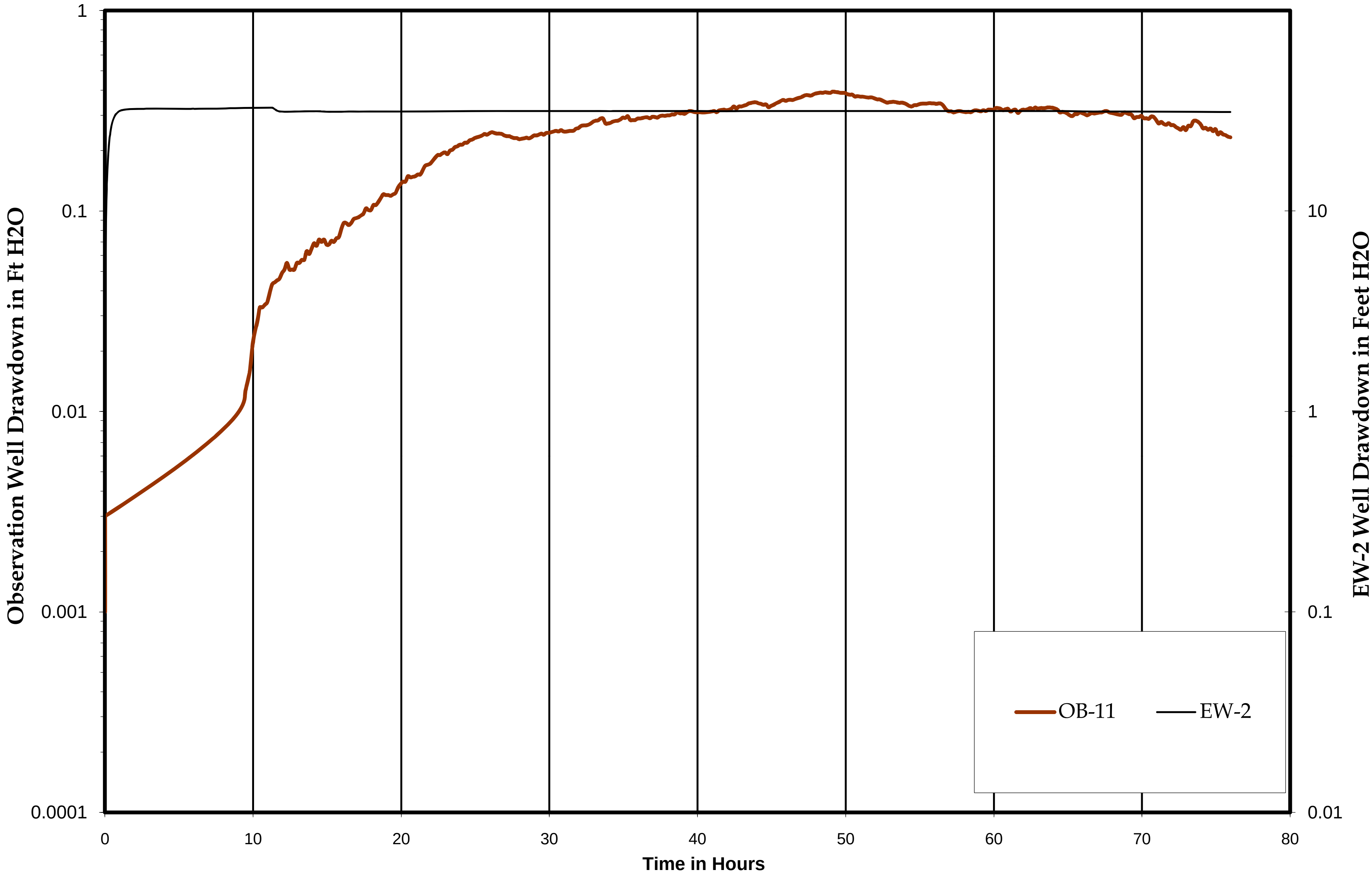


Figure E-5
OB-11 Hydrograph
EW-2 APT
Remedial Investigation Report
September 2008

CDM

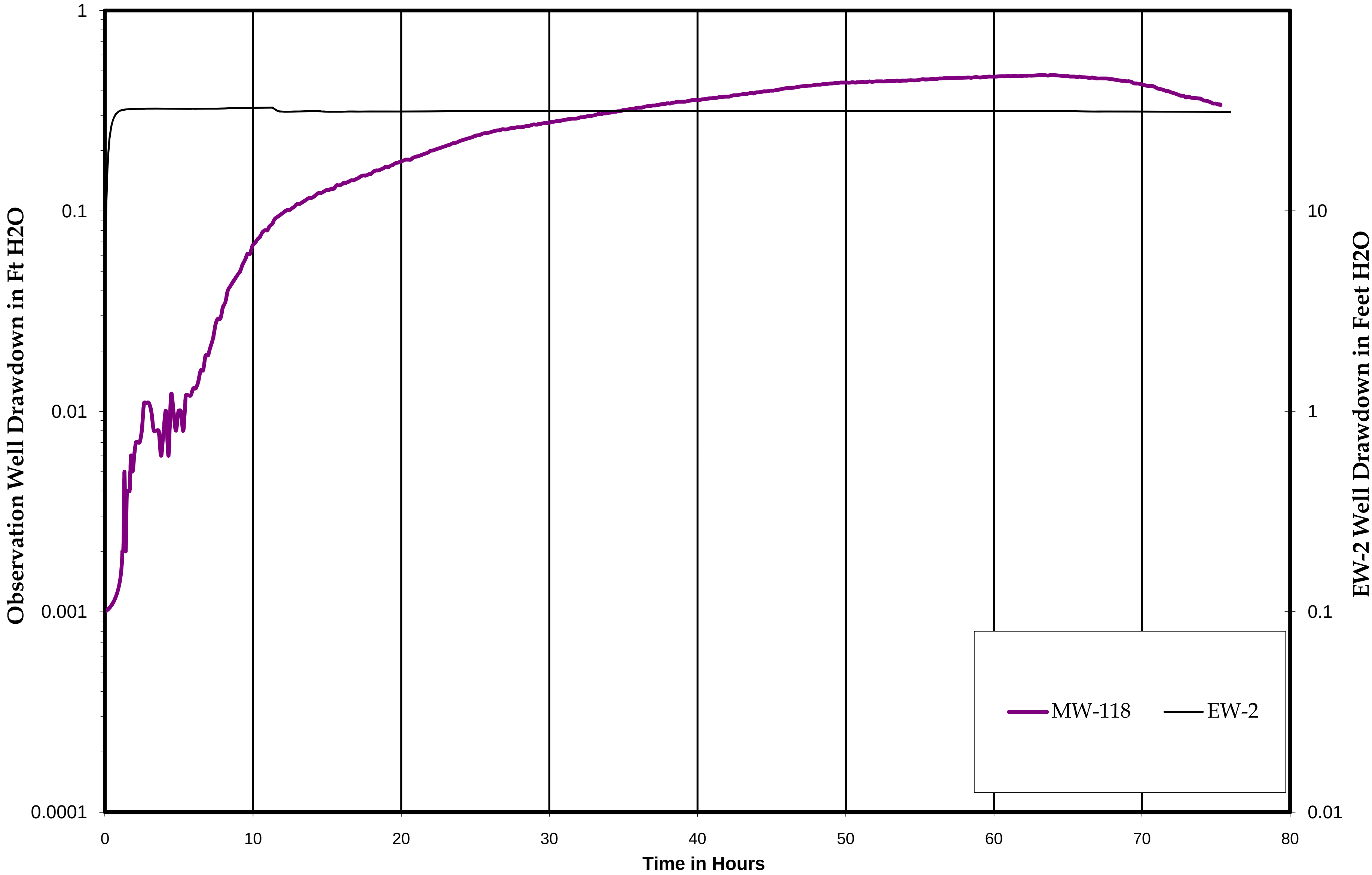
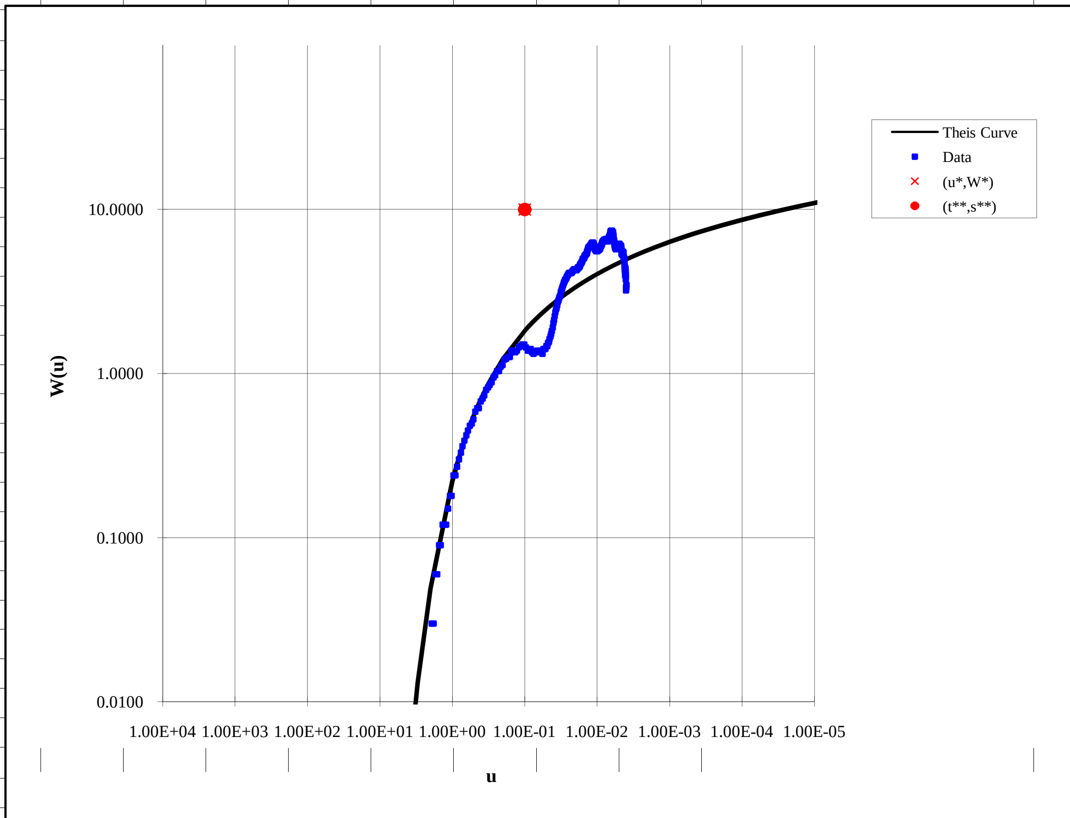


Figure E-6
MW-118 Hydrograph
EW-2 APT
Remedial Investigation Report
September 2008

CDM



Q	**2.7**	gpm
	0.361	ft^3/min
r	**225**	ft

(1) Select convienent u,W(u)** on type curve (shown as (u**,W**)).**

	0.1	**<- u****		
	10	**<- W****		

(2) Shift data point curve relative to type curve

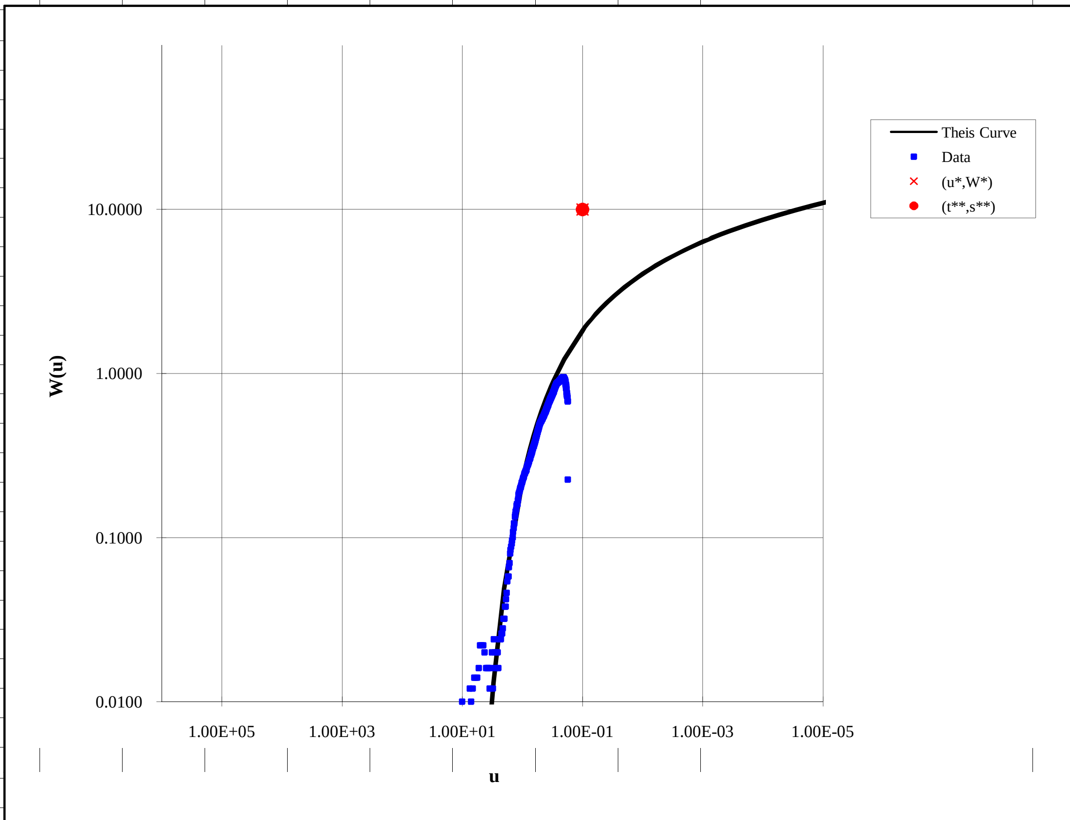
	18	**<- Shift-h**	(Left-Right Shifting)	
	15	**<- Shift-v**	(Up-Down Shifting)	

(3) Adjust (t,s) to move match point (on data curve - shown as (t,s**))**

	180	**<-t****	0.10	<- computed u** (should agree with u** in step 1)
	0.667	**<-s****	10.01	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	**0.430652**	**ft^2/min**	**620.1**	**ft^2/day**
S=	**0.000612**			



Q	**2.7**	gpm
	0.361	ft^3/min
r	**109**	ft

(1) Select convienent u,W(u)** on type curve (shown as (u**,W**)).**

0.1	**<- u****	
10	**<- W****	

(2) Shift data point curve relative to type curve

800	**<- Shift-h**	(Left-Right Shifting)
2	**<- Shift-v**	(Up-Down Shifting)

(3) Adjust (t,s) to move match point (on data curve - shown as (t,s**))**

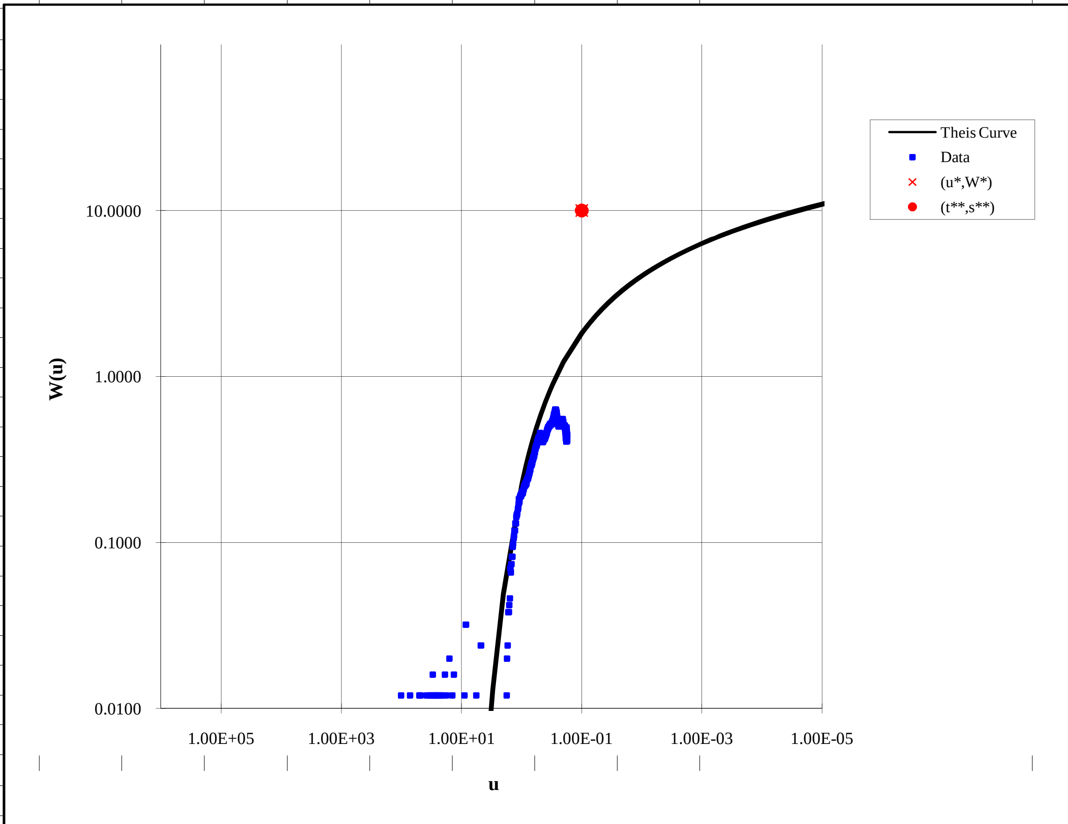
8000	**<-t****	0.10	<- computed u** (should agree with u** in step 1)
5	**<-s****	10.00	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	**0.057449**	**ft^2/min**	**82.7**	**ft^2/day**
S=	**0.015473**			

CDM

Appendix E
MW-118 Theis Curve
EW-2 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill , South Carolina



Q	2.7	gpm
	0.361	ft^3/min
r	207	ft

(1) Select convienent u**,W(u)** on type curve (shown as (u**,W**)).

0.1	<- u**	
10	<- W**	

(2) Shift data point curve relative to type curve

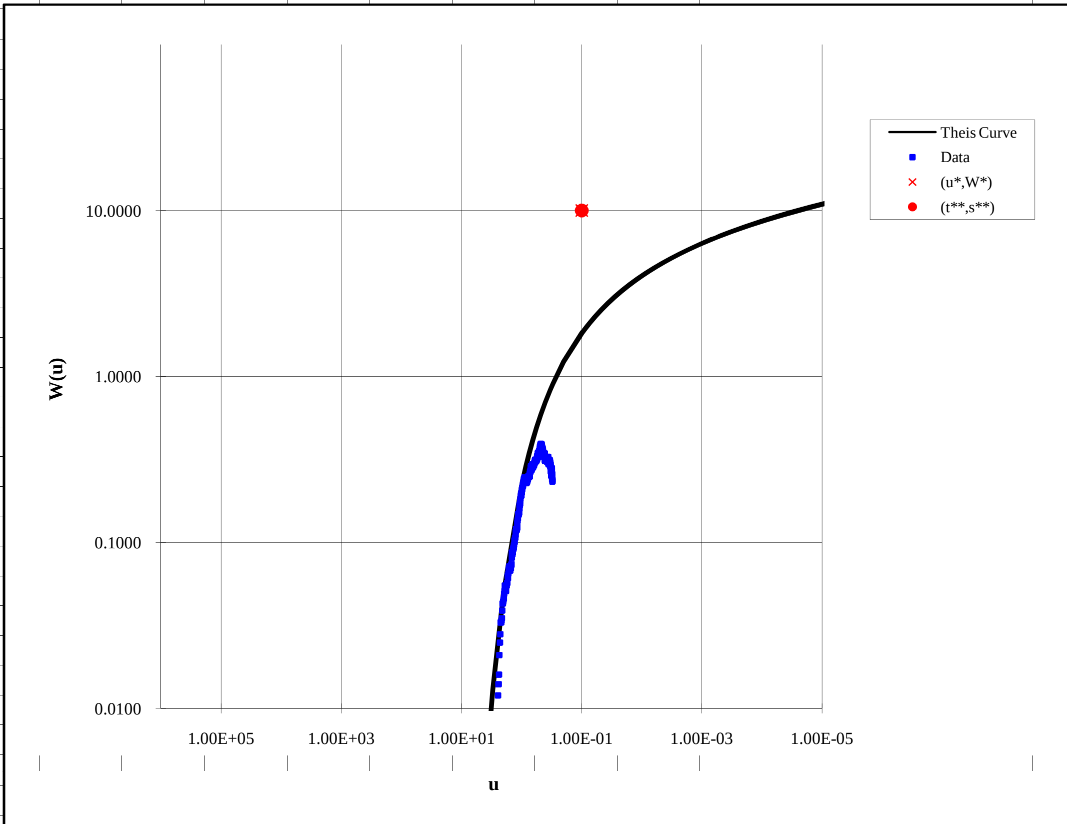
800	<- Shift-h	(Left-Right Shifting)
2	<- Shift-v	(Up-Down Shifting)

(3) Adjust (t,s) to move match point (on data curve - shown as (t**,s**))

8000	<-t**	0.10	<- computed u** (should agree with u** in step 1)
5	<-s**	10.00	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	0.057449	ft^2/min	82.7	ft^2/day
S=	0.00429			



Q	**2.7**	gpm
	0.361	ft^3/min
r	**185**	ft

(1) Select convienent u,W(u)** on type curve (shown as (u**,W**)).**

0.1	**<- u****	
10	**<- W****	

(2) Shift data point curve relative to type curve

1400	**<- Shift-h**	(Left-Right Shifting)
1	**<- Shift-v**	(Up-Down Shifting)

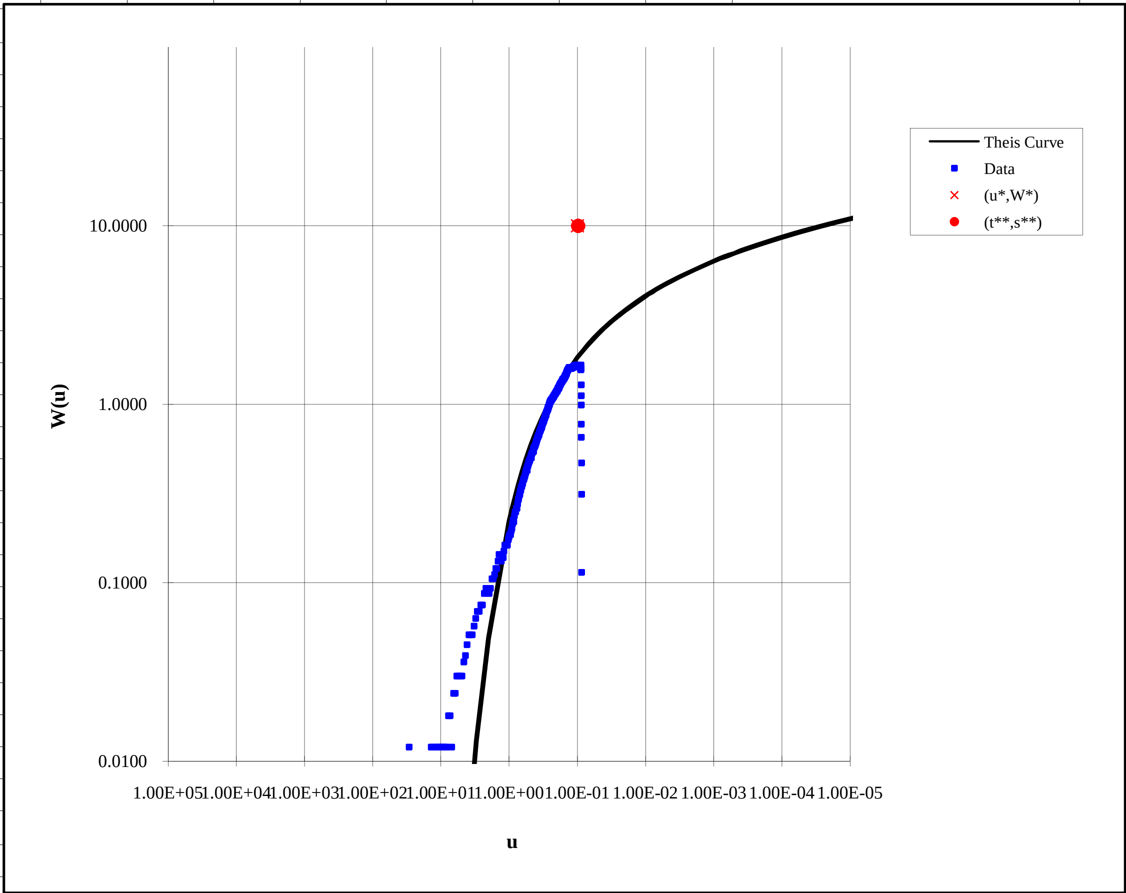
(3) Adjust (t,s) to move match point (on data curve - shown as (t,s**))**

14000	**<-t****	0.10	<- computed u** (should agree with u** in step 1)
10	**<-s****	10.00	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	**0.028724**	**ft^2/min**	**41.4**	**ft^2/day**
S=	**0.0047**			

CDM



Q	**2.7**	gpm
	0.361	ft^3/min
r	**230**	ft

(1) Select convienent u,W(u)** on type curve (shown as (u**,W**)).**

0.1	**<- u****	
10	**<- W****	

(2) Shift data point curve relative to type curve

390	**<- Shift-h**	(Left-Right Shifting)
3	**<- Shift-v**	(Up-Down Shifting)

(3) Adjust (t,s) to move match point (on data curve - shown as (t,s**))**

4000	**<-t****	0.10	<- computed u** (should agree with u** in step 1)
3.333	**<-s****	10.00	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	**0.086182**	**ft^2/min**	**124.1**	**ft^2/day**
S=	**0.002607**			

CDM

Appendix E
RIMW-14 Theis Curve
EW-2 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill , South Carolina

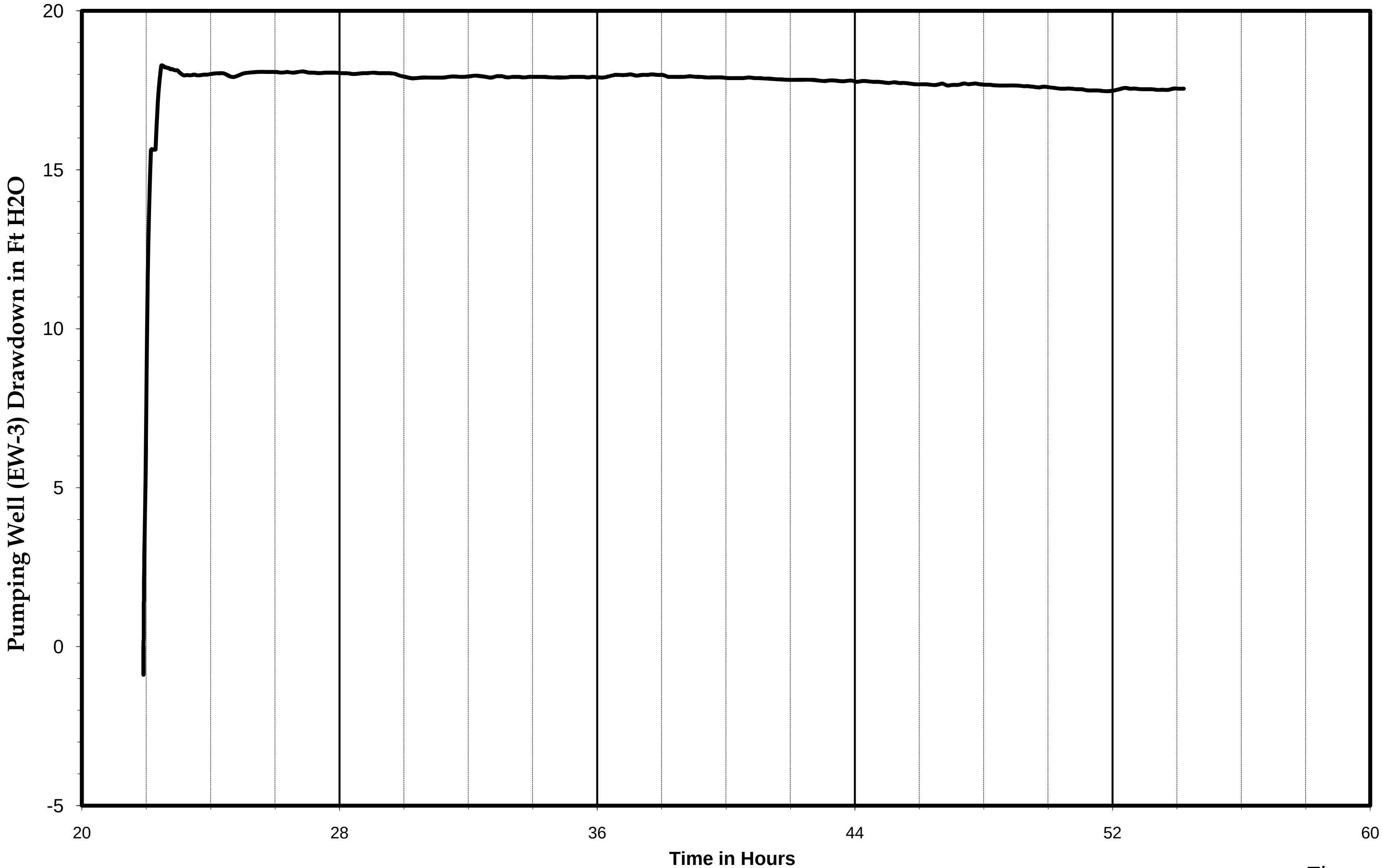


Figure E-7
EW-3 Hydrograph
EW-3 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, SC

CDM

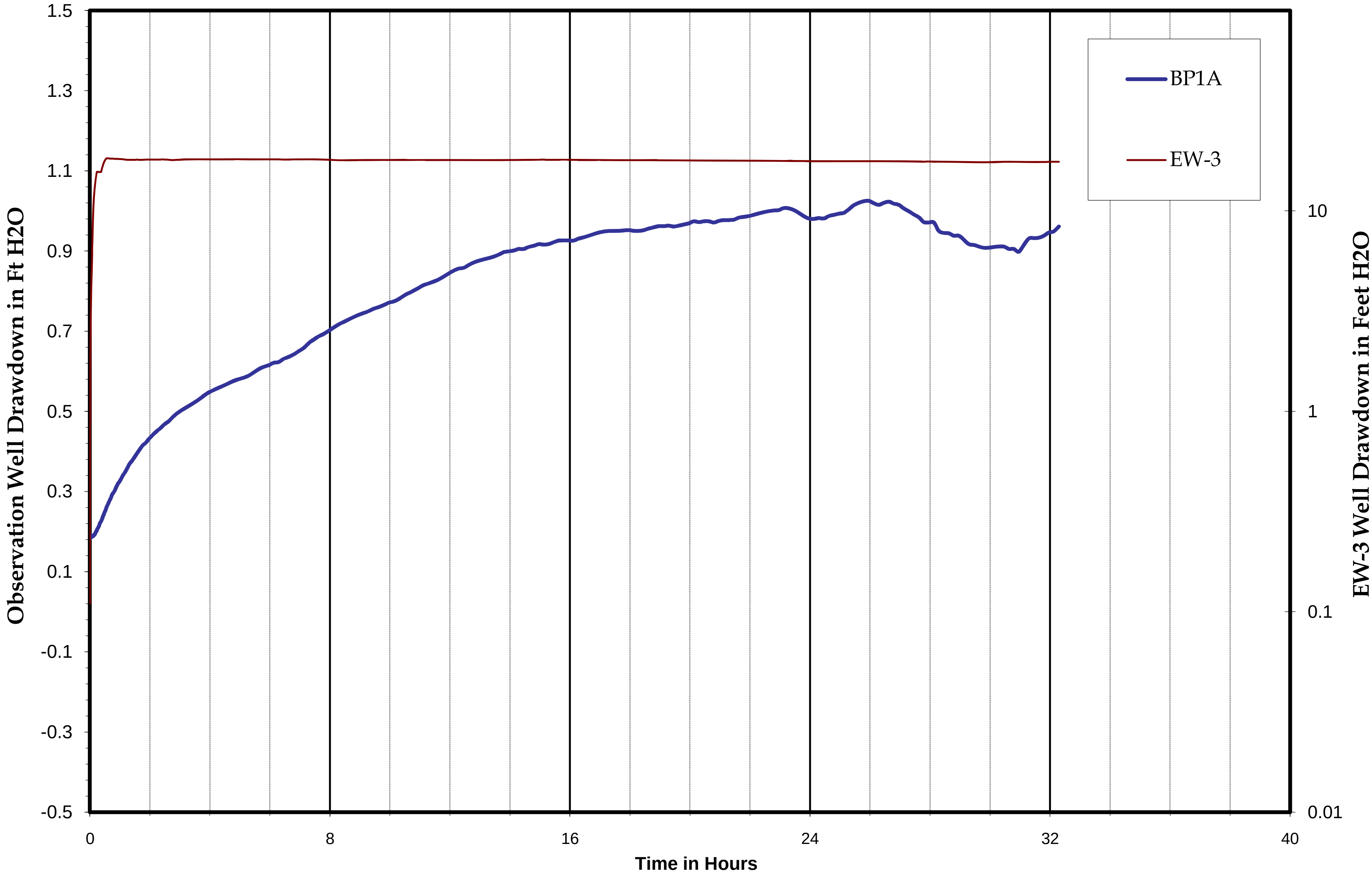


Figure E-8
BP-1A Hydrograph
EW-3 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, SC

CDM

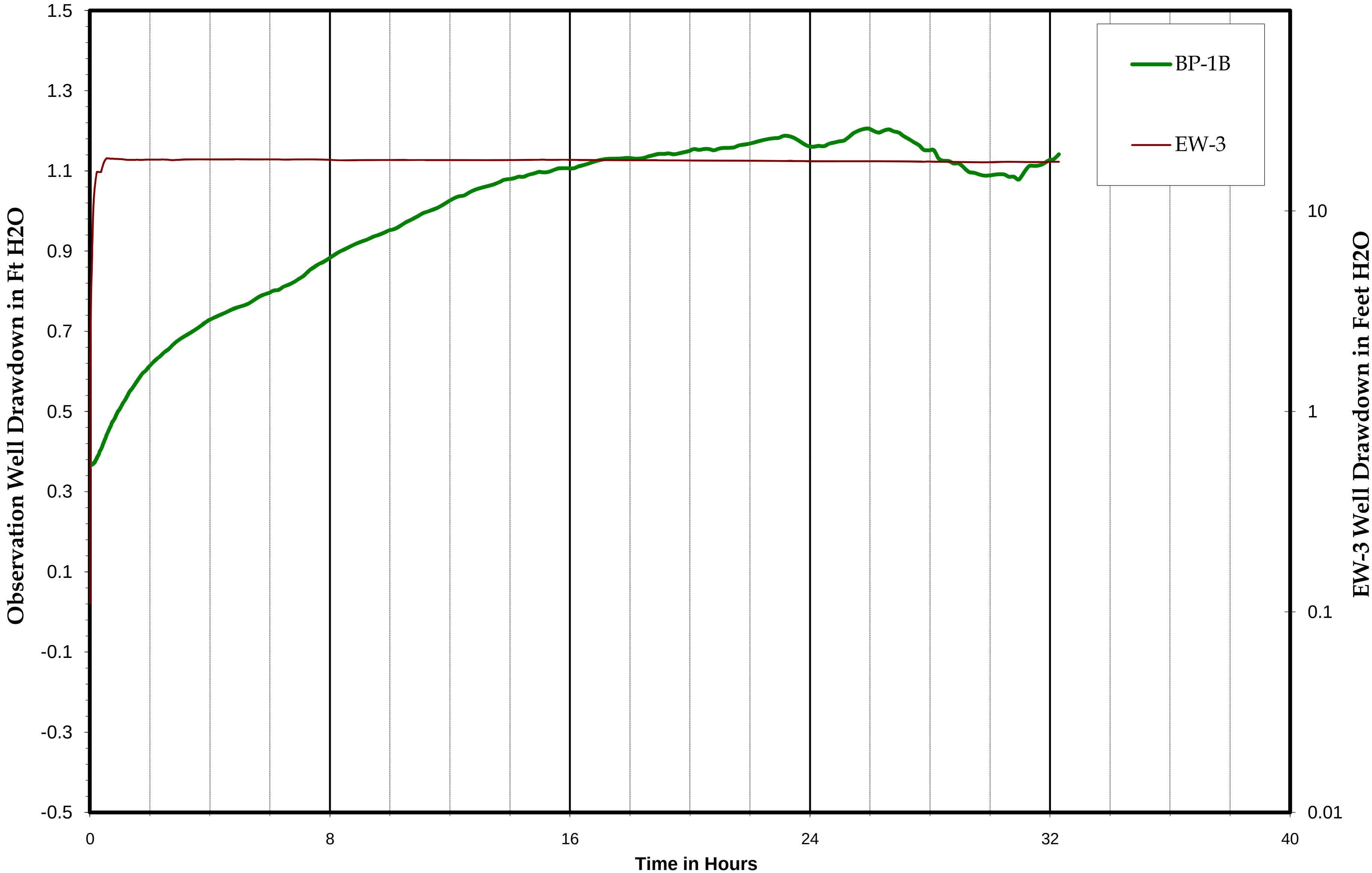


Figure E-9
BP-1B Hydrograph
EW-3 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, SC

CDM

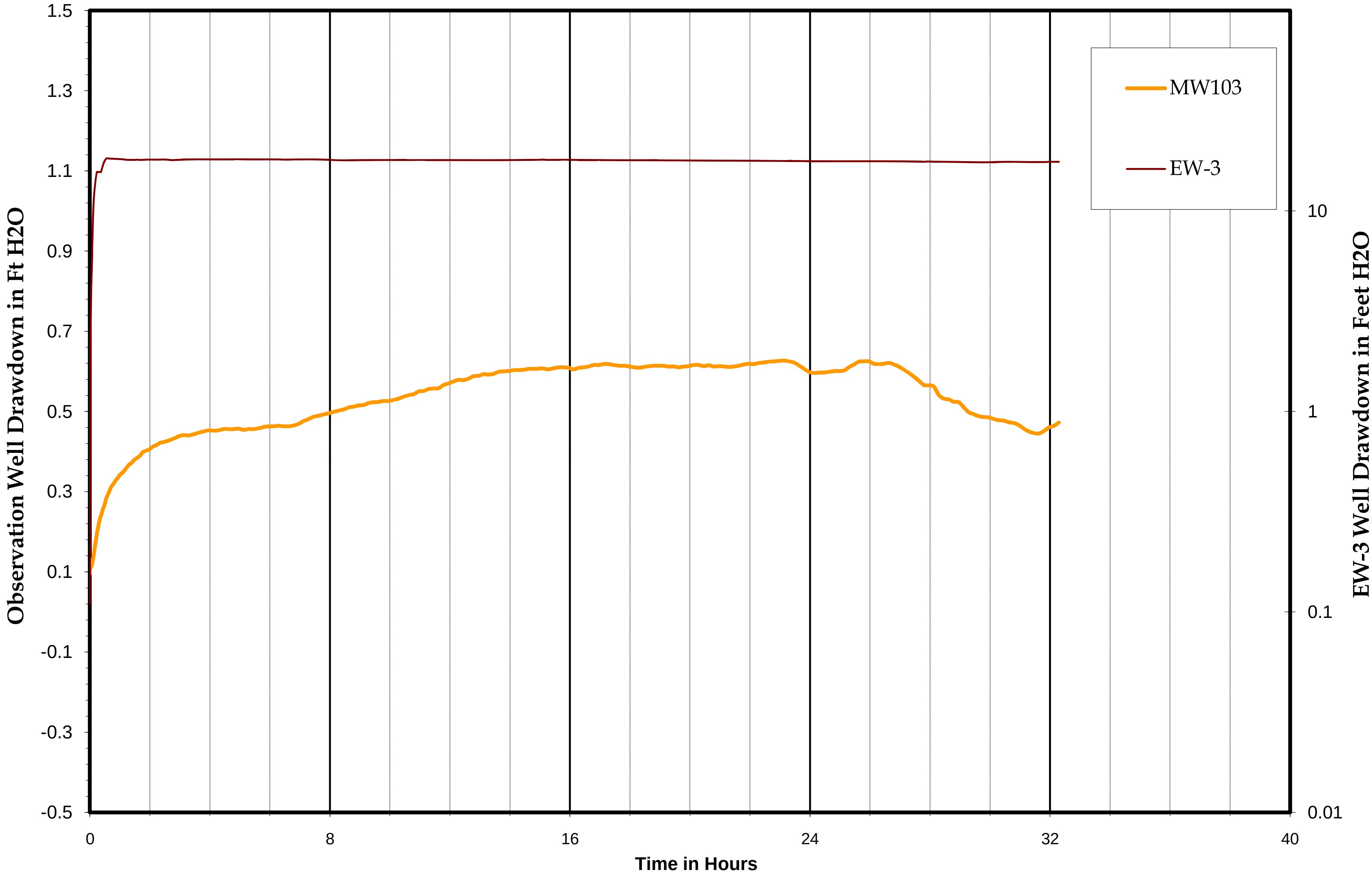


Figure E-10
MW-103 Hydrograph
EW-3 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, SC

CDM

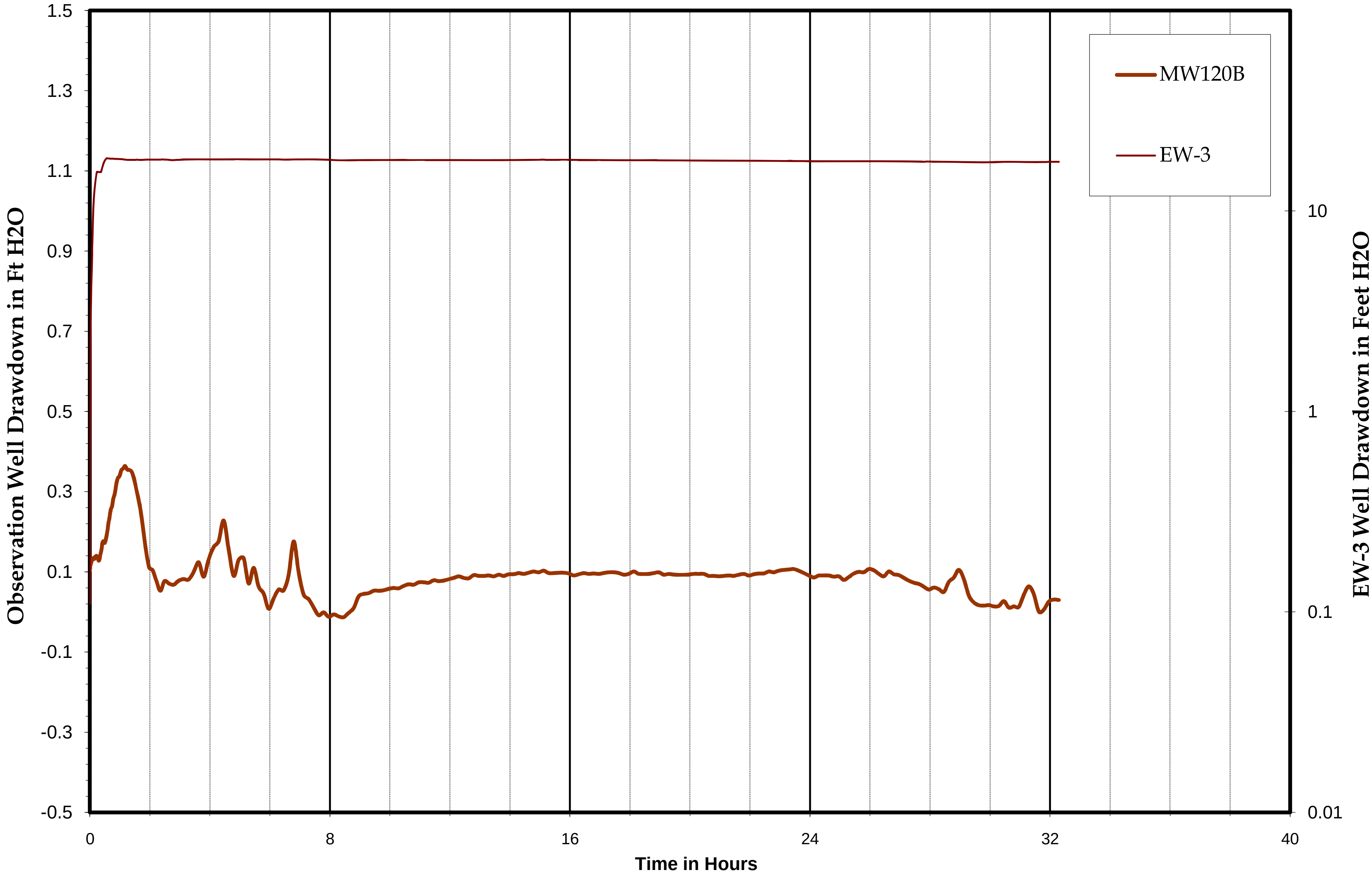


Figure E-11
MW-120B Hydrograph
EW-3 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, SC

CDM

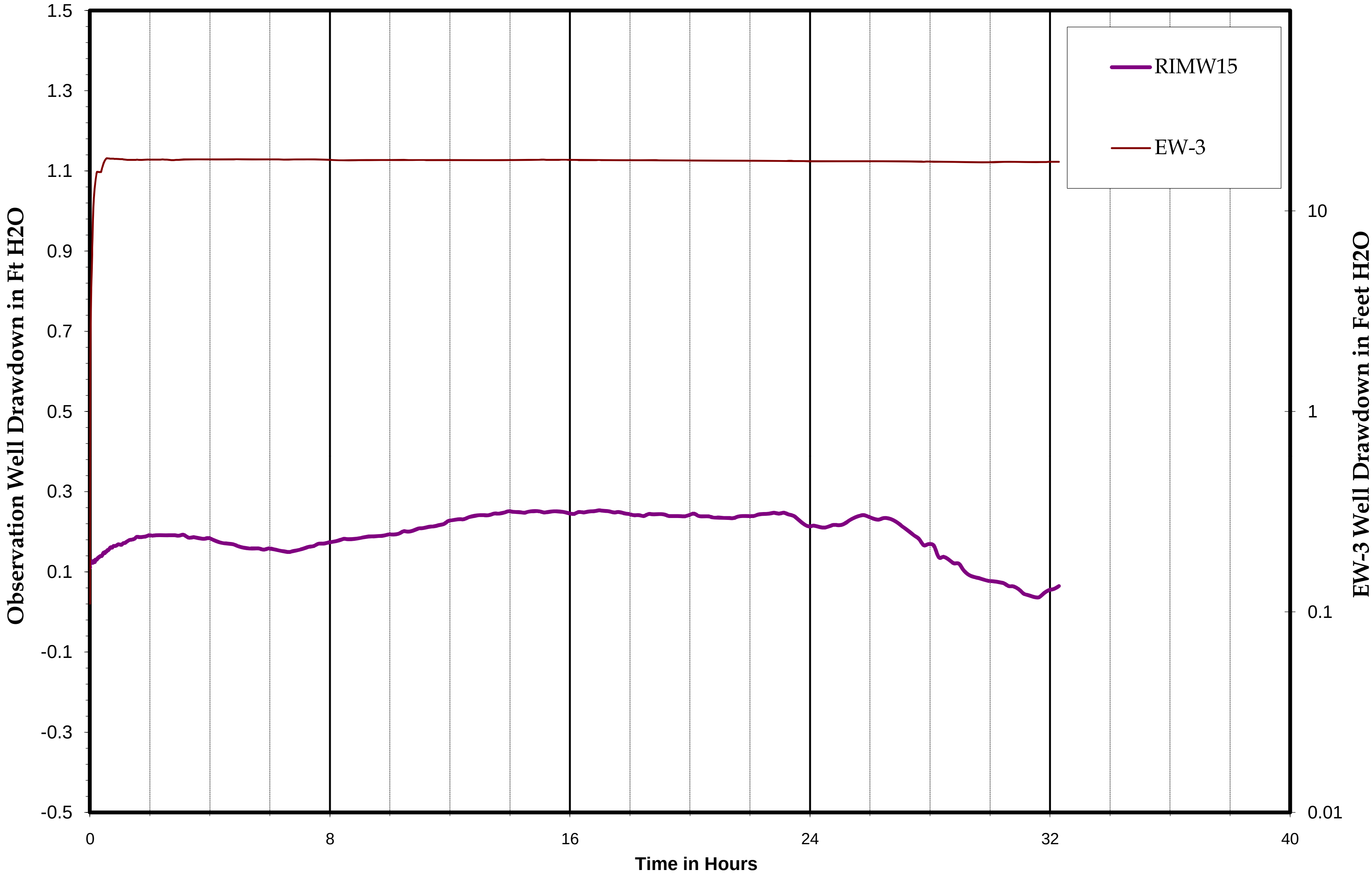
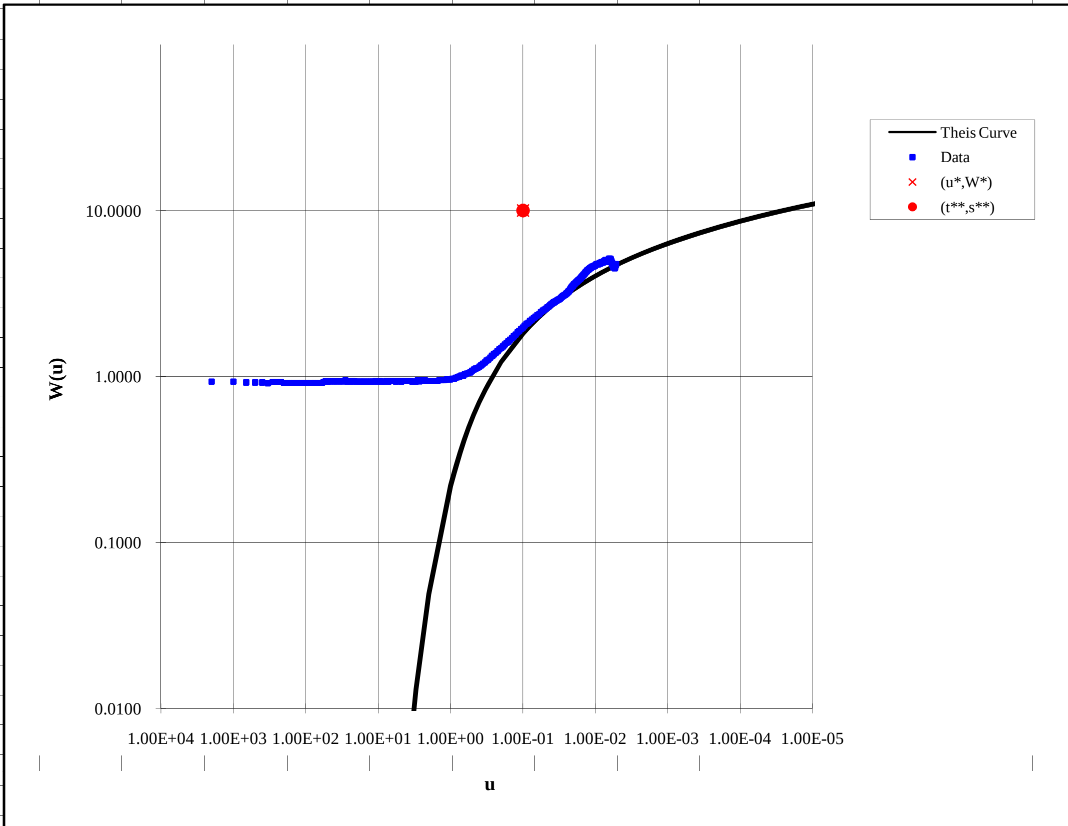


Figure E-12
RIMW-15 Hydrograph
EW-3 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, SC

CDM



Q	**3.3**	gpm
	0.441	ft^3/min
r	**59**	ft

(1) Select convienent u,W(u)** on type curve (shown as (u**,W**)).**

	0.1	**<- u****		
	10	**<- W****		

(2) Shift data point curve relative to type curve

	10	**<- Shift-h**	(Left-Right Shifting)	
	5	**<- Shift-v**	(Up-Down Shifting)	

(3) Adjust (t,s) to move match point (on data curve - shown as (t,s**))**

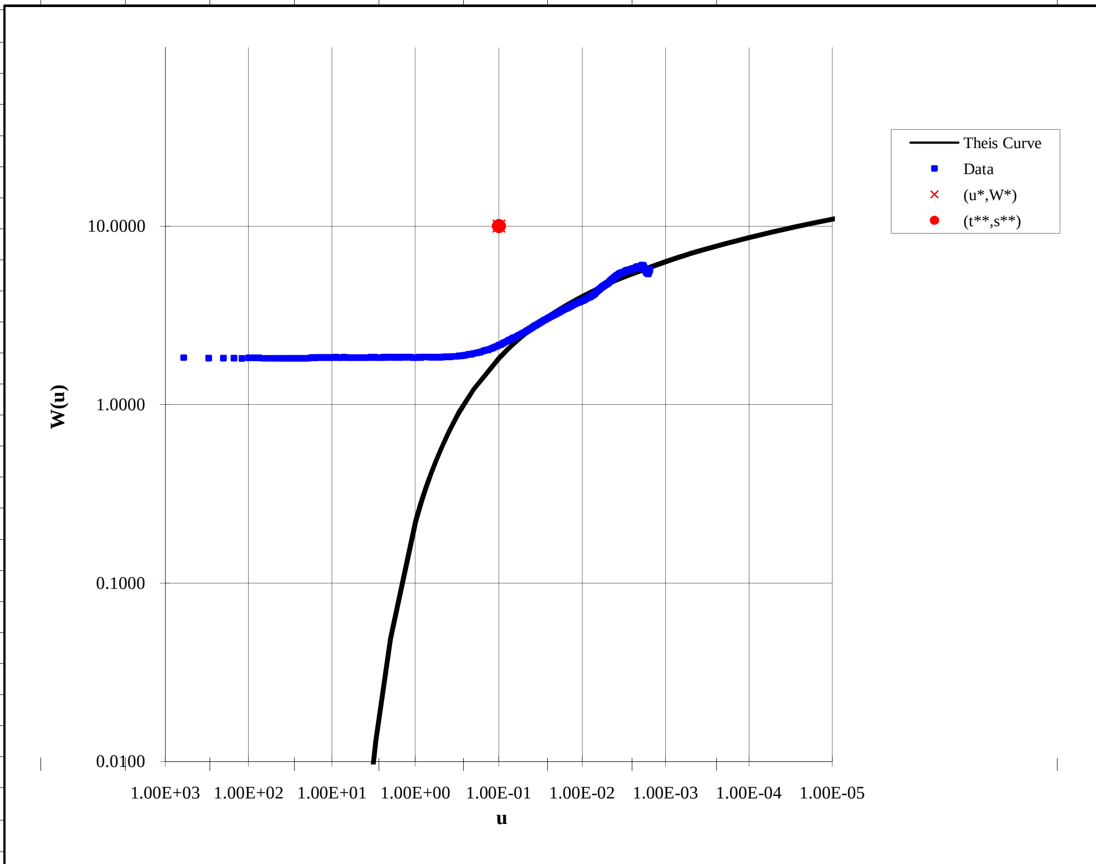
	100	**<-t****	0.10	<- computed u** (should agree with u** in step 1)
	2	**<-s****	10.00	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	**0.175539**	**ft^2/min**	**252.8**	**ft^2/day**
S=	**0.002017**			

Appendix E
BP-1A Theis Curve
EW-3 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill , South Carolina

CDM



Q	**3.3**	gpm
	0.441	ft^3/min
r	**52**	ft

(1) Select convienent u,W(u)** on type curve (shown as (u**,W**)).**

0.1	**<- u****	
10	**<- W****	

(2) Shift data point curve relative to type curve

3	**<- Shift-h**	(Left-Right Shifting)
5	**<- Shift-v**	(Up-Down Shifting)

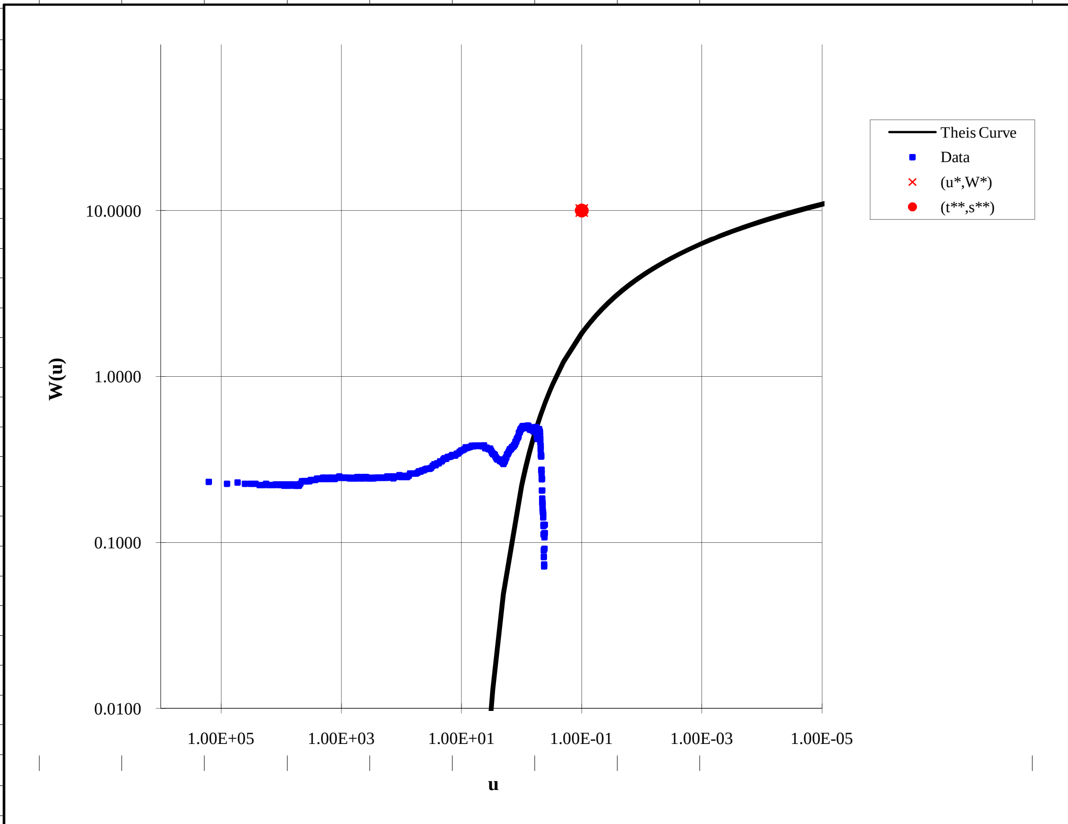
(3) Adjust (t,s) to move match point (on data curve - shown as (t,s**))**

30	**<-t****	0.10	<- computed u** (should agree with u** in step 1)
2	**<-s****	10.00	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	**0.175539**	**ft^2/min**	**252.8**	**ft^2/day**
S=	**0.000779**			

CDM



Q	3.3	gpm
	0.441	ft^3/min
r	225	ft

(1) Select convienent u,W(u)** on type curve (shown as (u**,W**)).**

0.1	<- u**			
10	<- W**			

(2) Shift data point curve relative to type curve

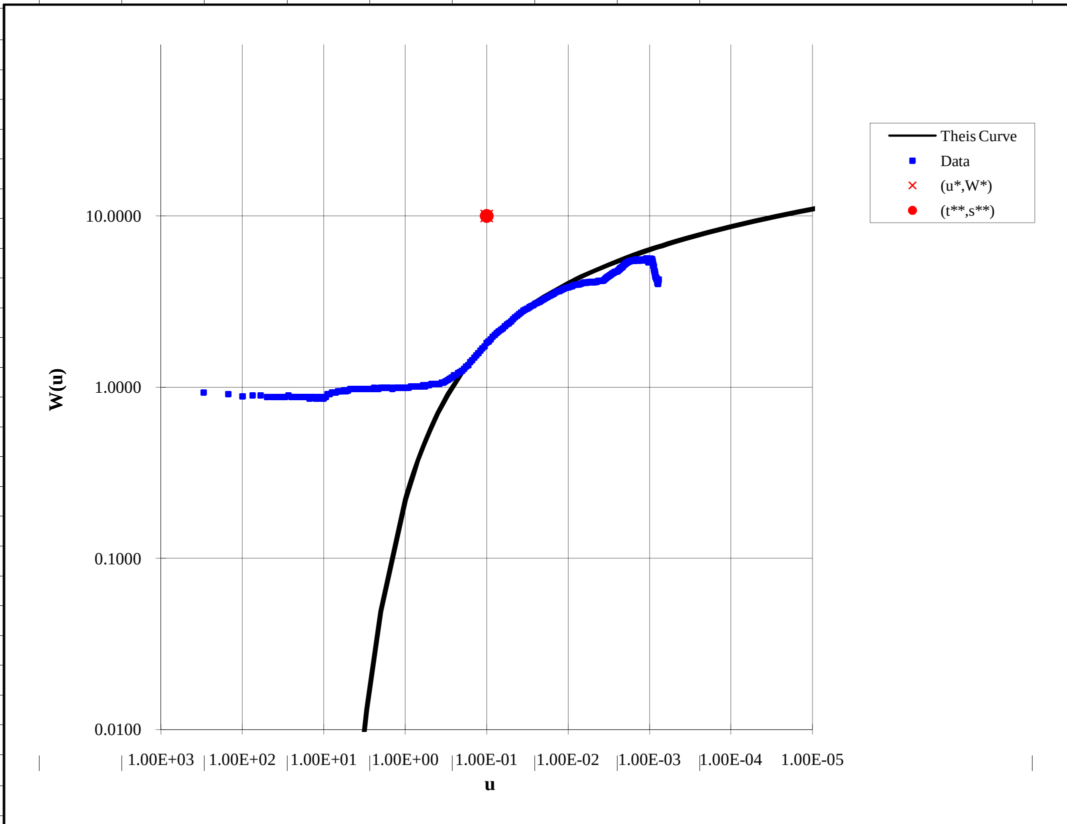
800	<- Shift-h	(Left-Right Shifting)		
2	<- Shift-v	(Up-Down Shifting)		

(3) Adjust (t,s) to move match point (on data curve - shown as (t,s**))**

8000	<-t**	0.10	<- computed u** (should agree with u** in step 1)
5	<-s**	10.00	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	0.070215	ft^2/min	101.1	ft^2/day
S=	0.004438			



Q	**3.3**	gpm
	0.441	ft^3/min
r	**65**	ft

(1) Select convienent u,W(u)** on type curve (shown as (u**,W**)).**

0.1	<- u**	
10	<- W**	

(2) Shift data point curve relative to type curve

1.5	**<- Shift-h**	(Left-Right Shifting)
9	**<- Shift-v**	(Up-Down Shifting)

(3) Adjust (t,s) to move match point (on data curve - shown as (t,s**))**

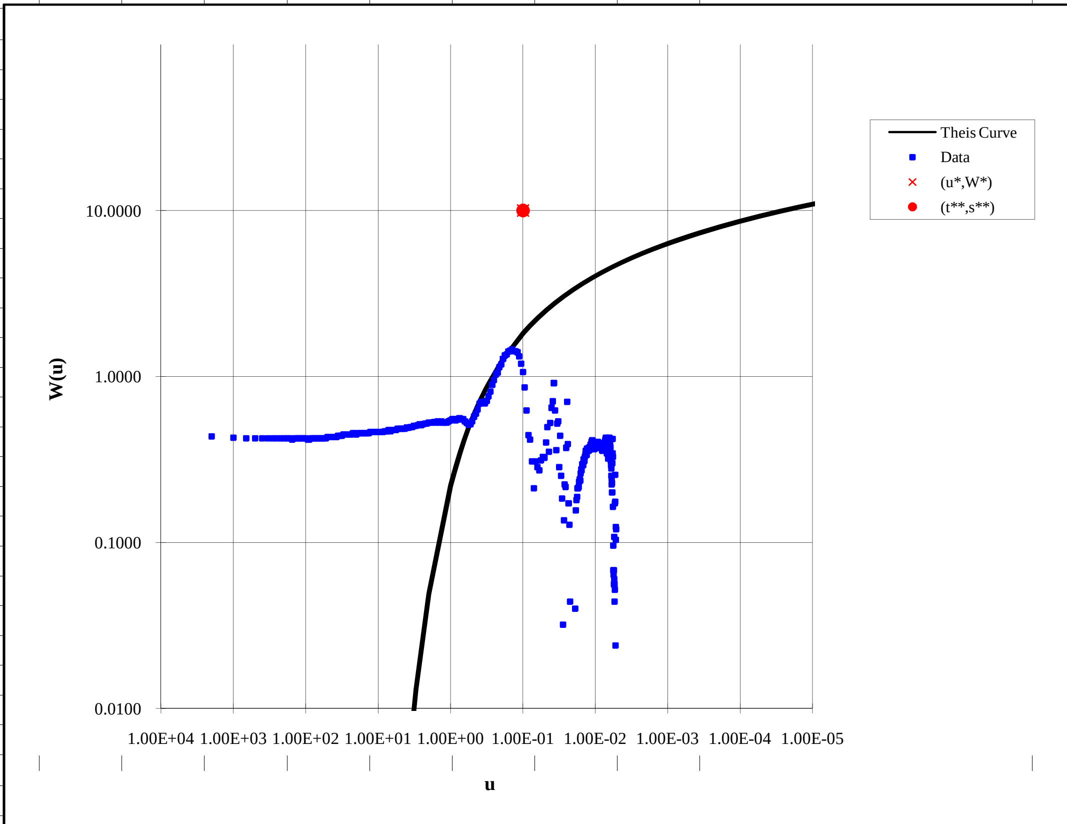
15	**<-t****	0.10	<- computed u** (should agree with u** in step 1)
1.11	**<-s****	9.99	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	**0.316286**	**ft^2/min**	**455.5**	**ft^2/day**
S=	**0.000449**			

CDM

Appendix E
MW-103 Theis Curve
EW-3 APT
Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill , South Carolina



Q	3.3	gpm
	0.441	ft^3/min
r	293	ft

(1) Select convienent u**,W(u)** on type curve (shown as (u**,W**)).

0.1	<- u**	
10	<- W**	

(2) Shift data point curve relative to type curve

10	<- Shift-h	(Left-Right Shifting)
4	<- Shift-v	(Up-Down Shifting)

(3) Adjust (t,s) to move match point (on data curve - shown as (t**,s**))

100	<-t**	0.10	<- computed u** (should agree with u** in step 1)
2.5	<-s**	10.00	<-computed W** (should agree with W** in step 1)

(5) Compute Formation Constants

T=	0.140431	ft^2/min	202.2	ft^2/day
S=	6.54E-05			

Appendix F
MPE Pilot Study Results

KEMRON
ENVIRONMENTAL SERVICES

1359-A Ellsworth Industrial Boulevard ■ Atlanta, GA 30318 ■ Telephone (404) 636-0928 ■ FAX (404) 636-7162 ■ http://www.kemron.com

April 13, 2007

Mr. Mike Lamar, P.E.
Camp Dresser and McKee, Inc.
3715 Northside Parkway, N.W.
Building 300, Suite 400
Atlanta, Georgia 30327

RE: **SVE/Pneumatic Pumping Pilot Test Report**
Former Philip Service Site (PSC site)
2324 Vernsdale Road.
Rock Hill, York County, South Carolina

Dear Mr. Lamar:

KEMRON Environmental Services, Inc. (KEMRON) is pleased to present the above-referenced pilot study report. A total of two multi-phase extraction pilot tests were conducted at the subject site.

If you have any questions, or would like additional information concerning the enclosed information, please contact either of the undersigned at 404-636-0928.

Sincerely,
KEMRON Environmental Services, Inc.

Daniel S. Robinson
Project Scientist

Jeanette L. Hamm, P.E.
Project Manager

HIGH-VACUUM MULTIPHASE EXTRACTION PILOT STUDY REPORT

Former Philips Service Site (PSC)
2324 Vernsdale Road.
Rock Hill, South Carolina

Prepared for:

Camp Dresser and McKee, Inc.
3715 Northside Parkway NW, Building 300, Suite 400
Atlanta, GA 30327

March 2007

Prepared by:

KEMRON
ENVIRONMENTAL SERVICES

KEMRON Environmental Services, Inc.
1359-A Ellsworth Ind. Blvd.
Atlanta, Georgia

Daniel S. Robinson
Project Scientist

Date 4/13/07

Jeanette L. Hamm. P.E.
Project Manager

Date 4/13/07

Table of Contents

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

KEMRON Environmental Services, Inc. (KEMRON) has prepared this Pilot Study Report to present site specific data based on the two pilot studies completed at the PSC site on February 20-21, 2007. This report will outline the site background, study objectives, study procedures/equipment, and conclusions based on field data. Data evaluation as a result of the pilot studies will be utilized as a basis of future remedial engineering design.

1.1 Background

The Philip Services Corporation (PSC) site in Rock Hill, South Carolina is a former RCRA hazardous waste treatment, storage, and disposal facility (TSDF). Operations began at the site in 1966 and continued until the bankruptcy of PSC in December 2003. Several previous investigations at the site have identified chemical releases to soil and groundwater, and some remediation has been performed.

1.2 Objectives

In order to determine the overall effectiveness of Multi-Phase Extraction (MPE) at a specific site, field pilot studies should be performed prior to the engineering design of a MPE system. Pilot studies usually measure pressures, flow rates, contaminant levels, and other system parameters. The primary objective of a MPE pilot study is to demonstrate that multi-phase extraction has the potential to perform significant remediation of a contaminant mass when operated over a longer time period.

A second objective of the MPE pilot study is the determination of the zone of influence. The pilot study will indicate the response of both the vadose and saturated zone to varying levels of vacuum. The zone of influence is determined by monitoring the effect of vacuum applied in an extraction well to surrounding observation wells. Additionally, the drawdown recorded in the observation wells can determine a zone of influence, or capture zone, the pumping wells will create on the subsurface.

A third objective of the MPE pilot study is to provide engineers with contaminant levels and flow rates in order to prepare design specifications and cost estimates for remediation equipment. However, long-term trends of removal rates cannot be assumed based on data collected during short-term pilot studies.

2.0 PROCEDURES

2.1 Methods

Multi-phase extraction is a remedial technology that extracts both subsurface liquids and vapors from an extraction well through the application of varying levels of vacuum pressure. To control liquid levels during the pilot study, a drop tube, also known as a stinger, is installed in the extraction well, to obtain static water level depth. The applied vacuum and airflow extracted from the well is conveyed through the drop tube. As the water table begins to rise due to the applied vacuum, both free product and groundwater are extracted through the drop tube. As a result, the static water table can be maintained as the applied vacuum is introduced to the extraction well during the pilot study. The depth of the drop tube can be adjusted to varying depths to optimize vacuum to depress the liquid levels in the extraction well.

To increase airflow and recovery, ambient air (aspiration air) is introduced at the extraction well. An airflow meter is mounted to the test well assembly to measure the additional volume of aspiration air that is added to the well. Additionally, two vacuum gauges are mounted to the test well assembly to measure the induced vacuum of the stinger and the well annulus.

The combined air and liquid extracted from the well is conveyed through a flexible vacuum hose to the MPE unit where the liquid is processed through an air/water separator and contained in a poly tank. The extracted vapors are discharged into the atmosphere. During the pilot study, specific system parameters such as vacuum levels, flow rate, temperature, and vapor concentrations are recorded at regular intervals. Figure 2 illustrates the process flow of the MPE pilot study unit, and Figure 3 illustrates a typical pilot test well manifold assembly.

To monitor the subsurface effects of the extraction, five observation wells are selected within a predetermined radius of the extraction well and monitored during the pilot study at regular intervals. All data collected from the pilot study will be evaluated to determine the effectiveness of MPE as a remedial strategy for the specific site.

2.2 Equipment

The KEMRON MPE Pilot Test Unit is a completely self-contained, trailer-mounted unit equipped with a Siemens 10 hp liquid ring vacuum pump capable of 200 cfm @ 27 in HG vacuum, a 120-gallon capacity knock-out tank with level controls, a 2 hp transfer pump, a MPE unit electrical control panel, an 18 kw, 240 VAC 3-phase power generator, a custom instrument gauge panel, a custom test manifold with gauges, custom observation wellhead plugs, a set of differential pressure gauges, flexible vacuum hose, an interface probe, and a Multi-Rae.

3.0 MONITORING AND DATA COLLECTION

3.1 Extraction Wells

Prior to mobilization, research into the geology of the site, well specifications, and contaminant concentrations can aid in determination of extraction well selection. Final decisions should be made in the field based on accessibility and other site conditions. Field inspection should confirm that the existed extraction and observation wells adhere to the current South Carolina Water Well Standards. For the PSC site in Rock Hill, South Carolina, two pilot studies were conducted in different areas of the facility, which are illustrated in Figure 1. Pilot test extraction wells were selected by CDM at the beginning of the tests.

3.1.1 Pilot Study 1

In the first pilot study conducted February 20, 2007, monitoring well RIMW-8 was utilized as the extraction well and was gauged prior to startup of the pilot study. The depth to water from the top of the well casing was measured at 16.35 feet below ground surface (bgs). A 1" drop tube was installed in RIMW-8 to a depth of approximately 22 feet bgs. Upon pilot study start-up, an induced vacuum of 88.4 inches of water column (in. w.c.) or 6.5 inches of Mercury (in. Hg) was introduced and maintained for approximately 165 minutes. Induced vacuum pressures stabilized in the observation wells after approximately 135 minutes of extraction at 6.5 in. Hg. At this point, the vacuum was increased to 231.1 in. w.c. or 17.0 in. Hg and maintained for approximately 150 minutes. Induced vacuum pressures stabilized in observation wells after approximately 120 minutes of extraction at 17.0 in. Hg. All measured data from this pilot study on the extraction well, RIMW-8, is presented in timed intervals as Table 1 in Appendix A.

3.1.2 Pilot Study 2

The second pilot study conducted on February 21, 2007, utilized PW-2A as the extraction well. Prior to the test liquid levels in this well were gauged. Free phase product was encountered at a depth of 13.64 feet bgs, and water at a depth of 18.78 feet bgs. A 1" drop tube was installed in PW-2A to a depth of 22 feet. Upon pilot study start-up, an induced vacuum of 108.8 inches of water column (in. w.c.) or 8.0 inches of Mercury (in. Hg) was introduced and maintained for approximately 180 minutes. Induced vacuum pressures stabilized in the observation wells after approximately 120 minutes of extraction at 8.0 in. Hg. At this point, the vacuum was increased to 224.3 in. w.c. or 16.5 in. Hg and maintained for approximately 165 minutes. Induced vacuum pressures stabilized in observation wells after approximately 150 minutes of extraction at 16.5 in. Hg. All measured data at timed intervals from this pilot study on extraction well, PW-2A, is presented as Table 2 in Appendix A

3.2 Observation Wells

Observation wells utilized for measuring the subsurface response to the MPE pilot study should be strategically located around the perimeter of the extraction well. Five observation wells were observed during each pilot study. Dependent upon field conditions, observation wells available should be at varying distances from the extraction well and along 90, 120, or 180 degree radials from the extraction well. Additionally, the five observation wells should be placed within a radial distance of less than two times the depth to water table for low permeability sites. For mixed to high permeability sites, a radial distance of one to three times the depth to water table should be utilized dependent upon site conditions. Observation wells should be screened to bracket the static water table. Observation wells for both pilot studies were selected by CDM.

3.2.1 Pilot Study 1

The pilot study on extraction well RIMW-8 utilized five existing wells, including MW-110A, P-1, RIMW-4, RIMW-5, and OB-8A as observation wells. These wells are at distances of 56, 105, 119, 112, and 50 feet from the extraction well, respectively. All observation wells were gauged prior to pilot study start-up to monitor any drawdown caused by the extraction. Observation wells were fitted with well seals and differential pressure gauges to monitor subsurface changes. At 88.4 in. w.c. (6.5 in. Hg) vacuum induced at the extraction well, vacuum influence was noted in all observation wells. Stabilization was achieved in approximately 135 minutes in all five wells. After stabilization was achieved and monitored the induced vacuum was increased to 231.1 in. w.c. (17.0 in. Hg) at the extraction well. Stabilization was achieved after approximately 120 minutes in all five observation wells.

Slight variation was noted in most of the observation wells during the pilot study. These deviations can most likely be attributed naturally occurring preferential pathway development. Given the length of the study and the soil conditions, variation in the observation wells is to be expected. Upon completion of the pilot study, the observation wells were again gauged using an interface probe. Most of the observation wells experienced drawdown due to the extraction from RIMW-8, and this is illustrated in Table 1 and Figure 4.

3.2.2 Pilot Study 2

The pilot study on extraction well PW-2A utilized five existing wells, including PW-2, OB-900, OB-21, OB-22, and OB-23, as observation wells. These wells are at distances of 20.2, 20.0, 6, 11, and 20 feet from the extraction well, respectively. All observation wells were gauged prior to pilot study start-up. Observation wells were fitted with well seals and differential pressure gauges to monitor subsurface changes. At 108.8 in. w.c. (8.0 in. Hg) vacuum induced at the extraction well, vacuum influence was noted in all observation wells. Stabilization was achieved in approximately 120 minutes in all five wells. After stabilization was achieved and monitored, the induced vacuum was increased to 224.3 in. w.c. (16.5 in. Hg) at the extraction well. Stabilization was achieved after approximately 150 minutes in all five observation wells. Follow stabilization at 224.3 in. w.c., the induced vacuum was increased to 312.8 in. w.c. (23.0 in. Hg) to maximize fluid collection.

Slight variation was noted in most of the observation wells during the pilot study. These deviations can most likely be attributed to naturally occurring preferential pathway development. Given the length of the study and the soil conditions, variation in the observation wells is to be expected. Upon completion of the pilot study, the observation wells were again gauged using an interface probe. All observation wells experienced drawdown due to the extraction from PW-2A, and this is illustrated in Table 2 and Figure 5.

3.3 MPE Pilot Test Results

The aboveground portion of the MPE pilot testing system, including a vacuum pump, air/water separator, valves, gauges, and power generator, is trailer-mounted. This type of mounting provides simple connections which are beneficial in areas of limited space. The duration of pilot studies can range from a few hours to multiple days. Upon start-up, MPE systems produce an initial jump in effluent concentrations, followed by a decrease to more stable levels. During each of the pilot studies, specific system parameters were recorded at regular intervals.

3.3.1 Pilot Study 1

During the extraction conducted on RIMW-8, all observation monitoring wells including MW-110A, P-1, RIMW-4, and RIMW-5 experienced decreases in groundwater elevation of 0.03, 0.09, 0.38, and 0.05 feet, respectively. An increase in groundwater elevation of 0.06 feet was seen in well OB-8A. This can be explained by a mounding effect on the water table caused by the induced vacuum for the shallow monitoring well. The distance from the extraction point versus drawdown curve for observation wells is illustrated in Figure 4.

With an applied vacuum of 88.4 in. w.c. (6.5 in. Hg) at the MPE unit, an adjusted well flow rate averaging 3.1 scfm was measured using a Dwyer DS-200 flow sensor. A Multi-Rae was used in measuring VOC vapor concentrations in parts per million (ppm) and Lower Explosive Limit effluent concentrations in percent LEL. At 6.5 in. Hg, the LEL readings were 0% and PID readings ranged from 2.3 to 4.5 ppm. Based on historical data of the nature of constituents, the PID readings were corrected to 1,2-Dichloroethane (DCA). The VOC extraction rate was measured at an average below 0.00 pounds/day at 6.5 in. Hg induced vacuum pressure at the well. A total of 0.00 pounds of VOCs were extracted during this pilot study.

Following stabilization at 6.5 in. Hg, the induced vacuum was increased to 231.1 in. w.c. (17.0 in. Hg) at the MPE unit. The adjusted well flow rate averaged 6.75 scfm, and was measured using a Dwyer DS-200 flow sensor. A Multi-Rae was used in measuring VOC vapor concentrations in ppm and effluent concentrations in percent LEL. At 17.0 in. Hg, the LEL readings were 0% and PID readings ranged from 6.9 to 9.4 ppm. Based on historical data of the nature of constituents, the PID readings were corrected to 1,2-Dichloroethane (DCA). The VOC extraction rate was measured at an average of 0.012 pounds/day at 17.0 in. Hg induced vacuum pressure at the well. A total of 0.00 pounds of VOCs were extracted during this pilot study.

During the first pilot study on extraction well RIMW-8, 262 gallons of fluids were recovered. At 6.5 in. Hg, the calculated flowrate is 0.38 gallons per minute (gpm), and at 17.0 in. Hg the calculated flowrate is 1.33 gpm. Free phase fluids were noticeable in the sight tube on the MPE unit's recovery tank during the pilot study. A clear fluid separated above the water in the tank. The total amount of this free phase fluid was not recorded at the end of the pilot study, and all fluids recovered were disposed in the onsite water treatment system. All measured data from the MPE unit is presented in Appendix A.

3.3.2 Pilot Study 2

During the extraction conducted on PW-2A, monitoring wells including PW-2 and OB-900 experienced decreases in groundwater potentiometric elevation of 1.20 and 3.91 feet, respectively. An increase in potentiometric elevation of 6.38, 1.76, and 0.48 feet was observed in wells OB-21, OB-22, and OB-23. This can be explained by a mounding effect on the water table for the shallow monitoring well. The distance from the extraction point versus drawdown curve for observation wells is illustrated in Figure 4.

With an applied vacuum of 108.7 in. w.c. (8.0 in. Hg) at the MPE unit, an adjusted well flow rate averaging 11.3 scfm was measured using a Dwyer DS-200 flow sensor. A Multi-Rae was used in measuring VOC vapor concentrations in ppm and effluent concentrations in percent LEL. At 8.0 in. Hg, the LEL readings were 0% and PID readings ranged from 0.3 to 0.9 ppm. Based on historical data of the nature of constituents, the PID readings were corrected to diesel fuel. The VOC extraction rate was measured at an average below 0.00 pounds/day at 8.0 in. Hg induced vacuum pressure at the well. A total of 0.00 pounds of VOCs were extracted during this pilot study.

Following stabilization at 8.0 in. Hg the induced vacuum was increased to 224.3 in. w.c. (16.5 in. Hg) at the MPE unit. The adjusted well flow rate averaged 10.7 scfm, and was measured using a Dwyer DS-200 flow sensor. A Multi-Rae was used in measuring VOC vapor concentrations in ppm and effluent concentrations in percent LEL. At 16.5 in. Hg, the LEL readings ranged from 7 to 11% and PID readings ranged from 0.4 to 0.5 ppm. Based on historical data of the nature of constituents, the PID readings were corrected to diesel fuel. The VOC extraction rate was measured at an average of 3.82 pounds/day at 16.5 in. Hg induced vacuum pressure at the well. A total of 0.64 pounds of VOCs were extracted during this pilot study.

During the second pilot study on extraction well PW-2A, 169 gallons of fluids were recovered, at an average rate of 0.43 gallons per minute. At 6.5 in. Hg , the calculated flowrate was 0.29 gpm, and at 16.5 the calculated flowrate was 0.49 gpm. Free phase fluids were noticeable in the sight tube on the MPE unit's recovery tank during the pilot study. A dark brown liquid separated above the water in the tank. The total amount of this free phase fluid was not recorded at the end of the pilot study, and all fluids recovered were disposed in the onsite water treatment system. All measured data from the MPE unit is presented in Appendix A.

4.0 CONCLUSIONS

Groundwater elevation measurements taken in the extraction and observation wells before and after the pilot study exhibit the drawdown results of the two pilot studies. The drawdown observed during the pilot study was plotted versus horizontal distance from the extraction well, as illustrated in Figures 4 and 5. In addition, the vacuum radius of influence or is determined by plotting distance from the extraction point versus the induced the vacuum pressures. This is illustrated in Figures 6 through 9.

4.1 Pilot Study 1

4.1.1 Vadose Zone Information

In a homogeneous lithology, recorded vacuum readings should exponentially decline with distance from the extraction well at a rate dependent upon the horizontal permeability. Thus, the vadose zone vacuum radius of influence can be determined for any desired vacuum pressure. Based on the results of Pilot Study 1, the extraction and observation wells utilized are likely installed in a relatively homogeneous lithology. The graphs produced show an extrapolated best-fit line gradually declining over time, and by expanding the scale an estimated radius of influence can be determined.

Utilizing the 0.10 in. w.c. engineering standard as an indication of induced vacuum pressure's radius of influence in the vadose zone, a radius of influence of 130 feet was extrapolated at an extraction well vacuum pressure of 88.4 in. w.c. or 6.5 in. Hg. A radius of influence of 130 feet is not realistic. Due to varying soil permeability and discontinuities in the subsurface, a conservative vacuum pressure of 1.0 in. w.c. is typically utilized as an indication of induced vacuum pressure in the vadose zone. Based on a standard of 1.0 in. w.c., a radius of influence of 100 feet was extrapolated at a vacuum pressure of 88.4 in. w.c. or 6.5 in Hg. A radius of influence of 100 feet is not realistic. Additionally, air and water extraction rates at this vacuum show little effect on the subsurface.

Utilizing the 0.10 in. w.c. engineering standard as an indication of induced vacuum pressure's radius of influence in the vadose zone, a radius of influence of 150 feet was extrapolated at an extraction well vacuum pressure of 231.1 in. w.c. or 17.0 in. Hg. A radius of influence of 150 feet is not realistic. Due to varying soil permeability and discontinuities in the subsurface, a conservative vacuum pressure of 1.0 in. w.c. is typically utilized as an indication of induced vacuum pressure in the vadose zone. Based on a standard of 1.0 in. w.c., a radius of influence of approximately 90 feet was extrapolated at a vacuum pressure of 231.1 in. w.c. or 17.0 in Hg. A radius of influence of 90 feet is not realistic. A conservative radius of influence of 50 feet would ensure the capture of VOCs in the vadose zone and increase the air exchange in the subsurface around RIMW-8. However, during full scale implementation the radius may decline due to the formation of preferential pathways.

4.1.2 Recommendations

Pilot study 1 activities conducted at RIMW-8, were performed to determine if multi-phase extraction would be an effective means of remediation. Based on evaluation of the data outlined above, it appears that MPE technology would not be an effective means of remediation of the site contamination. During the pilot study, the total fluids and vapor recovery was low, VOC vapor extraction rates were 0.00 pounds/day and 1.33 gpm at 17.0 in. Hg. Additionally, the relatively low observed induced vacuum pressure on the subsurface would limit the ability to remove VOCs in the vadose zone.

A typical multiphase extraction system would include utilizing drop tubes to effectively remove total fluids, including free product and groundwater, and vapor phase VOCs for treatment above ground. This technology would also require a large vacuum blower to overcome the pressure head and distance to the available remediation system locations. A vacuum enhanced pump and treat system would provide a higher flowrate of total fluids for treatment, assuming a sustained yield from the aquifer.

4.2 Pilot Study 2

4.2.1 Vadose Zone Information

In a homogeneous lithology, recorded vacuum readings should exponentially decline with distance from the extraction well at a rate dependent upon the horizontal permeability. Thus, the vadose zone vacuum radius of influence can be determined for any desired vacuum pressure. Based on the results of Pilot Study 2, the extraction and observation wells utilized are likely installed in a relatively homogeneous lithology. The graphs produced which show an extrapolated best-fit line gradually declining over time, and by expanding the scale an estimated radius of influence can be determined. Results obtained from observation well monitoring do not surround the well perimeter and may have skewed results.

Utilizing the 0.10 in. w.c. engineering standard as an indication of induced vacuum pressure's radius of influence in the vadose zone, a radius of influence of 40 feet was extrapolated at an extraction well vacuum pressure of 108.8 in. w.c. or 8.0 in. Hg. A radius of influence of 40 feet is realistic. However, due to varying soil permeability and discontinuities in the subsurface, a conservative vacuum pressure of 1.0 in. w.c. is typically utilized as an indication of induced vacuum pressure in the vadose zone. Based on a standard of 1.0 in. w.c., a radius of influence of 25 feet was extrapolated at a vacuum pressure of 108.8 in. w.c. or 8.0 in Hg. A radius of influence of 25 feet is realistic, however during long-term extractions the radius may decrease due to formation of preferential pathways.

Utilizing the 0.10 in. w.c. engineering standard as an indication of induced vacuum pressure's radius of influence in the vadose zone, a radius of influence of 148 feet was extrapolated at an extraction well vacuum pressure of 224.4 in. w.c. or 16.5 in. Hg. A radius of influence of 148 feet is not realistic. Due to varying soil permeability and discontinuities in the subsurface, a conservative vacuum pressure of 1.0 in. w.c. is typically utilized as an indication of induced vacuum pressure. Based on a standard of 1.0 in. w.c., a radius of influence of 74 feet was extrapolated at a vacuum pressure of 224.4 in. w.c. or 16.5 in Hg. A radius of influence of 74 feet is realistic; however during long-term extractions the radius may decrease due to formation of preferential pathways.

A conservative radius of influence of 50 feet would ensure the capture of VOCs in the vadose zone and increase the air exchange in the subsurface around PW-2A.

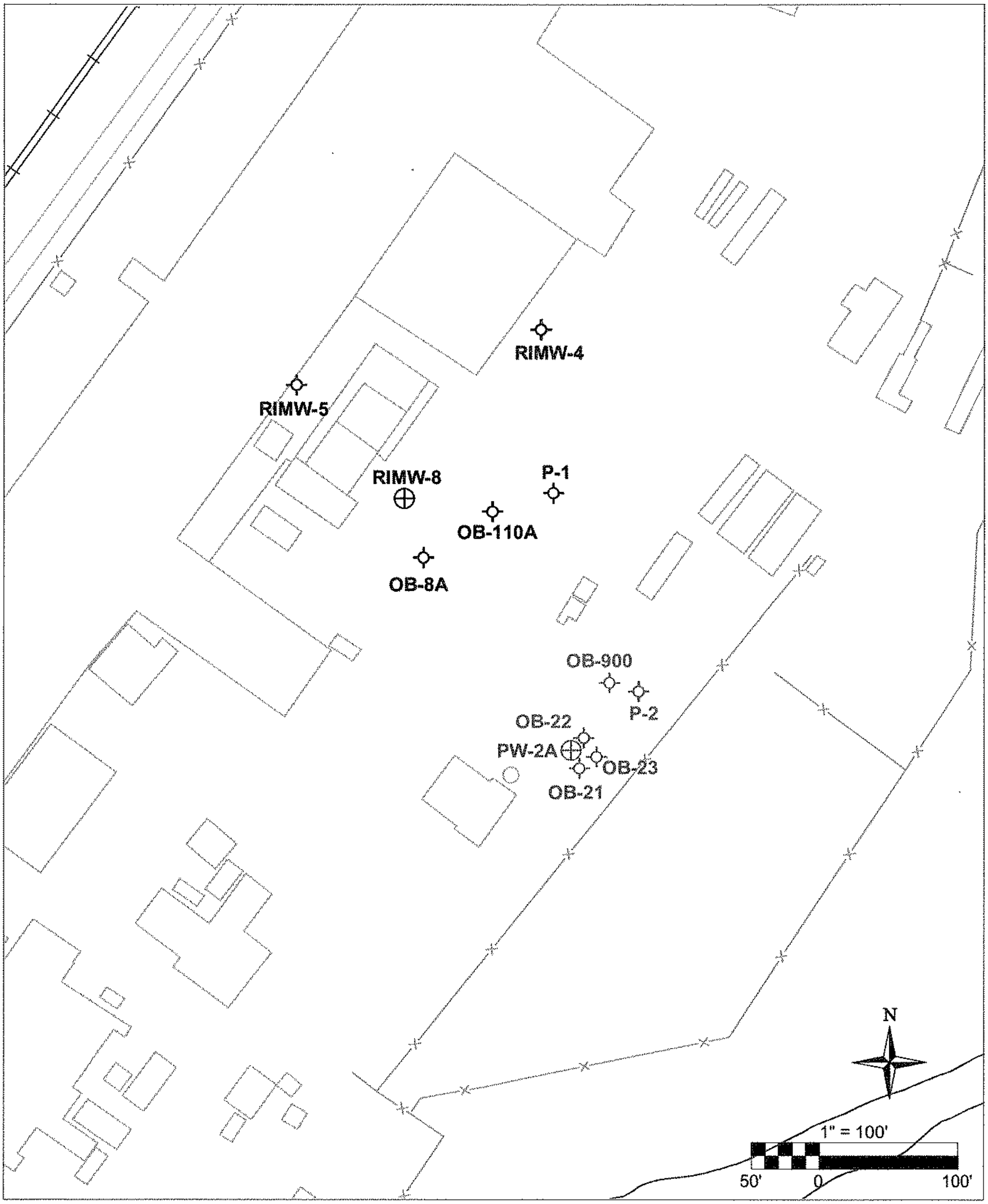
4.2.2 Recommendations

Pilot study 2 activities conducted at PW-2A were performed to determine if multi-phase extraction would be an effective means of remediation. Based on evaluation of the data outlined above, it appears that MPE technology would be an effective means of remediation of the site contamination. The potential to remove large quantities of total fluids, including groundwater and free product, and vapor phase VOCs would be an efficient remediation alternative. Additionally, application of vacuum pressure to the subsurface would increase to ability to remove VOCs in the vadose zone by air exchanges.

Based on the data collected during the pilot study, MPE well data calculated includes the following: At 8.0 in. Hg, an average scfm of 11.3, VOC extraction rates of 0.00 lbs/day, total fluid recovery of 0.29 gpm, and a radius of influence of 25 feet. At 16.5 in. Hg an average scfm of 10.7, VOC extraction rates of 3.82 lbs/day, total fluids recovery of 0.49 gpm, and a radius of influence of 50 feet.

A typical multiphase extraction system would include utilizing drop tubes to effectively remove the total fluids and vapor phase VOCs for treatment above ground. This technology would also require a large vacuum blower to overcome the pressure head and distance to the available remediation system locations. This combination of a vacuum enhanced pump and treat system would provide a higher flowrate of total fluids recovered for treatment, assuming a sustained yield from the aquifer. This vacuum enhanced pump and treat would be better suited at this portion of the PSC site. However, VOC vapor extraction rates will decline during system operation and fluid extraction rates will depend on the yield of the underlying aquifer.

Figures



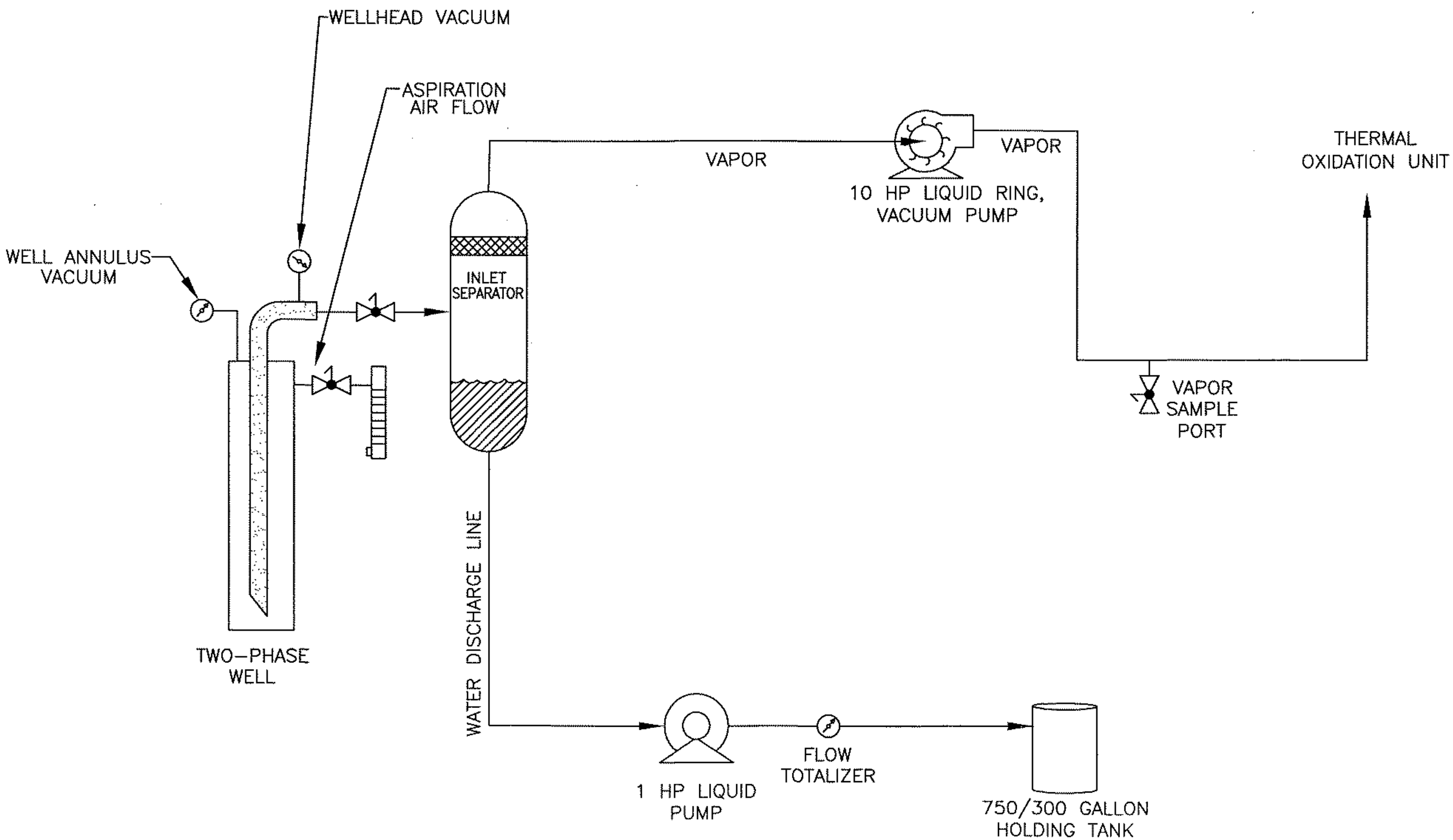
Chlorinated VOC Area
MPE Extraction Well
MPE Observation Well

Fuel Oil Area
MPE Extraction Well
MPE Observation Well

Figure 1
MPE Pilot Study Locations

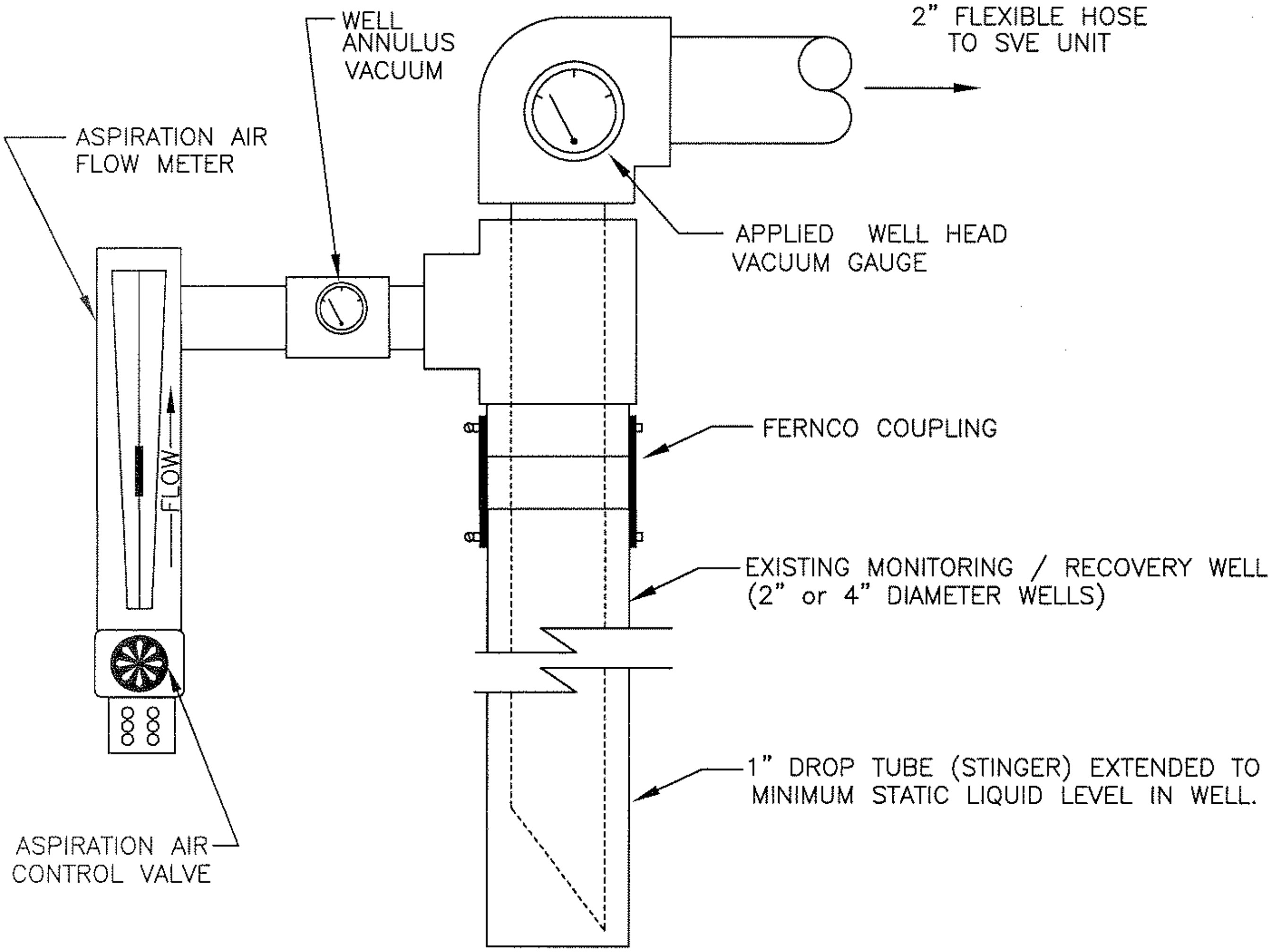
RI Phase II
PSC Site
Rock Hill, South Carolina

CDM



KEMRON ENVIRONMENTAL SERVICES	NOT TO SCALE	DRAWN BY: KG	DATE 19 MARCH 2007	FIGURE 2	PROCESS FLOW DIAGRAM MPE EQUIPMENT
		REVIEWED:	PROJECT NO. SE4440-001-001		
		APPROVED:	DWG. FILE NO. MPE EQUP.		

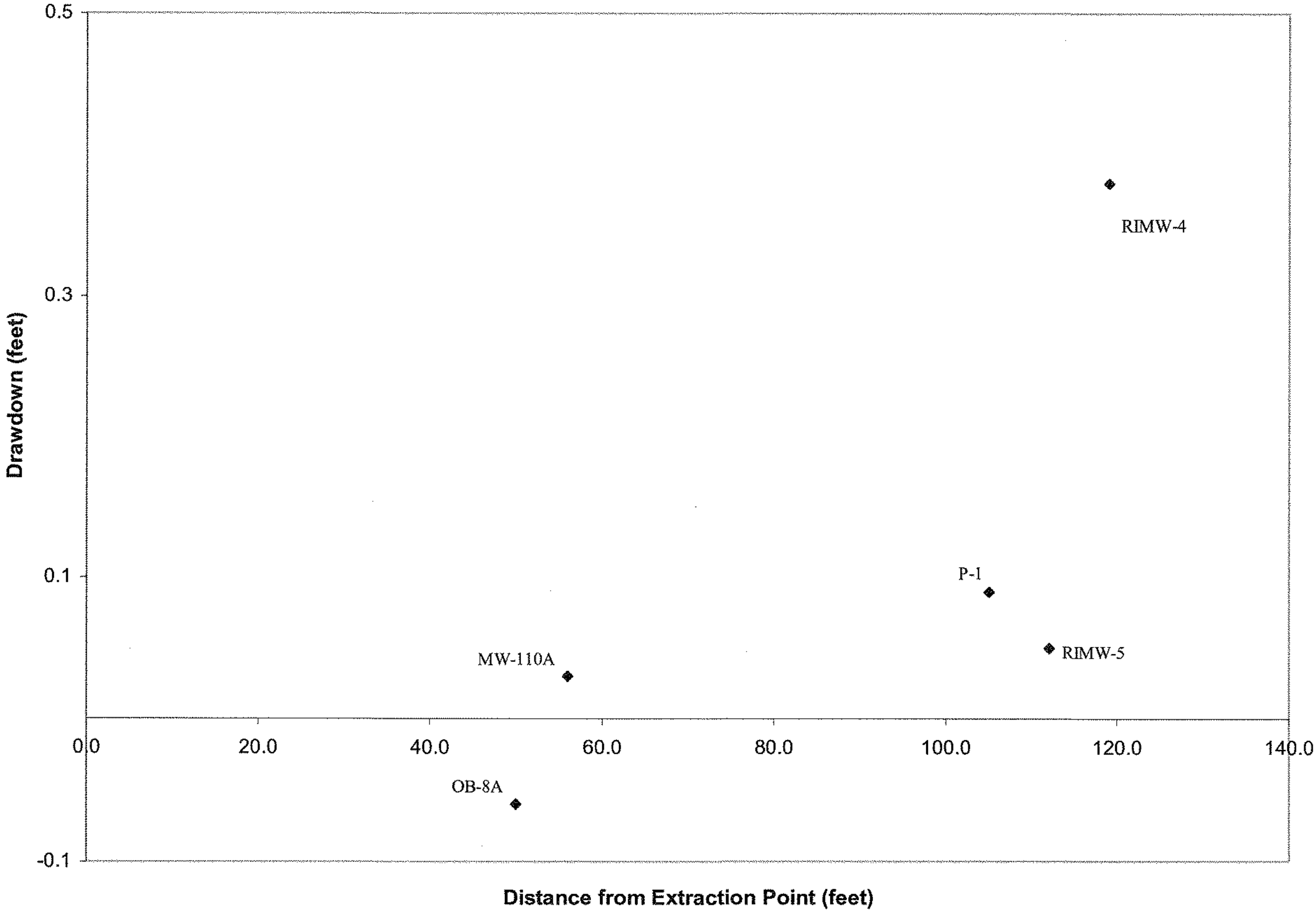
M:\SE-ATLANTA PROJECTS\0 SE44\SE 4440-001-001\ MPE EQUP. FIG 2.dwg 03/19/2007 kgrigoryan CH



M:\SE-ATLANTA PROJECTS\0 SE44\SE 4440-001-001\ TEST WELL FIG 3.dwg 03/19/2007 kgrigoryan CH

KEMRON ENVIRONMENTAL SERVICES	NOT SCALED	DRAWN BY: KG	DATE 19 MARCH 2007	FIGURE 3	TEST WELL MANIFOLD ASSEMBLY
		REVIEWED:	PROJECT NO. SE4440-001-001		
		APPROVED:	DWG. FILE NO. TEST WELL		

Figure 4. Pilot Study 1. RIMW-8
Distance from Extracion Point verses Drawdown



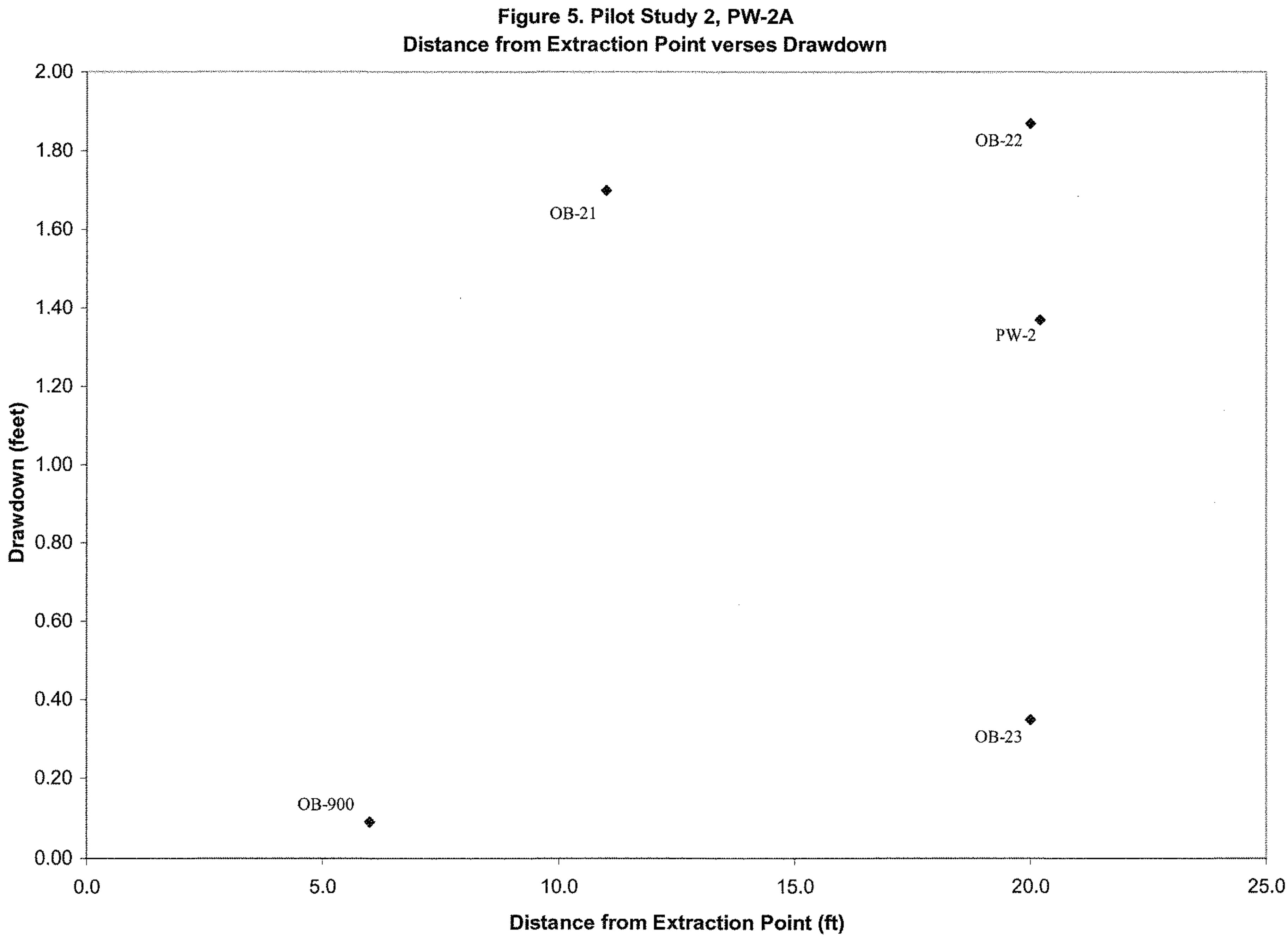


Figure 5. Pilot Study 2, PW-2A
Distance from Extraction Point verses Drawdown
Drawdown (feet)
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.0
5.0
10.0
15.0
20.0
25.0
Distance from Extraction Point (ft)
OB-22
OB-21
PW-2
OB-23
OB-900

Figure 6: Pilot Study 1, RIMW-8
Distance from Extraction Point verses 6.5 in Hg at Blower Inlet

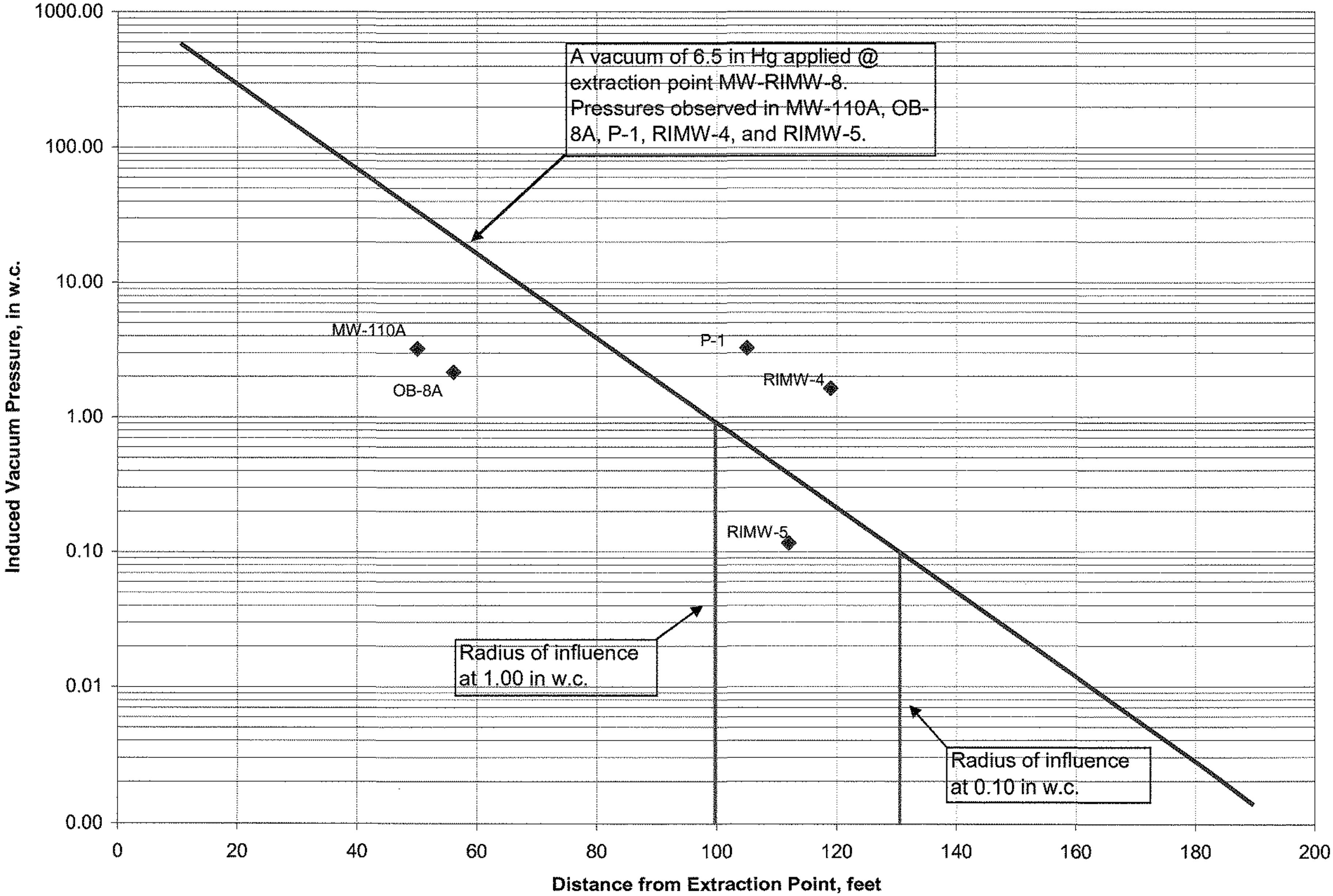


Figure 7: :Pilot Study 1, RIMW-8
Distance from Extraction Point verses 17.0 in. Hg at Blower Inlet

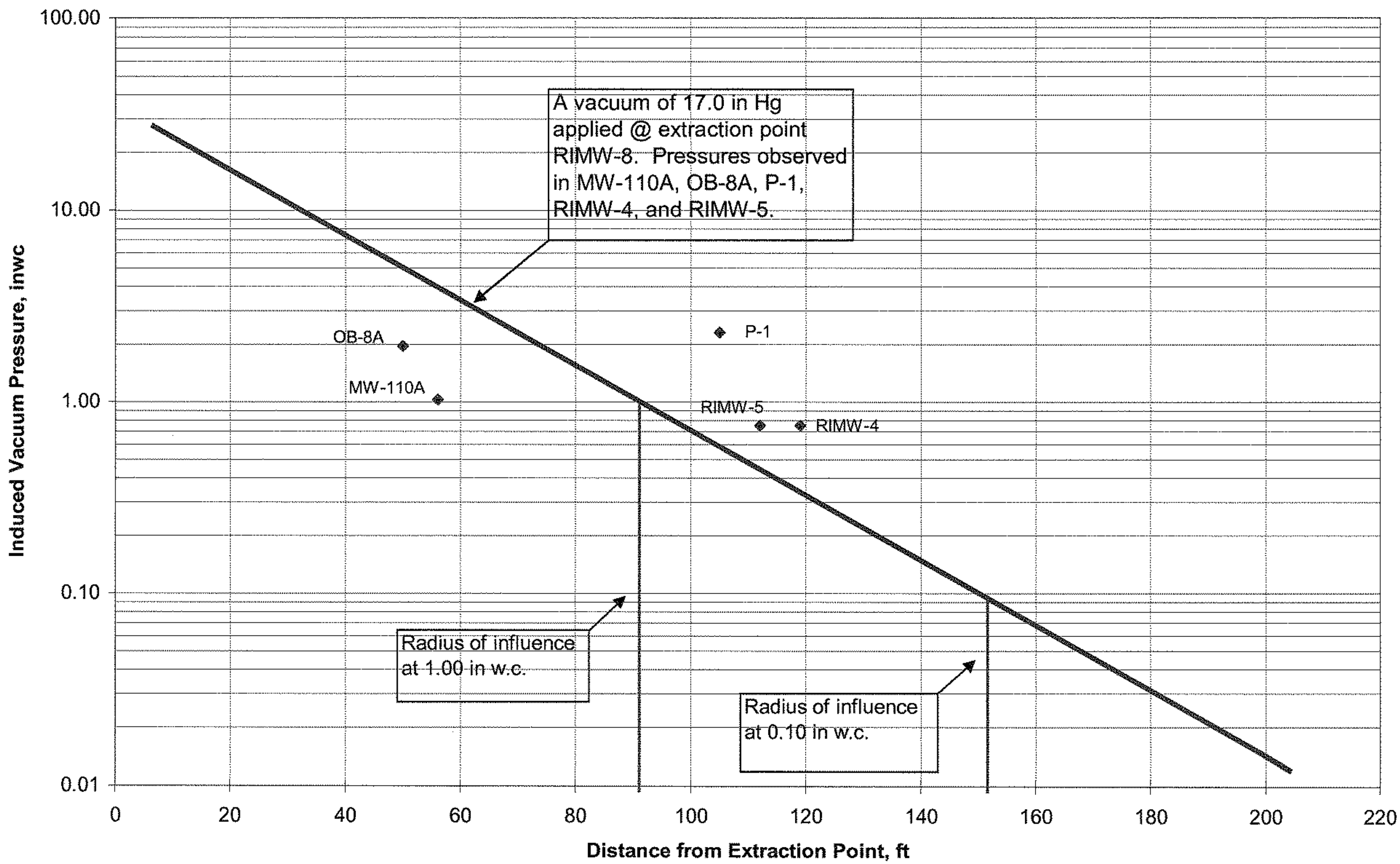


Figure 8: Pilot Study 2, PW-2A
Distance from Extraction Point verses 8.0 in Hg at Blower Inlet

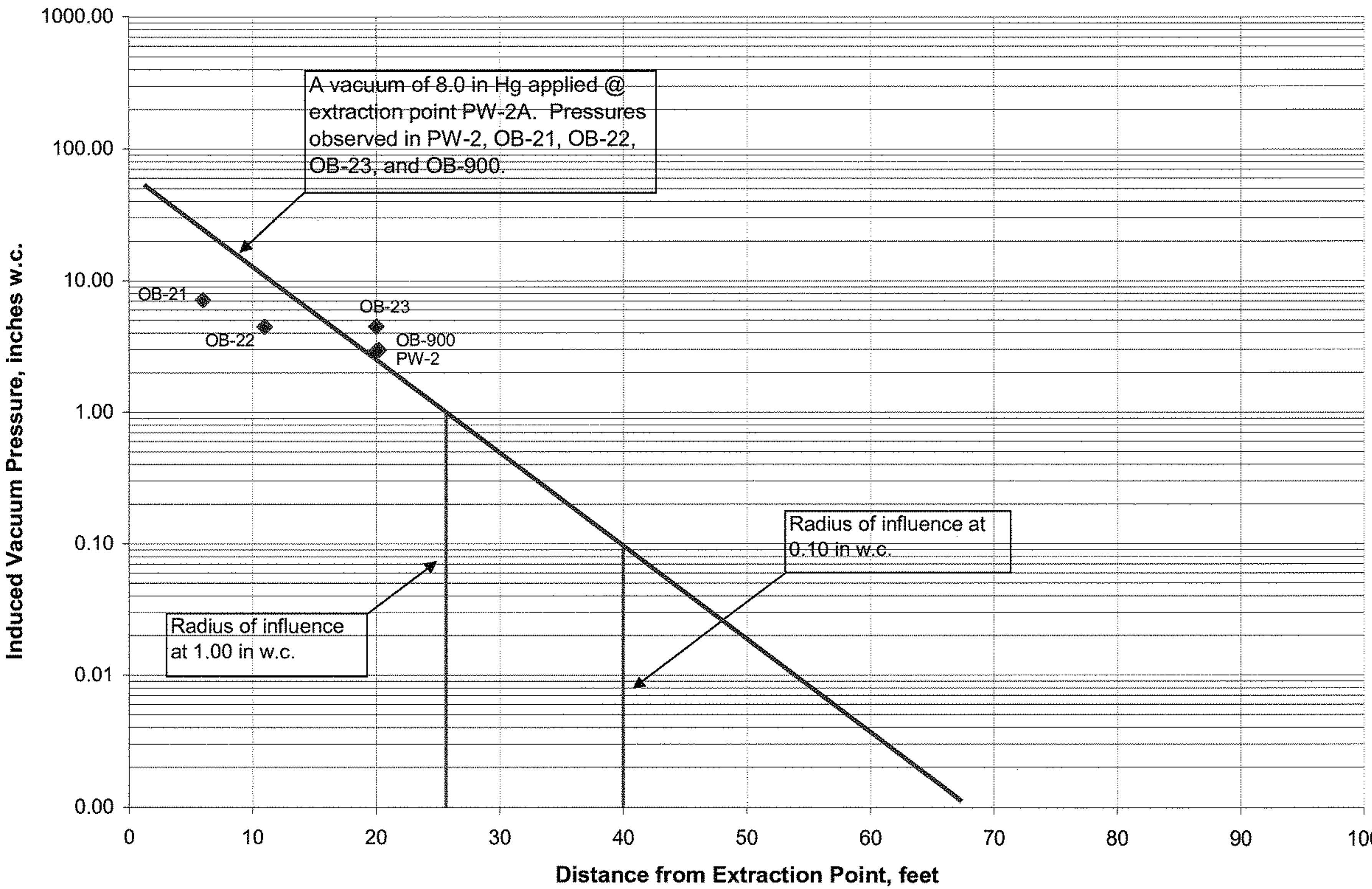
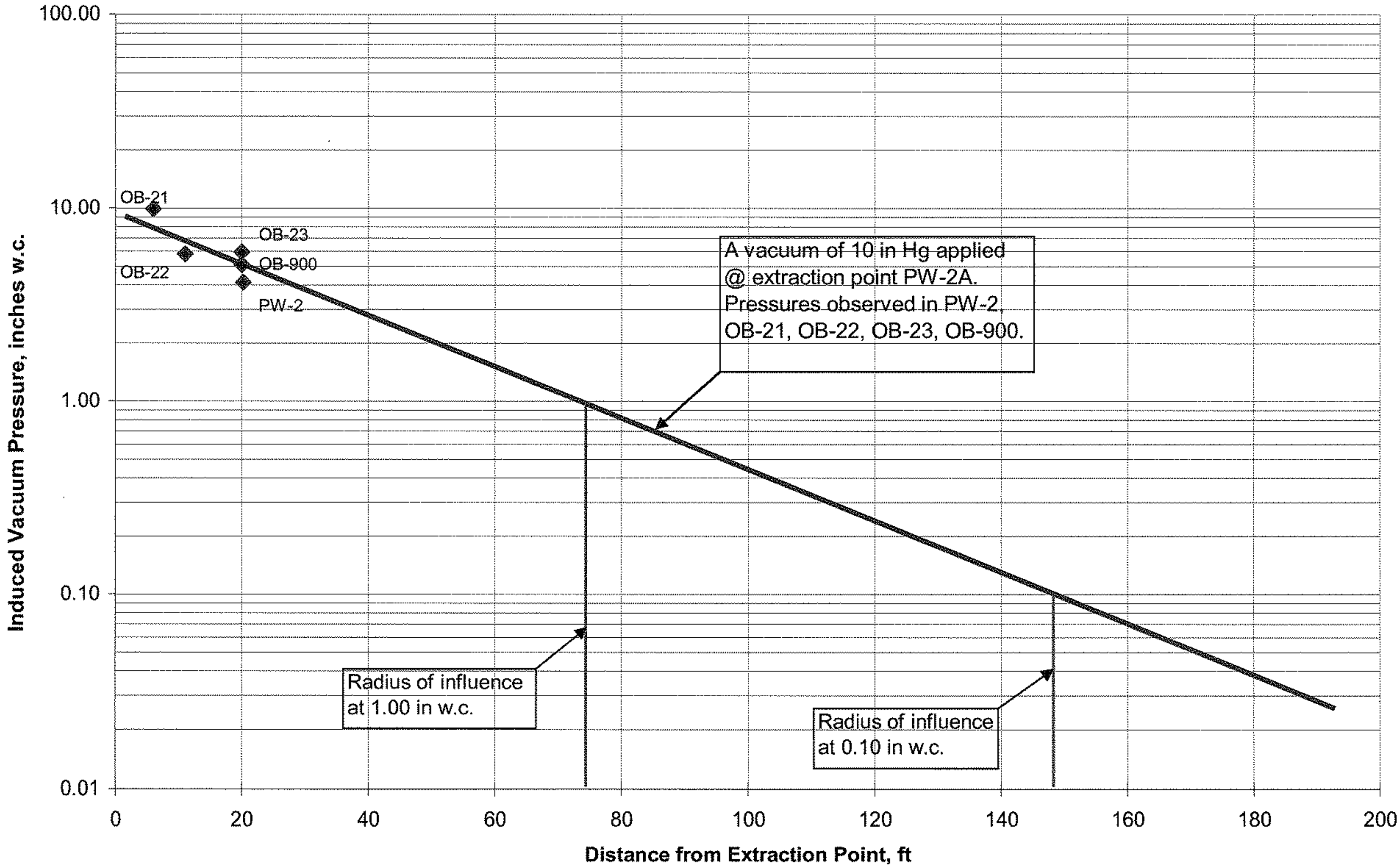


Figure 9: Pilot Study 2, PW-2A
Distance from Extraction Point verses 16.5 in. Hg at Blower Inlet



Tables

Pilot Study 1, RIMW-8
PSC Site, Rock Hill, South Carolina
Table 1. Pre and Post Extraction Potentiometric Elevations

Pre-extraction potentiometric elevations

Well ID	Distance from Extraction Well (feet)	Depth to Water (feet)	Depth to Product (feet)	Water Elevation (feet)	Product Elevation (feet)	Product Thickness (feet)	Potentiometric Elevation (feet)
RIMW-8	N/A	16.35	-	83.65	-	0.00	83.65
MW-110A	56	12.80	-	87.20	-	0.00	87.20
P-1	105	12.21	-	87.79	-	0.00	87.79
RIMW-4	119	15.60	-	84.40	-	0.00	84.40
RIMW-5	112	17.33	-	82.67	-	0.00	82.67
OB-8A	50	12.28	-	87.72	-	0.00	87.72

Post-extraction potentiometric elevations

Well ID		Depth to Water (ft.)	Depth to Product (ft.)	Water Elevation (ft.)	Product Elevation (ft.)	Product Thickness (ft.)	Potentiometric Elevation (ft.)
RIMW-8	N/A	N/A	-	N/A	N/A	N/A	N/A
MW-110A	56	12.77	-	87.23	-	0.00	87.23
P-1	105	12.12	-	87.88	-	0.00	87.88
RIMW-4	119	15.22	-	84.78	-	0.00	84.78
RIMW-5	112	17.28	-	82.72	-	0.00	82.72
OB-8A	50	12.34	-	87.66	-	0.00	87.66

Notes:
N/A = Not Applicable

Pilot Study 2, PW-2A
PSC Site, Rock Hill, South Carolina
Table 2. Pre and Post Extraction Potentiometric Elevations

Pre-extraction potentiometric elevations

Well ID	Distance from Extraction Well (feet)	Depth to Water (feet)	Depth to Product (feet)	Water Elevation (feet)	Product Elevation (feet)	Product Thickness (feet)	Potentiometric Elevation (feet)
PW-2A	N/A	18.78	13.64	81.22	86.36	5.14	85.33
PW-2	20	13.25	11.77	86.75	88.23	1.48	87.93
OB-900	6	9.98	7.85	90.02	92.15	2.13	91.72
OB-21	11	12.96	12.95	87.04	87.05	0.01	87.05
OB-22	20	12.95	12.82	87.05	87.18	0.13	87.15
OB-23	20	15.51	12.10	84.49	87.90	3.41	87.22

Post-extraction potentiometric elevations

Well ID	Distance from Extraction Well (feet)	Depth to Water (ft.)	Depth to Product (ft.)	Water Elevation (ft.)	Product Elevation (ft.)	Product Thickness (ft.)	Potentiometric Elevation (ft.)
PW-2A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PW-2	20	14.76	13.14	85.24	86.86	1.62	86.54
OB-900	6	9.00	7.94	91.00	92.06	1.06	91.85
OB-21	11	14.66	14.65	85.34	85.35	0.01	85.35
OB-22	20	14.81	14.69	85.19	85.31	0.12	85.29
OB-23	20	16.83	12.45	83.17	87.55	4.38	86.67

Notes:
N/A = Not Applicable

Appendix A
MPE Pilot Study Data Sheets

Pilot Study 1, RIMW-8 Data
PSC, Rock Hill, South Carolina
KEMRON ID:SE4440

Site: PSC		Weather: 50's, partly cloudy		Date:	2/20/2007
Proj. No.: SE4440	Gallons Fluid Recovered: 262		Time Arv: 8:00	Time Dep:	18:00

Test Well	Time	DTP	DTW	PT	Time	DTP	DTW	PT	Stinger Depth		Remarks:
RIMW-8	8:30	-	16.35	0.00	18:00	-	N/A	0.00	22 feet		
Obser. Well	Time	DTP	DTW	PT	Time	DTP	DTW	PT		Dist. from RIMW-8 (in feet):	
MW-110A	8:30	-	12.80	0.00	18:00	-	12.77	0.00		56	
P-1	8:30	-	12.21	0.00	18:00	-	12.12	0.00		105	
RIMW-4	8:30	-	15.60	0.00	18:00	-	15.22	0.00		119	
RIMW-5	8:30	-	17.33	0.00	18:00	-	17.28	0.00		112	
OB-8A	8:30	-	12.28	0.00	18:00	-	12.34	0.00		50	

Time of Readings hours		RIMW-8			Air Stream @MPE unit																Observation Well Vacuums					Flowmeter/ Totalizer gallons	Remarks
	MPE inHg	Stinger inHg	Well inHg	Bleed scfm	Pitot inwc	Velocity fpm	Temp °F	pitot vacuum	Conc. %LEL	corrected %LEL	mean %LEL	Conc. ppm	corrected ppm	mean ppm	PPMv	elapsed time hrs	VOCs lbs/day	VOCs extracted during elapsed time(lbs)	cumulative VOCs lbs	Flow scfm	MW-110A inwc	P-1 inwc	RIMW-4 inwc	RIMW-5 inwc	OB-8A inwc		
11:00																										318	Startup
11:15	6.5	2	0	11	0.50	146.7	60	26	0	0	0	4.5	2.7	1.4	1.4	0.25	0.00	0.00	0.00	3.2	2.6	2.7	1.5	0.1	3.0	318	
11:30	6.5	1.5	0	12	0.50	100.8	60	26	0	0	0	2.9	1.7	2.2	2.2	0.25	0.00	0.00	0.00	2.2	2.0	2.5	1.5	0.1	2.8	318	
11:45	6.5	1.5	0	11	0.50	145.4	62	26	0	0	0	3.3	2.0	1.9	1.9	0.25	0.00	0.00	0.00	3.2	3.4	2.5	3.0	0.2	4.0	333	
12:15	6.5	1.5	0	11	0.50	144.2	64	26	0	0	0	3.4	2.0	2.0	2.0	0.25	0.00	0.00	0.00	3.1	5.0	4.0	4.8	0.25	5	333	
12:45	6.5	1.5	0	11	0.50	146.7	60	26	0	0	0	3.9	2.3	2.2	2.2	0.50	0.00	0.00	0.00	3.2	3.0	4.0	1.5	+	3.2	357	
13:15	6.5	1.5	0	11	0.50	149.2	56	26	0	0	0	2.7	1.6	1.8	1.8	0.50	0.00	0.00	0.00	3.3	0.2	2.5	0.2	0.0	2.8	357	
13:45	6.5	1.5	0	11	0.50	147.9	58	26	0	0	0	2.3	1.4	1.5	1.5	0.50	0.00	0.00	0.00	3.2	0.4	2.5	0.0	0.1	1.8	381	
14:00	17	12	11	8	0.50	242.5	58	26.5	0	0	0	7.4	4.4	3.2	3.2	0.50	0.01	0.00	0.00	5.3	0.8	2.5	0.5	0.1	1.6	404	
14:30	17	12	11	8	0.50	642.7	59	20.5	0	0	0	8	4.8	4.6	4.6	0.50	0.02	0.00	0.00	14.0	0.8	2.5	0.25	0.1	1.4	430	
15:00	17	12	11	8	0.50	241.9	59	26.5	0	0	0	6.9	4.1	4.5	4.5	0.50	0.01	0.00	0.00	5.3	0.8	2.5	0.25	0.0	1.6	481	
15:30	17	12	11	8	0.50	241.9	59	26.5	0	0	0	9.1	5.5	4.8	4.8	0.50	0.01	0.00	0.00	5.3	0.8	2.5	0.5	0.1	1.8	505	
16:00	16.5	12	11	8	0.50	241.9	59	26.5	0	0	0	8.6	5.2	5.3	5.3	0.50	0.01	0.00	0.00	5.3	1.4	2.2	1.25	0.1	2.3	555	
16:30	16.5	12	11	8	0.50	241.9	59	26.5	0	0	0	9.4	5.6	5.4	5.4	0.50	0.01	0.00	0.00	5.3	1.1	2.0	1.0	0.1	2.1	580	
17:00																											Shutdown

Notes: +=positive pressure observed
PID readings were corrected for Dichloroethane per the RAE systems tech guidance.

Multi-phase Pilot Study 2, PW-2A Data
PSC, Rock Hill, South Carolina
KEMRON ID:SE4440

Site: PSC | Weather: 50's, partly cloudy | Date: 02/21/07
Proj. No.: SE4440 | Gallons Fluid Recovered: 169 | Time Arv: 8:00 | Time Dep: 19:00

Test Well	Time	DTP	DTW	PT	Time	DTP	DTW	PT	Stinger Depth		Remarks:
PW-2A	8:30	13.64	18.78	5.14	17:45	N/A	N/A	N/A	22		
PW-2	8:30	11.77	13.25	1.48	17:45	N/A	N/A	N/A	20		
Obser. Well	Time	DTP	DTW	PT	Time	DTP	DTW	PT		Dist. from PW-2A (in feet):	
PW-2	8:30	11.77	13.25	1.48	17:45	N/A	N/A	N/A		20.2	
OB-900	8:30	7.85	9.98	2.13	17:45	7.94	9.00	1.06		20	
OB-21	8:30	12.95	12.96	0.01	17:45	14.65	14.66	0.01		6	
OB-22	8:30	12.82	12.95	0.13	17:45	14.69	14.81	0.12		11	
OB-23	8:30	12.10	15.51	3.41	17:45	12.45	16.83	4.38		20	

Time of Readings hours		PW-2A			PW-2			Air Stream @MPE unit																Observation Well Vacuums					Flowmeter/ Totalizer gallons	Remarks
	MPE inHg	Stinger inHg	Well inHg	Bleed scfm	Stinger inHg	Well inHg	Bleed scfm	Pitot inwc	Velocity fpm	Temp °F	pitot vacuum	Conc. %LEL	corrected %LEL	mean %LEL	Conc. ppm	corrected ppm	mean ppm	PPMv	elapsed time hrs	VOCs lbs/day	VOCs extracted during elapsed time(lbs)	cumulative VOCs lbs	Flow scfm	PW-2 inwc	OB-900 inwc	OB-21 inwc	OB-22 inwc	OB-23 inwc		
9:30																													675	Startup
9:45	8.5	7	2.5	6				1.00	521.2	58	27	0	0	0	0.9	0.6	0.3	0	0.25	0.00	0.00	0.00	11.4	0.7	0.2	2.0	1.0	1.0	675	
10:00	8.5	6.5	2.5	6				1.00	520.4	59	27	0	0	0	0.9	0.6	0.6	1	0.25	0.00	0.00	0.00	11.4	0.8	0.2	2.8	1.1	1.5	675	
10:15	8.5	6.5	2.5	6				1.00	520.4	59	27	0	0	0	0.6	0.4	0.5	1	0.25	0.00	0.00	0.00	11.4	1.0	+	2.75	1.5	2.0	709	
10:30	8.5	6.5	2.5	6				1.00	519.6	60	27	0	0	0	0.6	0.4	0.4	0	0.25	0.00	0.00	0.00	11.3	1.9	0.8	5.1	1.75	3.0	709	
10:45	8	6.5	2.5	6				1.00	518.1	62	27	0	0	0	0.7	0.5	0.5	0	0.50	0.00	0.00	0.00	11.3	2.3	1.3	5.1	3.25	3.6	709	
11:00	8	6.5	2.5	6				1.00	517.4	63	27	0	0	0	0.6	0.4	0.4	0	0.50	0.00	0.00	0.00	11.3	2.8	2.4	6.5	4.0	4.2	709	
11:30	8	6.5	2.5	6				1.00	517.4	63	27	0	0	0	0.3	0.2	0.3	0	0.50	0.00	0.00	0.00	11.3	3.0	2.8	7.0	4.5	4.6	709	
12:00	8	6.5	2.5	6				1.00	518.1	62	27	0	0	0	0.4	0.3	0.4	0	0.50	0.00	0.00	0.00	11.3	3.1	3.0	7.1	4.6	4.75	723	
12:30	8	6.5	2.5	6				1.00	517.4	63	27	0	0	0	0.4	0.3	0.3	0	0.50	0.00	0.00	0.00	11.3	2.8	2.9	7.25	4.25	4.1	723	
12:45	16.5	15.5	13	8				1.00	491.5	62	26.5	10	10	5	0.5	0.4	0.3	650	0.50	2.44	0.05	0.05	10.7	2.7	2.9	7.25	4	4.1	723	
13:00	16.5	15.5	13	8				1.00	489.9	64	26.5	7	7	9	0.4	0.3	0.3	1105	0.50	4.13	0.09	0.14	10.7	3.1	3.4	7.9	4.6	4.75	747	
13:15	16.5	15.5	13	8				1.00	490.7	63	26.5	8	8	8	0.4	0.3	0.3	975	0.50	3.65	0.08	0.21	10.7	3.2	3.4	8	4.5	4.75	747	
13:45	17	15.5	12.5	8				1.00	489.9	64	26.5	9	9	9	0.4	0.3	0.3	1105	0.50	4.13	0.09	0.30	10.7	3.9	3.5	9.5	5	5.25	771	
14:15	16.5	15.5	13	8				1.00	488.3	66	26.5	10	10	10	0.4	0.3	0.3	1235	0.50	4.60	0.10	0.40	10.7	4.3	5.3	9.9	6	6.3	771	
14:45	16.5	15.5	13	8				1.00	489.1	65	26.5	9	9	9	0.4	0.3	0.3	1105	0.50	4.12	0.09	0.48	10.7	3.7	4.4	9.9	5.1	5.3	794	
15:15	16.5	15.5	12.5	8				1.00	489.1	65	26.5	11	11	10	0.4	0.3	0.3	1300	0.50	4.85	0.10	0.58	10.7	4.2	5.3	9.9	5.9	6	794	
15:45	16.5	15.5	12.5	8				0.50	237.9	66	26.5	11	11	11	0.4	0.3	0.3	1430	0.50	2.60	0.05	0.64	5.2	4.3	5.3	9.9	6.1	6.1	828	
16:00	23	24	19	6	23	18	10	1.00	346.6	62	24.5	94	94	53	0.8	0.6	0.4	6825	0.50	18.05	0.38	1.01	7.6		6.9	11.25	7.5	7.25	844	
16:15	23	23	19	6	23	19	10	1.00	342.5	66	24.5	99	99	97	0.6	0.4	0.5	12545	0.50	32.78	0.68	1.69	7.5		8.3	12	8.5	9.25	844	
16:45	23	22	17.5	10	22	17	12	1.00	162.4	66	23.5	100	100	100	0.5	0.4	0.4	12935	0.50	16.03	0.33	2.03	3.5		6.3	12.75	5.75	7.75	878	
17:15	23	20	15	15	20	18	15	2.00	528.2	62	21.5	70	70	85	0.3	0.2	0.3	11050	0.50	44.52	0.93	2.96	11.5		5.3	11	4.75	8.5	894	
17:30																				10.89	2.96	5.91								Shutdown

Notes: + = positive pressure observed
PID readings were corrected for Diesel fuel, per the RAE systems tech guidance.

Appendix B
References

References:

Dwyer Instruments Inc. Manual " Series DS-200 Flow Sensors", 1989

US EPA, "Air Emissions From Petroleum UST Cleanups", Office of UST, 1989

US Air Force, AFCEE, " Engineering Evaluation For Bioslurper", March 1997

US Army Corps of Engineers, "Soil Vapor Extraction And Bioventing", 2002

US EPA, "Assessing UST Corrective Action Technologies", 1996

US Army Corps of Engineers, "Multi-Phase Extraction", 1999

Keet, BA, "Bioremediation of Petroleum Hydrocarbons", 1995

Appendix G
Data Validation Worksheets

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229079 soil
Laboratory: Analytical Services, Inc.
Analysis/Methods: 6010B/7471A/%Moisture

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-30-01	229079-1	RISB-31-01	229079-6
RISB-37-01	229079-2	RISB-38-1721	229079-7
RISB-30-913	229079-3	RISB-31-913	229079-8
RISB-37-913	229079-4	RISB-32-01	229079-9
RISB-38-01	229079-5	RISB-39-01	229079-10

Full Validation Sample: Cursory validation performed on all samples. No raw data was present.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations): **Laboratory Duplicate -** Batch 129636 duplicate performed on a for 6010B sample from another SDG.
Batch 128626 duplicate for Hg performed on sample RISB-30-01.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	N/A
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - Batch 129326 sample from another SDG spiked for 6010B.
Batch 128626 sample RISB-30-01 spiked for Hg.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	Yes

Comments (note deviations): Sample cooler was received at 4.0 ° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision
Field Duplicate N/A

Laboratory Duplicate		%RPD	Qualifier
129326 6010B			
	diff. SDG		
129421 %moisture			
	diff. SDG		
128626 Hg			
	RISB-30-01	acceptable	

Accuracy

Serial Dilution		%RPD
	not included	

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
129326 6010B						All samples in SDG
	diff. SDG					
	Aluminum	999/999%	7	0%	Sample concentration >4x spike - no qualification required	
	Calcium	127/157%	2	18%	Sample concentration >4x spike - no qualification required	
	Iron	0/999%	8	999%	Sample concentration >4x spike - no qualification required	
	Potassium	130/119%	5	82%	Sample concentration >4x spike - no qualification required	
	Magnesium	552/409%	6	0%	Sample concentration >4x spike - no qualification required	
	Manganese	71/52%	6	83%	Sample concentration >4x spike - no qualification required	
	Antimony	30/15%	64	85%		All samples in SDG
	Vanadium	72/80%	4	87%	Sample concentration >4x spike - no qualification required	
128626 Hg						
	RISB-30-01	acceptable				

Laboratory Control Spike/ Spike Duplicate(90-110);Hg (62-136)

	%R
129326 6010B	
	acceptable
128626 Hg	
	acceptable

Blanks

	Analyte	Results	Qualifier	Associated Samples
129326 6010B		non-detect		
128626 Hg		non-detect		
129421 %moisture		non-detect		

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/12/07

Reviewer: Alecia Epes Date: 8/13/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	229079
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8270C

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-30-01	229079-1	RISB-31-01	229079-6
RISB-37-01	229079-2	RISB-38-1721	229079-7
RISB-30-913	229079-3	RISB-31-913	229079-8
RISB-37-913	229079-4	RISB-32-01	229079-9
RISB-38-01	229079-5	RISB-39-01	229079-10

Full Validation Sample: Cursory validation performed on all samples. No raw data was present.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 25% and RRF greater than or equal to 0.05?	Yes
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations):
MS/MSD - Batch 129471 sample RISB-30-913 all %R's acceptable.
CCV - Benzidine 27.4% in 6/2/07 ccv. No action taken, benzidine does not appear on target list.

Precision	**%RPD**
N/A	

Laboratory Duplicate	**%RPD**
N/A	

Accuracy

MS/MSD	**MS/MSD RPD**
129471 RISB-30-913	acceptable

LCS/LCSD	**%R**
129471	acceptable

Blanks	**Analyte**	**Qualifier**	**Associated Sample/ Qualification**
129471	non-detect		

			Qualifier		Associated sample
Rinsate Blank	N/A				

		Ave. RRF	%RSD	Qualifier	Associated sample
ICV	**5/31/06** Benzaldehyde only	acceptable	acceptable		
	6/1/06 8270C	acceptable	acceptable		
	6/2/06 TCL	acceptable	acceptable		Acetophenone, Caprolactam, Biphenyl, and Atrazine

		Ave. RRF	%RSD	Qualifier	Associated sample
CCV	**6/2/06** 8270C Benzidine	acceptable	27.4%D	none	not a target compound
	6/2/06 Benzaldehyde only	acceptable	acceptable		

	%R	Qualifier	Associated sample
Surr.			
129471	acceptable		

Internal Standard not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/12/07

Reviewer: Alecia Epes Date: 8/13/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	229079
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-30-01	229079-1	RISB-31-01	229079-6
RISB-37-01	229079-2	RISB-38-1721	229079-7
RISB-30-913	229079-3	RISB-31-913	229079-8
RISB-37-913	229079-4	RISB-32-01	229079-9
RISB-38-01	229079-5	RISB-39-01	229079-10
		Trip Blank	229079-11

Full Validation Sample: Cursory validation performed on all samples. No raw data was present.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	N/A
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Several analytes outsited criteria. See below.

Precision

Field Duplicates **%RPD**
N/A

Laboratory Duplicate
N/A

Accuracy

MS/MSD	**MS/MSD** (70-130)	**RPD**
129418 RISB-30-01		
trans-1,3-Dichloropropene	66/65%	2%
cis-1,3-Dichloropropene	66/65%	2%
trichlorofluoromethane	31/6%	135%
129419 RISB-31-01		
trans-1,3-Dichloropropene	70/66%	6%
cis-1,3-Dichloropropene	70/66%	6%
Carbon Tetrachloride	73/70%	4%
129431 Aqueous		
diff. SDG	acceptable	

no action taken on MS/MSD data

LCS/LCSD	**%R** (70-130)
129418	acceptable
129419	acceptable
129431 Aq.	acceptable

Blanks	**Results in ug/L**	**Qualifier**	**Associated Sample/ Qualification**
129418	non-detect		
129419	non-detect		
129431 Aq.	non-detect		

		RRF	%RSD	Qualifier	Associated sample
Trip Blank	229079-11 Trip Blank	non-detect			
Holding Blank	N/A				
Rinsate Blank	N/A			**Qualifier**	**Associated sample**
ICV		**RRF**	**%RSD**	**Qualifier**	**Associated sample**
PT1/PT2	**4/26/2006 A Files**	acceptable			
PT1	**4/26/2006 A Files Extra 1**				
	Methyl Acetate	0.019		R	RISB-30-01, RISB-37-01, RISB-30-913, RISB-37-913, RISB-38-01
PT2	**4/26/2006 A Files Extra 2**				
	Methyl Acetate	0.017		R	RISB-31-01, RISB-38-1721, RISB-31-913, RISB-32-01, RISB-39-01
PT1	**6/1/2006 Extra D Files**	acceptable			TB
PT1	**5/31/2006 8260 D Files**	acceptable			
CCV		**RRF**	**%RSD**	**Qualifier**	**Associated sample**
PT1	**6/1/2006 0828 A16647 Extra 1**				
	Methyl Acetate		33.48%	J/UJ	Qual. due to ICV
PT2	**6/1/2006 0850 A16648 Extra 2**				
	Methyl Acetate		34.26%	J/UJ	Qual. due to ICV
PT1	**6/1/2006 0911 A16649 8260**				
	2-Hexanone		29.40%	UJ	RISB-30-01, RISB-37-01, RISB-30-913, RISB-37-913, RISB-38-01
PT2	**6/1/2006 0932 A16650 8260**	acceptable			
PT1	**6/1/2006 1146 D2760 Extra 1**	acceptable			
PT1	**6/1/2006 1245 D2763 8260**				
	Acetone		54.7%(L)	UJ	TB
	2-Butanone		27.3%(L)	UJ	TB

Surr.	**%R (70-130)**	**Qualifier**	**Associated sample**
129418	acceptable		
129419	acceptable		
129431 Aq.	acceptable		

Internal Standard	not included

Representativeness:

	Yes No N/A
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met ? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C

Comparibility:

	Yes No N/A
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):

	Yes No N/A
Are all data in this SDG useable?	No

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? No

Comments: Some results for methyl acetate were rejected due to initial and continuing calibration.

Validator: Carrie Madrid Date: 4/12/07
Reviewer: Alecia Epes Date: 8/17/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229143
Laboratory: Analytical Services, Inc.
Analysis/Methods: 6010B/7471A/%Moist.

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-39-1317	229143-1	RISB-18-15	229143-13
RISB-29-1-S	229143-2	RISB-28-5-9	229143-14
RISB-28-913	229143-3	RISB-46-15	229143-15
RISB-29-913	229143-4	RISB-46-01	229143-16
RISB-23-01	229143-5	RISB-946	229143-17
RISB-28-01	229143-6	RISB-27-59	229143-18
RISB-22-01	229143-7	RISB-19-01	229143-19
RISB-24-01	229143-8	RISB-25-913	229143-20
RISB-29-01	229143-9	RISB-26-15	229143-22
RISB-23-911	229143-10		
RISB-27-01	229143-11		
RISB-25-1720	229143-12		

Full Validation Sample: Raw data not provided, only a cursory validation was performed. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 35%)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations): **Field Duplicates** - Samples RISB-46-01 and RISB-946 were identified as field duplicates. Several %RPD's were outside the 20% criteria, however no action taken on field duplicate data.

Laboratory Duplicate - RISB-28-01(metals); RISB-28-5-9(Hg); RISB-39-1317 and RISB-26-15(%moisture). All %RPD's were acceptable. Other laboratory duplicates were analyzed on samples from other SDG's and had RPDs outside of control limits. Associated samples were qualified J/UJ. See below.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - MS/MSD recoveries were outside of appropriate control limits for various analytes. Associated samples have been qualified J/UJ. See below.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Sample cooler was received at 1.0 ° C, however no action taken based on temperature.

Comparibility:

Does data compare with similar analysis and data sets? **Yes No N/A**: Yes

Comments (note deviations):

Completeness (90%):

Are all data in this SDG useable? **Yes No N/A**: Yes

Comments (note deviations):

Precision		**%RPD**	**Qualifier**
Field Duplicate			
	Beryllium	161.87%	
	Calcium	126.32%	
	Chromium	37.13%	
	Manganese	142.86%	
	Potassium	65.49%	
		No action taken on field duplicate data.	

Laboratory Duplicate

6010B

			RPD	Qualifier	Associated Samples	
129326	RISB-28-01	Acceptable				
129330	Diff. SDG. 229203-9	Chromium	37	J/UJ	RISB-25-1720	RISB-946
		Iron	38	"	RISB-18-15	RISB-27-59
		Vanadium	47	"	RISB-28-5-9	RISB-19-01
		Antimony	37	"	RISB-46-15	RISB-25-913
					RISB-46-01	RISB-26-15
129333	Diff. SDG. 229204-10	Acceptable				

Hg

128626	Acceptable
128629	Acceptable
128630	Acceptable

Accuracy		**%RPD**	**Qualifier**
Serial Dilution			
	Not included		

MS/MSD	**Analyte**	**MS/MSD RPD**		**Post %R**	**Qualifier**	**Associated Samples**	
6010B						RISB-39-1317,RISB-29-1, RISB-28-913,RISB-23-01, RISB-28-01, RIDB-22-01, RISB-24-01, RISB-29-01, RISB-23-911, RISB-27-01	
129326	RISB-28-01						
	Aluminum	999/999%	7%	0%	Sample concentration >4x spike - no qualification required		
	Calcium	127/157%	2%	18%	Sample concentration >4x spike - no qualification required		
	Iron	0/999%	8%	999%	Sample concentration >4x spike - no qualification required		
	Potassium	130/119%	5%	82%	Sample concentration >4x spike - no qualification required		
	Magnesium	552/409%	6%	0%	Sample concentration >4x spike - no qualification required		
	Manganese	71/52%	6%	83%	Sample concentration >4x spike - no qualification required		
	Antimony	30/15%	64%	85%	UJ	Samples identified above	
	Vanadium	72/80%	4%	87%	Sample concentration >4x spike - no qualification required		
						RISB-25-1720	RISB-946
						RISB-18-15	RISB-27-59
						RISB-28-5-9	RISB-19-01
						RISB-46-15	RISB-25-913
129330	Diff. SDG 229203-9					RISB-46-01	RISB-26-15
	Aluminum	999/999%	4%	999%	Sample concentration >4x spike - no qualification required		
	Calcium	479/111%	16%	393%	Sample concentration >4x spike - no qualification required		
	Iron	999/889%	11%	999%	Sample concentration >4x spike - no qualification required		
	Potassium	233/63%	47%	123%	Sample concentration >4x spike - no qualification required		
	Magnesium	999/536%	22%	999%	Sample concentration >4x spike - no qualification required		
	Manganese	132/58%	9%	262%	Sample concentration >4x spike - no qualification required		
	Sodium	136/102%	15%	134%	Sample concentration >4x spike - no qualification required		
	Thallium	74/78%	6%	92%	Sample concentration >4x spike - no qualification required		
	Antimony	44/39%	12%	99%	UJ	Samples identified above	

129333	Diff. SDG 229204-10				
	Aluminum	999/999%	1%	191%	Sample concentration >4x spike - no qualification required
	Calcium	999/999%	8%	833%	Sample concentration >4x spike - no qualification required
	Iron	793/0%	14%	0%	Sample concentration >4x spike - no qualification required
	Potassium	135/149%	3%	89%	Sample concentration >4x spike - no qualification required
	Magnesium	704/636%	2%	0%	Sample concentration >4x spike - no qualification required
	Sodium	213/236%	5%	91%	Sample concentration >4x spike - no qualification required
	Antimony	57/53%	8%	92%	UJ RISB-26-15
	Vanadium	81/47%	12%	36%	Sample concentration >4x spike - no qualification required

Hg		
129326	RISB-28-5-9	Acceptable
128626	Diff. SDG 229079-1	Acceptable
128630	Diff. SDG 229204-20	Acceptable
128269		Acceptable

Laboratory Control Spike/Spike Duplicate (90-110); Hg(62-136)

6010B	**%R**
129326	Acceptable
129330	Acceptable
129333	Acceptable
Hg	
128626	Acceptable
128629	Acceptable
128630	Acceptable

Blanks

	Analyte	**Results**	**Qualifier**	**Associated Samples**
6010B	All batches non-detect			
Hg	All batches non-detect			
%Moist.	All batches non-detect			

ICV/CCV

not included

ICSA/ICSAB

not included

CRI

not included

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/15/07

Reviewer: Cherie Zakowski Date: 9/19/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229143
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8082

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-18-15	229143-13	RISB-19-01	229143-19
RISB-46-15	229143-15	RISB-25-913	229143-20*
RISB-46-01	229143-16	RISB-26-15	229143-22*
RISB-946	229143-17		

* Sample were not marked for PCB's on the COC, however they were analyzed for PCB's.

Full Validation Sample: No raw data was present. Only a cursory validation was performed.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): Samples RISB-46-01 and RISB-946 were identified as field duplicates. All %RPD's were within the 50% criteria.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	N/A
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	N/A
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations):

Precision	**Analyte**	**%RPD**
Field Duplicates		
	RISB-46-01/RISB-946	acceptable

Laboratory Duplicate

Not included

Accuracy

			MS/MSD RPD	
MS/MSD	RISB-46-15		acceptable	
LCS/ LCSD	Batch 129538	acceptable		
			Qualifier	**Associated Sample/ Qualification**
Blanks	Batch 129538	All non-detect		
Holding Blank	Not included			
Trip Blanks	N/A			
Rinsate Blank	N/A			**Associated sample**

ICV	Not included		
CCV	Not included		
Surr.		**Qualifier**	**Associated sample**
	Tetrachloro-m-xylene (0 %recovery)	J/R	RISB-946
	Decachlorobiphenyl	J/UJ	RISB-19-01
Internal Standard	Not included		

Representativeness: — **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 1.0° C, however no action taken based on temperature.

Comparibility: — **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): — **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? No

Comments: Due several items missing the data does not meet all of the data quality objectives.

Validator: Carrie Madrid Date: 4/12/07

Reviewer: Cherie Zakowski Date: 9/19/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	229143
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8270C

Samples in SDG:

RISB-39-1317	229143-1	RISB-25-1720	229143-12
RISB-29-1-S	229143-2	RISB-18-15	229143-13
RISB-28-913	229143-3	RISB-46-15	229143-15
RISB-23-01	229143-5	RISB-46-01	229143-16
RISB-28-01	229143-6	RISB-946	229143-17
RISB-22-01	229143-7	RISB-27-59	229143-18
RISB-24-01	229143-8	RISB-19-01	229143-19
RISB-29-01	229143-9	RISB-25-913	229143-20
RISB-23-911	229143-10	RISB-26-15	229143-22
RISB-27-01	229143-11		

Cursory validation no raw data present.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Not Provided
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Not Provided

Comments (note deviations): **Field Duplicates** - Samples RISB-46-01 and RISB-946 were identified as field duplicates. Several %RPD's were outside the 50% criteria, however no action taken on field duplicate data.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30.0%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 25% and RRF greater than or equal to 0.05?	Yes
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations):

Precision		**%RPD**
Field Duplicate	RISB-46-01/RISB-946	
	1,1'-Biphenyl	65.22%
	Bis(2-ethylhexyl) phthalate	81.25%
		No action taken on field duplicate data.
Laboratory Duplicate		not included

Accuracy

MS/MSD	**MS/MSD RPD**	**Qualifier**	**Associated Samples**
RISB-27-59	Acceptable	N/A	
129483	Acceptable		

LCS/LCSD	**%R**
129471	Acceptable
129483	Acceptable

Blanks	**Analyte**	**Qualifier**	**Associated Samples**
129483	non-detect	none	

Rinsate Blank	**Analyte**	**Qualifier**	**Associated Samples**
N/A	non-detect	N/A	

		Ave. RRF	%RSD	Qualifier	Associated Samples
ICV	**5/31/06**				
	Benzaldehyde only	acceptable	acceptable		
	6/1/06				
	8270C	acceptable	acceptable		
	6/2/06				
	TCL	acceptable	acceptable		Acetophenone, Caprolactam, Biphenyl, and Atrazine

		Ave. RRF	%RSD	Qualifier	Associated Samples
CCV	**6/5/06**				
	Benzaldehyde	acceptable	acceptable		
	6/5/06				
	8270C	acceptable	acceptable		
	6/5/06				
	TCL	acceptable	acceptable		

Surrogates		%R	Qualifier	Associated Sample
RISB-29-1-S	Nitrobenzene-d5(26-91	11%	none	RISB-29-1-S no action; two surrogates allowed out per fraction

Internal Standard

not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met? Yes

Were holding times met? Yes

Were preservation criteria met? (4° C ± 2° C) No

Were Chain-of-Custody records complete and provided in data package? Yes

Were contaminants present in blanks? No

Comments (note deviations): Cooler temperatures 1.0° C

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

* - Label as SDG or SAMP

Do all data in this SDG meet the Data Quality Objectives? No

Comments: Due several items missing the data does not meet all of the data quality objectives.

Validator: Carrie Madrid Date: 4/12/07

Reviewer: Cherie Zakowski Date: 9/19/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	229143
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8260B

Samples in SDG:		Lab ID		Lab ID
	RISB-39-1317	229143-1	RISB-46-15	229143-15
	RISB-29-1-S	229143-2	RISB-46-01	229143-16
	RISB-28-913	229143-3	RISB-946	229143-17
	RISB-29-913	229143-4	RISB-27-59	229143-18
	RISB-23-01	229143-5	RISB-19-01	229143-19
	RISB-28-01	229143-6	RISB-25-913	229143-20
	RISB-22-01	229143-7	TW-38	229143-21
	RISB-24-01	229143-8	RISB-26-15	229143-22
	RISB-29-01	229143-9	TW-28	229143-23
	RISB-23-911	229143-10	TRIP BLANK	229143-24
	RISB-27-01	229143-11	TRIP BLANK	229143-25
	RISB-25-1720	229143-12	RISB-25-01	229143-26
	RISB-18-15	229143-13	RISB-26-0-1	229143-27
	RISB-28-5-9	229143-14	RISB-18-0-1	229143-28

Full Validation Sample: No raw data was present. Only a cursory validation was performed.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): Field Duplicates - Samples RISB-46-01 and RISB-946 were identified as field duplicates. Several %RPD's were outside the 50% criteria, however no action taken on field duplicate data.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	NA
Surrogate % Recoveries?	No
Internal Standards	NA

Comments (note deviations):

Precision	**Analyte**	**%RPD**	**Analyte**	**%RPD**
Field Duplicates	RISB-46-01/RISB-946			
	Benzene	80.37%	Ethylbenzene	118.34%
	Chlorobenzene	112.50%	Methylcyclohexane	113.92%
	1,3-dichlorobenzene	112.50%	Toluene	92.68%
	1,2-dichlorobenzene	144.50%	1,2,4-Trichlorobenzene	131.71%
	1,4-dichlorobenzene	134.09%	Xylenes	118.70%

No action taken on field duplicate data.

Laboratory Duplicate

Not included

Accuracy

	129452			**129453**		
MS/MSD	**RISB-39-1317**	**MS/MSD**	**RPD**	**RISB-28-5-9**	**MS/MSD**	**RPD**
	1,2-Dichlorobenzene	59/60	2	1,1,2,2-Tetrachloroethane	45/51	12
	1,3-Dichlorobenzene	63/66	5	Ethylbenzene	0/0	NC
	Bromoform	57/61	7	Tetrachloroethene	0/0	NC
	Ethylbenzene	74/8	161	1,1,2-Trichloroethane	0/0	NC
	Dibromochloromethane	55/60	9	trans-1,3-Dichloropropene	64/63	2
	1,1,2-Trichloroethane	173/114	41	Toluene	0/0	NC
	trans-1,3-Dichloropropene	53/56	6	cis-1,3-Dichloropropene	64/63	2
	Toluene	28/26	7	Bromodichloromethane	66/65	2
	cis-1,3-Dichloropropene	53/56	6	Trichloroethene	0/0	NC
	Bromodichloromethane	54/58	7	1,2-Dichloroethane	0/0	NC
	Chloroethane	173/98	55	Benzene	69/66	4
	Chloromethane	69/76	10	Carbon Tetrachloride	0/0	NC
				1,1,1-Trichloroethane	0/0	NC
				Chloroform	15/18	18
	TW-38 (water)			1,1-Dichloroethane	0/0	NC
	Tetachloroethene	198/195	2	Methylene Chloride	0/0	NC
	1,1-Dichloroethane	229/260	13	1,1-Dichloroethene	0/0	NC
	1,1-Dichloroethene	136/146	7	Trichlorofluoromethane	0/0	NC
				Vinyl Chloride	67/68	1
				Chloromethane	71/69	3

129455			
	Tetrachloroethene	198/195	2
	1,1-Dichloroethane	229/260	13
	1,1-Dichloroethene	136/146	7

No action taken on MS/MSD Data

NC - Not Calculated

LCS/ LCSD	Batch 129452	Acceptable				
	Batch 129453	Acceptable				
	Batch 129455water	Acceptable				
				Qualifier		**Associated Sample/ Qualification**
Blanks	Batch 129452	All non-detect				
	Batch 129453	All non-detect				
	Batch 129455 Water	All non-detect				
Holding Blank	Not included					
Trip Blanks	Trip Blank 6/2/2006 1325	Non-detect				
	Trip Blank 6/2/2006 1245	Non-detect				
Rinsate Blank						**Associated sample**
ICV						
		RRF	**%RSD**	**Qualifier**		**Associated sample**
PT1/PT2	4/26/2006 A Files	acceptable				
PT1	4/26/2006 A Files Extra 1					
	Methyl Acetate		0.019	R		All samples
PT2	4/26/2006 A Files Extra 2					
	Methyl Acetate		0.017	R		All samples
CCV						
		RRF	**%RSD**	**Qualifier**		**Associated sample**
PT1	**6/2/2006 0901 A16687 Extra 1**					
	Methyl Acetate		28.44%	J/UJ		Qualified due to ICV
PT2	**6/2/2006 0922 A16688 Extra 2**					
	Methyl Acetate		34.16%	J/UJ		Qualified due to ICV
PT1	**6/2/06 0943 A 16689**					
		acceptable				
PT2	**6/2/06 1004 A 16690**					
	4-Methyl-2-pentanone		25.10%	J/UJ		RISB-21-1-S, RISB-29-01, RISB-25-1720, RISB-18-15,
	2-Hexanone		25.90%	J/UJ		TW-38, TW-28, TB (24), TB (25)
PT1	**6/2/2006 2307 A16727 Extra 1**					
		acceptable				
PT2	**6/2/2006 2328 A16728 Extra 2**					
	Methyl Acetate		37.70%	J/UJ		Qualified due to ICV
PT1	**6/2/2006 2349 A16729 8260**					
	2-Hexanone		31.9%(L)	J/UJ		RISB-39-1317, RISB-22-01, RISB-28-5-9, RISB-46-15,
	Acetone		28.2%(L)	J/UJ		RISB-46-01, RISB-946, RISB-27-59, RISB-19-01, RISB-25-913
PT2	**6/2/2006 0010 A16730 8260**					
	2-Hexanone		28.4%(L)	J/UJ		RISB-39-1317, RISB-22-01, RISB-28-5-9, RISB-46-15,
	4-Methyl-2-pentanone		28.30%	J/UJ		RISB-46-01, RISB-946, RISB-27-59, RISB-19-01, RISB-25-913
PT1	**6/5/2006 1045 A16761 Extra 1**					
	Methyl Acetate		71.52%	J/UJ		Qualified due to ICV
PT2	**6/5/2006 1106 A16762 Extra 2**					
	Methyl Acetate		44.52%	J/UJ		Qualified due to ICV

PT1	**6/5/2006 1209 A16765 8260**			
	Acetone	105.2%(L)	J/UJ	RISB-28-01
	2-Butanone	48.3%(L)	J/UJ	RISB-28-01
PT2	**6/5/2006 1230 A16766 8260**			
	Acetone	69.3%(L)	J/UJ	RISB-28-01
	2-Butanone	37.5%(L)	J/UJ	RISB-28-01
PT1	**6/5/2006 2243 A16795 Extra 1**			
	Methyl Acetate	27.58%	J/UJ	Qualified due to ICV
PT2	**6/5/2006 2304 A16796 Extra 2**			
	Methyl Acetate	37.90%	J/UJ	Qualified due to ICV
PT1	**6/6/2006 1111 A16827 Extra 1**			
	Methyl Acetate	76.44%	J/UJ	Qualified due to ICV
PT2	**6/6/2006 1101 A16866 Extra 2**			
	Methyl Acetate	40.16%	J/UJ	Qualified due to ICV
PT2	**6/6/2006 1144 A16868 8260**			
		acceptable		
PT1	**6/6/2006 1153 A16829 8260**			
		acceptable		

Surr.	**Toluene-d8 (70-130)**	**%R**	**Qualifier**	**Associated sample**
	RISB-29-1-S 50x dil.	169%	J pos. results	RISB-29-1-S 50x dil.

Internal Standard Not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 1.0° C - No action required.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/12/07

Reviewer: Cherie Zakowski Date: 9/19/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229203 soil
Laboratory: Analytical Services, Inc.
Analysis/Methods: 6010B/7471A/%Moisture

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB13-59	229203-1	RISB36-1316	229203-6
RISB35-39	229203-2	RISB16-15	229203-7
RISB11-15	229203-3	RISB40-913	229203-8
RISB-92	229203-4	RISB2-913	229203-9
RISB14-913	229203-5		

Full Validation Sample: Cursory validation performed on all samples. No raw data was present.

Precision: **Yes No N/A**

Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%) N/A

Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%) Yes

Comments (note deviations): **Field Duplicate -** Samples RISB13-59/RISB-92 are identified as field dups. Several %RPD's outside of control limits, see below. **Laboratory Duplicate -** Dup. analysis performed on sample RISB2-913 for 6010B all %RPD within limits with the exception of Cr, Fe, V, and Sb. Duplicates for Hg and %moisture performed on a sample from another SDG.

Accuracy: **Yes No N/A**

Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	Yes

Comments (note deviations): **Matrix Spike** - Sample RISB2-913 spiked for 6010B. Hg spike from another SDG.

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	No
Were contaminants present in blanks?	No

Comments (note deviations): Sample cooler was received at 4.0 ° C.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Precision

Field Duplicate

RISB13-59/RISB-92	RPD		RPD
%moisture	146.76%	Manganese	37.16%
Barium	59.60%	Nickel	46.15%
Beryllium	73.91%	Potassium	141%
Calcium	140%	Selenium	43.90%
Iron	40%	Sodium	179%
Lead	168.70%	Thallium	43%
Magnesium	88.14%	Vanadium	72%
Aluminum	21.28%		

Laboratory Duplicate		%RPD	Qualifier	Associated Samples
6010B				
RISB2-913	Chromium	37%	J	All samples
	Iron	38%	J	All Samples
	Vanadium	47%	J	All Samples
	Antimony	37%	UJ	All Samples
Hg	Diff. SDG			
%Moisture	Diff. SDG			

Accuracy

Serial Dilution	%RPD
	Not included

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
Hg	Diff. SDG	Accep.		Accep.		
6010B	(76-124)					
RISB2-913	Aluminum	999/999%	4%	999%	No Action - Sample concentration greater than 4x the spike concentration	
	Calcium	479/111%	16%	393%	No Action - Sample concentration greater than 4x the spike concentration	
	Iron	999/889%	11	999%	No Action - Sample concentration greater than 4x the spike concentration	
	Potassium	233/63%	47%	123%	No Action - Sample concentration greater than 4x the spike concentration	
	Magnesium	999/536%	22%	999%	No Action - Sample concentration greater than 4x the spike concentration	
	Manganese	132/58%	9%	262%	No Action - Sample concentration greater than 4x the spike concentration	
	Sodium	136/102%	15%	134%	No Action - Sample concentration greater than 4x the spike concentration	
	Thallium	74/68%	6%	92%	No Action - Sample concentration greater than 4x the spike concentration	
	Antimony	44/39%	12%	92%	No Action - Sample concentration greater than 4x the spike concentration	

Laboratory Control Spike/ Spike Duplicate(90-110);Hg (62-136)

	%R
6010B	acceptable
Hg	acceptable

Blanks

	Analyte	Results	Qualifier	Associated Samples
6010B	non-detect			
Hg	non-detect			
%Moisture	non-detect			

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/12/07

Reviewer: Alecia Epes Date: 5/12/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	229203
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8270C

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB13-59	229203-1	RISB36-1316	229203-6
RISB35-39	229203-2	RISB16-15	229203-7
RISB11-15	229203-3	RISB40-913	229203-8
RISB-92	229203-4	RISB2-913	229203-9
RISB14-913	229203-5		

Full Validation Sample: Cursory validation performed on all samples. No raw data was present.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicate -** Samples RISB13-59/RISB-92 are identified as field dups.
Laboratory Duplicate - Sample RISB13-59 listed as a duplicate however no sample result given.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 25% and RRF greater than or equal to 0.05?	Yes
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Batch 129512 sample from a different SDG spiked.

Precision	**%RPD**
Field Duplicates	
RISB13-59/RISB-92	acceptable
Laboratory Duplicate	**%RPD**
RISB13-59	No data given

Accuracy

MS/MSD	**MS/MSD RPD**
Batch 129512	Diff. SDG - acceptable

LCS/LCSD	**%R**
Batch 129512	acceptable

Blanks	**Analyte**	**Qualifier**	**Associated Sample/ Qualification**
Batch 129512	non-detect		

	Qualifier	**Associated sample**
Rinsate Blank **N/A**		

		Ave. RRF	%RSD	Qualifier	Associated Sample
ICV	**6/5/06**				
	8270C	acceptable	acceptable		
	6/5/06				
	Benzaldehyde	acceptable	acceptable		
	6/6/06				
	TCL	acceptable	acceptable		Acetophenone, Caprolactam, Biphenyl, and Atrazine

		Ave. RRF	%RSD	Qualifier	Associated Sample
CCV	**6/7/06**				
	8270C	acceptable	acceptable		
	6/7/06				
	Benzaldehyde	acceptable	acceptable		
	6/7/06				
	TCL	acceptable	acceptable		

Surr.	%R	Qualifier	Associated sample
Batch 129512	acceptable		

Internal Standard not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

* - Label as SDG or SAMP

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/12/07

Reviewer: Alecia Epes Date: 5/12/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229203
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB13-59	229203-1	RISB36-1316	229203-6
RISB35-39	229203-2	RISB16-15	229203-7
RISB11-15	229203-3	RISB40-913	229203-8
RISB-92	229203-4	RISB2-913	229203-9
RISB14-913	229203-5	Trip Blank	229203-10

Full Validation Sample: Cursory validation performed on all samples. No raw data was present.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicate -** Samples RISB13-59/RISB-92 are identified as field dups. Several anlaytes were outside the 50% criteria see below. No action taken on field duplicate data.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Batch 129488 soil sample RISB35-39 (Ethylbenzene and Toluene out).
Aqueous Batch 129500 spike performed on a sample from another SDG.

Surrogate - 4-Bromofluorobenzene out in sample RISB-92 RR1

Precision

Field Duplicates

RISB13-59/RISB-92

	%RPD		%RPD
Benzene	177%	Toluene	145%
1,2-Dichlorobenzene	144%	Trichloroethene	188%
1,4-Dichlorobenzene	182%	Xylenes	155%
1,2-Dichloroethane	191%		

Laboratory Duplicate
N/A

Accuracy

MS/MSD		**MS/MSD**	**RPD**
		(70-130)	
Batch 129488 soil			
RISB35-39	Ethyl Benzene	69/70%	1%
	Toluene	67/66%	2%
Batch 129500 Aq.		Diff. SDG - acceptable	

No action taken on MS/MSD data.

LCS/LCSD	**%R** (70-130)
Batch 129488 soil	acceptable
Batch 129500 Aq.	acceptable

Blanks	**Results in ug/L**	**Qualifier**	**Associated Sample/ Qualification**
Batch 129488 soil	acceptable		
Batch 129500 Aq.	acceptable		

Trip Blank N/A

Holding Blank	N/A				

				Qualifier	Associated sample
Rinsate Blank	N/A				

ICV		RRF	%RSD	Qualifier	Associated sample
PT1/PT2	**4/26/2006 A Files**	acceptable			
PT1	**4/26/2006 A Files Extra 1/2**				
	Methyl Acetate	0.019/0.017		R	All Samples in SDG

		RRF	%RSD	Qualifier	Associated sample
CCV	**6/5/2006 1045 A16761 Extra 1**				
	Methyl Acetate		71.52%	J/UJ	Qual. due to ICV
	6/5/2006 1106 A16762 Extra 2				
	Methyl Acetate		44.52%	J/UJ	Qual. due to ICV
PT1	**6/5/2006 1209 A16765 8260**				
	Acetone		105.20%	UJ	No samples
	2-Butanone		48.30%	J UJ	No samples
PT2	**6/5/2006 1230 A16766 8260**				
		acceptable			All samples - no action

		RRF	%RSD	Qualifier	Associated sample
CCV	**6/6/2006 1111 A16827 Extra 1**				
	Methyl Acetate		76.44%	J/UJ	Qual. due to ICV
	6/6/2006 1132 A16828 Extra 2				
	Methyl Acetate		48.12%	J/UJ	Qual. due to ICV
PT1	**6/6/2006 1153 A16829 8260**				
		acceptable			
PT2	**6/6/2006 1214 A16830 8260**				
	Acetone		36.9%(L)	J UJ	RISB13-59, RISB35-39, RISB11-15 RISB16-15, RISB40-913, RISB2-913

Surr.		%R (70-130)	Qualifier	Associated sample
RISB-92	4-Bromofluorobenzene	144%	J detected results	RISB-92

Internal Standard	not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? No

Comments: The nondetect methyl acetate results were rejected due to initial calibration criteria.

Validator: Carrie Madrid Date: 4/12/07

Reviewer: Alecia Epes Date: 5/15/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	229204
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	TCLP 6010B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB25-01	229204-1	RISB35-01	229204-16
RISB3-01	229204-2	RISB40-01	229204-17
RISB5-01	229204-3	RISB1-01	229204-18
RISB41-01	229204-4	RISB43-01	229204-19
RISB15-01	229204-5	RISB47-01	229204-20
RISB914	229204-6	RISB02-01	229204-21
RISB913	229204-7	RISB36-01	229204-22
RISB16-01	229204-8	RISB935	229204-23
RISB14-01	229204-9	RISB5-5-9	229204-24
RISB14-59	229204-10	RISB2-17-21	229204-25
RISB42-01	229204-11	RISB3-9-13	229204-26
RISB11-01	229204-12	RISB15-9-13	229204-27
RISB47-913	229204-13	RISB-11-59	229204-28
RISB13-01	229204-14		

Full Validation Sample: Level III evaluation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%, 35%for soils)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%, 35% for soils)	No

Comments (note deviations): **Field Duplicate -** Samples RISB14-59/RISB914 are field duplicates.
Laboratory Duplicates - See below.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - See below.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Sample cooler was received at 4.0 ° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision

		%RPD
Field Duplicate		
	RISB14-59/RISB914	
	Barium	37.04%
	Cobalt	38.96%
	Manganese	73.97%
	Potassium	55.32

No action taken on field duplicate data.

Laboratory Duplicate		%RPD	Qualifier	Associated Samples
6010B				
129330	Diff. SDG 229203-9			
	Chromium	37%	J/UJ	RISB25-01, RISB3-01
	Iron	38%	J/UJ	"
	Vanadium	47%	J/UJ	"
	Antimony	37%	J/UJ	"
129333	RISB14-59	acceptable		
129340	RISB-5-9	acceptable		
Hg				
128629	Diff. SDG 229143-14	acceptable		
128630	RISB47-01	acceptable		
128634	Diff. SDG 229143-1	acceptable		
%Moist.				
129486	RISB47-913			
	Diff. SDG 229203-1	acceptable		
129487	Diff. SDG 229206-3 & 4	acceptable		

Accuracy

Serial Dilution	%RPD
	N/A

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
6010B	(76-124)					
129330	Diff. SDG 229203-9					
	Aluminum	999/999%	4%	0%	Sample concentration >4x spike - no qualification required	
	Calcium	479/111%	16%	0%	Sample concentration >4x spike - no qualification required	
	Iron	999/889%	11%	0%	Sample concentration >4x spike - no qualification required	
	Magnesium	999/536%	22%	0%	Sample concentration >4x spike - no qualification required	
	Manganese	132/58%	9%	0%	Sample concentration >4x spike - no qualification required	
	Sodium	136/102%	15%	0%	J	RISB25-01, RISB3-01
	Thallium	74/68%	6%	0%	J-/UJ	"
	Antimony	44/39%	12%	0%	J-/UJ	"
	Potassium	233/63%	47%	0%	J	"
129333	RISB14-59					
	Aluminum	999/999%	1%	191%	Sample concentration >4x spike - no qualification required	
	Calcium	999/999%	8%	833%	Sample concentration >4x spike - no qualification required	
	Iron	793/0%	14%	0%	Sample concentration >4x spike - no qualification required	
	Magnesium	704/636%	2%	0%	Sample concentration >4x spike - no qualification required	
	Potassium	135/149%	3%	89%	J	RISB5-01, RISB41-01, RISB15-01, RISB914, RISB913, RISB16-01, RISB14-01, RISB14-59, RISB42-01 RISB11-01, RISB47-913, RISB13-01, RISB35-01, RISB40-01, RISB1-01, RISB43-01, RISB47-01, RISB02-01, RISB36-01
	Sodium	213/236%	5%	159%	J+	"
	Antimony	57/53%	8%	92%	UJ	"
	Vanadium	81/47%	12%	36%	J-	"

129340	RISB5-5-9					
	Aluminum	999/999%	4%	999%	Sample concentration >4x spike - no qualification required	
	Calcium	999/999%	3%	999%	Sample concentration >4x spike - no qualification required	
	Iron	999/999%	2%	999%	Sample concentration >4x spike - no qualification required	
	Magnesium	960/723%	4%	86%	Sample concentration >4x spike - no qualification required	
	Manganese	0/28%	10%	124%	Sample concentration >4x spike - no qualification required	
	Potassium	80/47%	9%	13%	J-	RISB935, RISB-5-9, RISB2-17-21, RISB3-9-13, RISB15-9-13, RISB-11-59
	Antimony	42/43%	2%	77%	UJ	"

Hg		
128629	Diff. SDG 229143-14	acceptable
128630	RISB47-01	acceptable
128634	Diff. SDG 229312-1	acceptable

LCS/ LSD(90-110)

		%R
6010B	129330/129333 129340	acceptable
Hg	128629/128630 128634	acceptable

Blanks

	Analyte	**Results**	**Qualifier**	**Associated Samples**
6010B				
	129330/129333 129340	non-detect		
Hg	128629/128630 128634	non-detect		
%Moist.	129486/129487	non-detect		

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/21/07

Reviewer: Cherie Zakowski Date: 5/10/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	229204
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8270C

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB25-01	229204-1	RISB35-01	229204-16
RISB3-01	229204-2	RISB40-01	229204-17
RISB5-01	229204-3	RISB1-01	229204-18
RISB41-01	229204-4	RISB43-01	229204-19
RISB15-01	229204-5	RISB47-01	229204-20
RISB914	229204-6	RISB02-01	229204-21
RISB913	229204-7	RISB36-01	229204-22
RISB16-01	229204-8	RISB935	229204-23
RISB14-01	229204-9	RISB5-5-9	229204-24
RISB14-59	229204-10	RISB2-17-21	229204-25
RISB42-01	229204-11	RISB3-9-13	229204-26
RISB11-01	229204-12	RISB15-9-13	229204-27
RISB47-913	229204-13	RISB-11-59	229204-28
RISB13-01	229204-14		

Full Validation Sample: Level III evaluation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicate -** Samples RISB14-59/RISB914 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Matrix spike performed on sample R-84607.
Calibrations - See Below.

Precision		**%RPD**
Field Duplicates		
	RISB14-59/RISB914	acceptable

Laboratory Duplicate	**%RPD**
N/A	

Accuracy

MS/MSD		**MS/MSD RPD**
129511	RISB14-01	acceptable
129512		acceptable
129579		acceptable

LCS/LCSD	**%R**
129511	acceptable
129512	acceptable
129579	acceptable

		Analyte	Qualifier	Associated Sample/ Qualification
Blanks				
129511		non-detect		
129512		non-detect		
129579		non-detect		

		Qualifier	Associated sample
Rinsate Blank	**N/A**		

		RRF	%RSI	Qualifier	Associated sample
ICV	**5/31/06**				
	Benzaldehyde	acceptable			
	6/2/07				
	TCL compounds	acceptable			
	6/5/07				
	8270C/Benzaldehyde/ TCL compounds	acceptable			

		RRF	%D	Qualifier	Associated sample
CCV	**6/6/07**				
	8270C/Benzaldehyde/ TCL compounds	acceptable			
	6/7/07				
	8270C/Benzaldehyde/ TCL compounds	acceptable			
	6/9/07				
	8270C/Benzaldehyde	acceptable			
	TCL Atrazine	27.40%		UJ	RISB935

Surr.	%R	Qualifier	Associated sample
129511	acceptable		
129512	acceptable		
129579	acceptable		

Internal Standard not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/21/07

Reviewer: Cherie Zakowski Date: 5/10/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229204
Laboratory: Analytical Services, Inc.
Analysis/Methods: TCLP 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
		Trip Blank	229204-15
RISB3-01	229204-2	RISB35-01	229204-16
RISB5-01	229204-3	RISB40-01	229204-17
RISB41-01	229204-4	RISB1-01	229204-18
RISB15-01	229204-5	RISB43-01	229204-19
RISB914	229204-6	RISB47-01	229204-20
RISB913	229204-7	RISB02-01	229204-21
RISB16-01	229204-8	RISB36-01	229204-22
RISB14-01	229204-9	RISB935	229204-23
RISB14-59	229204-10	RISB5-5-9	229204-24
RISB42-01	229204-11	RISB2-17-21	229204-25
RISB11-01	229204-12	RISB3-9-13	229204-26
RISB47-913	229204-13	RISB15-9-13	229204-27
RISB13-01	229204-14	RISB-11-59	229204-28

Full Validation Sample: Level III evaluation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates -** RISB14-59/RISB914 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **Matrix Spike** - See below.

Precision		**%RPD**
Field Duplicates		
	RISB14-59/RISB914	acceptable

Laboratory Duplicate	**%RPD**
N/A	

Accuracy

MS/MSD			**MS/MSD** (70-130)	**RPD**
129497	RISB913			
		trans-1,3-Dichloro propene	66/66%	1%
		Carbon Tetrachloride	69/71%	4%
		Methylene Chloride	90/116%	25%
		Chloroethane	126/136	8%
129500Aq.	Diff. SDG 229207-1		acceptable	

MS/MSD			**MS/MSD** (70-130)	**RPD**
129498	RISB35-01			
		1,2-Dichlorobenzene	56/67%	18%
		1,3-Dichlorobenzene	58/69%	17%
		Bromoform	60/63%	5%
		Ethylbenzene	58/76%	27%
		Chlorobenzene	66/78%	17%
		Dibromochloro methane	57/63%	10%
		1,1,2-Trichloroethane	49/61%	22%
		trans-1,3-Dichloro propene	39/43%	10%
		Toluene	68/79%	15%
		cis-1,3-Dichloro propene	38/40%	5%
		Carbon Tetrachloride	62/69%	11%

No action taken based solely on MS/MSD data.

		%R
LCS/		(70-130)
LCSD		
129497		acceptable
129498		acceptable
129500Aq		acceptable

		Results in ug/L	Qualifier	Associated Samples
Blanks				
129497	non-detect			
129498	non-detect			
129500Aq	non-detect			

		Results in ug/L	Qualifier	Associated Samples
Trip Blank	Trip Blank	non-detect		

Holding Blank	N/A

		Qualifier	Associated sample
Rinsate Blank	N/A		

ICV	**6/2/06**	**RRF**	**%RSD**	**Qualifier**	**Associated sample**
Batch's	**129498/129497**				
PT1	Bromomethane	0.035		R	RISB3-01, RISB913, RISB16-01, RISB14-01, RISB14-59, RISB42-01, RISB11-01, RISB47-913, RISB13-01
PT2	Bromomethane	0.037		R	RISB5-01, RISB41-01, RISB914, RISB35-01, RISB40-01, RISB1-01, RISB43-01, RISB47-01, RISB-02-01, RISB36-01, RISB935, RISB-5-9, RISB2-17-21, RISB3-9-13, RISB15-9-13, RISB-11-59
	5/26/2006 Extra list				
PT1	Methyl Acetate	0.034		R	RISB3-01, RISB913, RISB16-01, RISB14-01, RISB14-59, RISB42-01, RISB11-01, RISB47-913, RISB13-01
PT2	Methyl Acetate	0.026		R	RISB5-01, RISB41-01, RISB914, RISB35-01, RISB40-01, RISB1-01, RISB43-01, RISB47-01, RISB-02-01, RISB36-01, RISB935, RISB-5-9, RISB2-17-21, RISB3-9-13, RISB15-9-13, RISB-11-59
Batch	**129500**				
129500	**4/26/2006 8260**				
	PT1/PT2	acceptable			
	4/26/2006 Extra				
PT1	Methyl Acetate	0.019		R	**Trip Blank**
PT2	Methyl Acetate	0.017			**Not used**

CCV		**RRF**	**%RSD**	**Qualifier**	**Associated sample**
Batch's	**129498/129497**				
PT1	**6/5/2006 8260 1208**				
	Bromomethane	0.037		R	No action already qual. due to ICV
	6/5/2006 Extra 1126				
		acceptable			
PT2	**6/5/2006 8260 1228**				
	Bromomethane	0.036			Not used
	6/5/2006 Extra 1147				Not used
		acceptable			

PT2	**6/6/2006 8260 0131**				
	Bromomethane	0.047	26.3%	R	No action already qual. due to ICV
	Methylene Chloride		28.60%	UJ	RISB35-01, RISB40-01, RISB1-01
	6/6/2006 Extra 0050				
	Methyl Acetate		133%	J/UJ	No action already qual. due to ICV
PT2	**6/6/2006 8260 0953**				
	Bromomethane		33.60%	J/UJ	No action already qual. due to ICV
	Methylene Chloride		34.60%	UJ	RISB5-01, RISB41-01, RISB914, RISB47-01, RISB02-01, RISB36-01, RISB935, RISB2-17-21, RISB3-9-13, RISB15-9-13, RISB-11-59
	2-Hexanone		25.90%	UJ	RISB5-01, RISB41-01, RISB914, RISB47-01, RISB02-01, RISB36-01, RISB935, RISB2-17-21, RISB3-9-13, RISB15-9-13, RISB-11-59
	6/6/2006 Extra 0909				
		acceptable			
PT1	**6/6/2006 8260 1054**				
	Bromomethane	0.041		R	No action already qual. due to ICV
	6/6/2006 Extra 1013				
		acceptable			
PT1	**6/5/2006 Extra 1045**				
	Methyl Acetate		71.50%	J/UJ	No action already qual. due to ICV
	6/5/2006 8260 1209				
	Acetone		105.20%	UJ	Trip Blank
	2-Butanone		48.30%	UJ	Trip Blank

Surr.	**%R (70-130)**	**Qualifier**	**Associated sample**
129497	acceptable		
129498	acceptable		
129500Aq	acceptable		

Internal Standard not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No
Comments (note deviations): Cooler temperatures 4.0° C.	

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/21/07

Reviewer: Cherie Zakowski Date: 5/10/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229206
Laboratory: Analytical Services, Inc.
Analysis/Methods: 6010B/7471A/%Moist.

Samples in SDG:

Client ID	Lab ID
RISB20-59	229206-1
RISB50-913	229206-2
RISB21-59	229206-3
RISB21-01	229206-4
RISB17-01	229206-5
RISB49-1317	229206-6
RISB17-913	229206-7
RISB49-01	229206-8

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%, 35% for soils)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%, 35% for soils)	Yes

Comments (note deviations): **Laboratory Duplicate -** Lab. Dup. for Hg and metals was performed on another SDG, all %RPD's were within limits.
% Moisture duplicate was performed on samples RISB21-59, RISB21-01, RISB17-01, and RISB49-1317 all %RPD's were within limits.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - MS/MSD from another SDG for metals and Hg.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Sample cooler was received at 4.0 ° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision

Field Duplicate		N/A

Laboratory Duplicate		%RPD
6010B, Hg	Diff. SDG	acceptable
%Moisture	RISB21-59	acceptable
	RISB21-01	acceptable
	RISB17-01	acceptable
	RISB49-1317	acceptable

Accuracy

Serial Dilution	%RPD
not present	

MS/MSD	Analytes	%R	RPD	Post %R	Qualifier	Associated Samples
6010B						All samples in this SDG
Diff. SDG 229204-24						
	Aluminum	999/999	4	999	Sample concentration >4x spike - no qualification required	
	Calcium	999/999	3	999	Sample concentration >4x spike - no qualification required	
	Iron	999/999	2	999	Sample concentration >4x spike - no qualification required	
	Potassium	80/47	9	13	Sample concentration >4x spike - no qualification required	
	Magnesium	960/723	4	86	Sample concentration >4x spike - no qualification required	
	Manganese	0/28	10	124	Sample concentration >4x spike - no qualification required	
	Antimony	42/43	2	77	UJ	All samples in this SDG
Hg	Diff. SDG 229312-1					
%Moisture	N/A					

Laboratory Control Spike/ Spike Duplicate

	%R
Hg 128634	
	acceptable
6010B 129340	
	acceptable

Blanks	Result
6010B 129340	non-detect
Hg 128634	non-detect
%Moisture	non-detect

ICV/CCV

not included

ICSA/ICSAB

not included

CRI

not included

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator:	Carrie Madrid	Date:	4/14/07
Reviewer:	Cherie Zakowski	Date:	10/3/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229206
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8270C

Samples in SDG:

Client ID	Lab ID
RISB20-59	229206-1
RISB50-913	229206-2
RISB21-59	229206-3
RISB21-01	229206-4
RISB17-01	229206-5
RISB49-1317	229206-6
RISB17-913	229206-7
RISB49-01	229206-8

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Laboratory Duplicate** - Sample RISB20-59 listed as a duplicate on the batch information sheet, however no results were present.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations): **MS/MSD - 8270C** sample RISB50-913 was spiked.
CCV - Atrazine 27.5% outside limits on 6/9/06 at 0825, associated samples qualified as "UJ".
Surrogate - RISB49-1317(10x) - Nitrobenzene-d5 out. No action one surrogate per fraction allowed out.

Precision

Field Duplicates **%RPD**
N/A

Laboratory Duplicate
RISB20-59 listed as dup. no results

Accuracy

MS/MSD	**MS/MSD RPD**
Batch 129579	acceptable

LCS/LCSD	**%R**
Batch 129579	acceptable

Blanks		**Qualifier**	**Associated Sample/ Qualification**
Batch 129579	non-detect		

		%R	Qualifier	Associated samples
Rinsate Blank	**N/A**			
ICV	All ICV's acceptable			
CCV	6/9/2006 0825	**%R**	**Qualifier**	**Associated Samples**
	Atrazine	27.50%	UJ	RISB20-59 RISB50-913 RISB21-59 RISB21-01 RISB17-01 RISB49-1317 RISB17-913
Surr.		**%R**	**Qualifier**	**Associated samples**
RISB49-1317(10x)				
	Nitrobenzene-d5	131%(26-91)	none one surrogate per fraction allowed out.	
Internal Standard	not included			

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met? Yes

Were holding times met? Yes

Were preservation criteria met? (4°C ± 2°C) Yes

Were Chain-of-Custody records complete and provided in data package? Yes

Were contaminants present in blanks? No

Comments (note deviations): Cooler temperatures 4.0° C

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/15/07

Reviewer: Cherie Zakowski Date: 10/3/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	229206
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8260B

	Client ID	Lab ID
Samples in SDG:	RISB20-59	229206-1
	RISB50-913	229206-2
	RISB21-59	229206-3
	RISB21-01	229206-4
	RISB17-01	229206-5
	RISB49-1317	229206-6
	RISB17-913	229206-7
	RISB49-01	229206-8
	Trip Blank	229206-9

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Batch 129501 sample RISB20-59 spiked. Chloroethane outside %R limits.
Surrogate - RISB21-59 - Toluene-d8 and 4-bromofluorbenzene out.

Precision

Field Duplicates — **%RPD**
N/A

Laboratory Duplicate
N/A

Accuracy

MS/MSD		**MS/MSD**	**RPD**	**Associated Sample**
129501	RISB20-59			
	Chloroethane	150/123%	20	
129500 (water)	Diff. SDG 229207-1	acceptable		

No action taken on MS/MSD Data

		%R
LCS/	Batch 129500(water)	acceptable
LCSD	Batch 129501	acceptable

			Qualifier	**Associated Sample/ Qualification**
Blanks	Batch 129500(water)	non-detect		
	Batch 129501	non-detect		
	Trip blank	non-detect		

Holding Blank	**N/A**

		RRF	%RSD	Qualifier	Associated sample
Rinsate Blank	**N/A**				

		RRF	%RSD	Qualifier	Associated sample
ICV					
PT1/PT2	**4/26/2006 A Files**	acceptable			
PT1	**4/26/2006 A Files Extra 1**				
	Methyl Acetate	0.019		R	RISB50-913, RISB21-01, RISB17-01, RISB49-1317, RISB17-913, RISB49-01, TB
PT2	**4/26/2006 A Files Extra 2**				
	Methyl Acetate	0.017		R	RISB20-59, RISB21-59

		RRF	%RSD	Qualifier	Associated sample
CCV	**6/5/2006 1045 A16761 Extra 1**				
	Methyl Acetate		71.52%	J/UJ	Qual. due to ICV
	6/5/2006 1106 A16762 Extra 2				
	Methyl Acetate		44.52%	J/UJ	Qual. due to ICV
PT1	**6/5/2006 1209 A16765 8260**				
	Acetone		105.20%	UJ	RISB17-913, TB
	2-Butanone		48.30%	J	RISB17-913
				UJ	RISB21-01, RISB17-01, TB
PT2	**6/5/2006 1230 A16766 8260**				
		acceptable			

		RRF	%RSD	Qualifier	Associated sample
CCV	**6/6/2006 1111 A16827 Extra 1**				
	Methyl Acetate		76.44%	J/UJ	Qual. due to ICV
	6/6/2006 1132 A16828 Extra 2				
	Methyl Acetate		48.12%	J/UJ	Qual. due to ICV
PT1	**6/6/2006 1153 A16829 8260**				
		acceptable			
PT2	**6/6/2006 1214 A16830 8260**				
	Acetone		36.9%(L)	J	RISB49-01, RISB-59
				UJ	RISB20-59, RISB17-01

		%R (70-130)	Qualifier	Associated sample
Surr. RISB21-59				
	Toluene-d8	1016%	J pos. results	RISB21-59
	4-bromofluorobenzene	259%	J pos. results	RISB21-59

Raw data not provided. No further evaluation could be performed.

Internal Standard not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C

Comparibility:

	Yes No N/A
Does data compare with similar analysis and data sets?	Yes
Comments (note deviations):	

Completeness (90%):

	Yes No N/A
Are all data in this SDG useable?	Yes
Comments (note deviations):	

Do all data in this SDG meet the Data Quality Objectives?	Yes
Comments:	

Validator:	Carrie Madrid	Date:	4/15/07
Reviewer:	Cherie Zakowski	Date:	10/3/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	229312
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	6010B/7471A/%Moist

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
SB6-1315	229312-1	SB7-01	229312-7
SB7-15	229312-2	SB12-01	229312-8
SB45-01	229312-3	SB12-1721	229312-9
SB6-01	229312-4	SB48-01	229312-10
SB45-15	229312-5	SB48-1315	229312-11
SB12-15	229312-6		

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations): **Sample Duplicates -** Sample duplicates performed on samples from different SDG's.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - 6010B matrix spikes analyzed on samples from different SDG's. sample 229312-1 and a sample from another SDG 229401-3 were spiked for Hg.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Sample cooler was received at 4.0 ° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision	**%RPD**
Field Duplicate	
	N/A

Laboratory Duplicate		%RPD	Qualifier	Associated Samples
6010B				
129350	diff. SDG 229403-3			
129340	diff. SDG 229204-24			
Hg				
128634	SB6-1315	acceptable		
128636	diff. SDG 229401-3	acceptable		
%Moist.				
129541	diff. SDG 229206-6 and 229206-6	acceptable		
129606	SB45-15	acceptable		

Accuracy

Serial Dilution	%RPD
	N/A

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
6010B	(76-124)					
129340	diff. SDG 229204-24					SB6-1315, SB7-15, SB45-01, SB6-01, SB45-15, SB12-15
	Aluminum	999/999%	4	999%	Sample concentration >4x spike - no qualification required	
	Calcium	999/999%	3	999%	Sample concentration >4x spike - no qualification required	
	Iron	999/999%	2	999%	Sample concentration >4x spike - no qualification required	
	Magnesium	960/723%	4	86%	Sample concentration >4x spike - no qualification required	
	Manganese	0/28%	10	124%	Sample concentration >4x spike - no qualification required	
	Antimony	42/43%	2	77%	UJ	
129350	diff. SDG 229403-3					SB7-01, SB12-01, SB12-1721, SB48-01, SB48-1315
	Aluminum	999/999%	8	999%	Sample concentration >4x spike - no qualification required	
	Barium	125/112%	6	110%	Sample concentration >4x spike - no qualification required	
	Calcium	247/999%	14	999%	Sample concentration >4x spike - no qualification required	
	Copper	110/129%	9	118%	Sample concentration >4x spike - no qualification required	
	Iron	999/999%	8	999%	Sample concentration >4x spike - no qualification required	
	Magnesium	999/999%	11	996%	Sample concentration >4x spike - no qualification required	
	Manganese	0/50%	25	0%	Sample concentration >4x spike - no qualification required	
	Sodium	429/524%	6	227%	Sample concentration >4x spike - no qualification required	
	Antimony	45/47%	4	77%	UJ	
Hg						
128634	SB6-1315	acceptable				
128636	diff. SDG 229401-3	acceptable				

LCS/ LSD(90-110)

		%R
137461	6010B	acceptable
137456	Thallium	acceptable
137458	Hg	acceptable

Blanks	Analyte	Results	Qualifier	Associated Samples
6010B				
129340	non-detect			
Hg				
128634	non-detect			
128636	non-detect			

%Moist.	
129541	non-detect
129606	non-detect

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator:	Carrie Madrid	Date:	4/19/07
Reviewer:	Alecia Epes	Date:	6/14/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229312
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8270C

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
SB6-1315	229312-1	SB7-01	229312-7
SB7-15	229312-2	SB12-01	229312-8
SB45-01	229312-3	SB12-1721	229312-9
SB6-01	229312-4	SB48-01	229312-10
SB45-15	229312-5	SB48-1315	229312-11
SB12-15	229312-6		

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Matrix spike performed on sample SB48-1315.
CCV - 8270 CCV standard analyzed at 0825 Atrazine out.

Precision | **%RPD**

Field Duplicates

N/A

Laboratory Duplicate | **%RPD**

N/A

Accuracy

MS/MSD		**MS/MSD RPD**
129580	SB48-1315	acceptable

LCS/LCSD	**%R**
129580	acceptable

Blanks	**Analyte**	**Qualifier**	**Associated Sample/ Qualification**
129580	non-detect		

			Qualifier		Associated sample
Rinsate Blank	**N/A**				
		RRF	**%RSI**	**Qualifier**	**Associated sample**
ICV	**6/5/06** 8270/Benzaldehyde/ TCL ICV's	acceptable			
	6/12/06 8270/Benzaldehyde/ TCL ICV's	acceptable			
		RRF	**%D**	**Qualifier**	**Associated sample**
CCV	**6/9/06** 8270/Benzaldehyde	acceptable			
	TCL - Atrazine		27.50%	none	All samples non-detect
	6/12/06 8270/Benzaldehyde/ TCL CCV's	acceptable			
Surr.		**%R**		**Qualifier**	**Associated sample**
129580		acceptable			
Internal Standard	not included				

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/19/07

Reviewer: Alecia Epes Date: 6/11/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229312
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
SB6-1315	229312-1	SB7-01	229312-7
SB7-15	229312-2	SB12-01	229312-8
SB45-01	229312-3	SB12-1721	229312-9
SB6-01	229312-4	SB48-01	229312-10
SB45-15	229312-5	SB48-1315	229312-11
SB12-15	229312-6	Trip Blank	229312-12

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	No
Trip Blanks/Rinsate Blanks	No
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Samples 229312-2(129551) and 229312-7(129552) were spiked for soils. A sample from a different SDG 229288-1 was spiked for water batch 129557.

Precision	**%RPD**
Field Duplicates	N/A
Laboratory Duplicate	N/A

Accuracy		**MS/MSD** (70-130)	**RPD**
MS/MSD			
SB7-15			
129551	trans-1,3-Dichloro propene	69/69%	0%
	cis-1,3-Dichloro propene	69/69%	0%
129552		Acceptable	
129557	diff. SDG 229288-1		
	1,1,2,2-Tetrachloroethane	66/75%	13%
	Trichlorofluoromethane	131/139%	6%
	Chloroethane	139/144%	4%

No action taken based solely on MS/MSD data.

LCS/ LCSD	**%R** (70-130)
129551	acceptable
129552	acceptable
129557 Aq.	acceptable

		Results in ug/L	Qualifier	Associated Samples
Blanks				
129551		non-detect		
129552		non-detect		
129557 Aq.		non-detect		

		Results in ug/L	Qualifier	Associated Samples
Trip Blank	Trip Blank Toluene	0.56ug/L	Raise to the reporting limit and U	SB6-1315, SB7-15

Holding Blank **N/A**

			Qualifier	Associated sample
Rinsate Blank	**N/A**			

ICV		RRF	%RSD	Qualifier	Associated sample
PT1/PT2	**4/26/2006 A Files**	acceptable			
PT1	**4/26/2006 A Files Extra 1**				
	Methyl Acetate		0.019	R	SB6-1315, SB7-15, SB45-01, SB6-01, SB45-15, SB12-15, SB12-1721
PT2	**4/26/2006 A Files Extra 2**				
	Methyl Acetate		0.017	R	SB7-01, SB12-01, SB48-01, SB48-1315

CCV		RRF	%RSD	Qualifier	Associated sample
	6/7/2006 1040 A16865 Extra 1				
	Methyl Acetate	54.08%			Already qual. due to ICV
	6/7/2006 1101 A16866 Extra 2				
	Methyl Acetate	40.16%			Already qual. due to ICV
PT2	**6/7/2006 1144 A16868 8260**				
		acceptable			
PT1	**6/7/2006 1122 A16867 8260**				
	Chloromethane	25.5%(L)		UJ	SB6-1315, SB7-15, SB45-01, SB6-01, SB45-15, SB12-15, SB12-01

		RRF	%RSD	Qualifier	Associated sample
	6/8/2006 0958 A16911 Extra 1				
	Methyl Acetate	53.50%			Already qual. due to ICV
	6/8/2006 1020 A16912 Extra 2				
	Methyl Acetate	32.00%			Already qual. due to ICV
PT1	**6/8/2006 1041 A16913 8260**				
		acceptable			
PT2	**6/8/2006 1102 A16914 8260**				
		acceptable			

Surr.	%R (70-130)	Qualifier	Associated sample
129551	acceptable		
129552	acceptable		
129557Aq.	acceptable		

Internal Standard not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes

Were contaminants present in blanks?	Yes
Comments (note deviations): Cooler temperatures 4.0° C.	

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets?	Yes
Comments (note deviations):	

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable?	No
Comments (note deviations):	

Do all data in this SDG meet the Data Quality Objectives?	No

Comments: Some results for methyl acetate were rejected due to initial and continuing calibration criteria.

Validator:	Carrie Madrid	Date:	4/19/07
Reviewer:	Alecia Epes	Date:	6/13/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229401 soil
Laboratory: Analytical Services, Inc.
Analysis/Methods: 6010B/7471A/%Moisture

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-8-01	229401-1	RISB-52-913	229401-7
RISB-9-01	229401-2	RISB-9-59	229401-8
RISB-33-1720	229401-3	RISB-8-58	229401-9
RISB-533	229401-4	RISB-44-01	229401-10
RISB-34-1113	229401-5	RI-Waste	229401-11
RISB-10-59	229401-6	RISB-33-59	229401-12

Full Validation Sample: A Level III evaluation was performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%, 35% for soils)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%, 35% for soils)	No

Comments (note deviations): **Field Duplicate -** Samples RISB-33-1720 and RISB-533 are identified as field dups.
Laboratory Duplicate - Dup. analysis performed on sample RISB-33-1720 for Hg all %RPD within limits.
Duplicates for 6010B and %moisture performed on a sample from another SDG.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - Sample RISB-33-1720 spiked for Hg. Metals spike from another SDG.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Sample cooler was received at 4.0 ° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision

Field Duplicate		%RPD
	RISB-33-1720 RISB-533	acceptable

Laboratory Duplicate		%RPD	Qualifier	Associated Samples
Hg				
128636	RISB-33-1720	acceptable		
6010B		Diff. SDG		
129350	Diff. SDG 229403-3			
	Cadmium	41%	J/UJ	All samples except RI-Waste
	Chromium	80%	J/UJ	"
	Vanadium	66%	J/UJ	"
129358	Diff. SDG 229404-26			
	Barium	58%	J/UJ	RI-Waste
	Cobalt	51%	J/UJ	"
	Copper	36%	J/UJ	"
	Manganese	92%	J/UJ	"
	Lead	41%	J/UJ	"
%Moisture		Diff. SDG		
129585		Acceptable		
129606		Acceptable		
129664		Acceptable		

Accuracy

Serial Dilution		%RPD
	not included	N/A

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
Hg(85-115)						
128636	RISB-33-1720	Acceptable		Acceptable		
6010B	6010B	Diff. SDG				
129350	Diff. SDG 229403-3					
	Aluminum	999/999%	8	999%	Sample concentration >4x spike - no qualification required	
	Calcium	247/999%	14	999%	Sample concentration >4x spike - no qualification required	
	Iron	999/999%	8	999%	Sample concentration >4x spike - no qualification required	
	Magnesium	999/999%	11	966%	Sample concentration >4x spike - no qualification required	
	Manganese	0/50%	25	0	Sample concentration >4x spike - no qualification required	
	Sodium	429/524%	6	227%	Sample concentration >4x spike - no qualification required	
	Antimony	45/47%	4	77%	J/UJ	All samples except RI-Waste
129358	Diff. SDG 229404-26					
	Aluminum	999/999%	6	0%	Sample concentration >4x spike - no qualification required	
	Barium	433/75%	54	0%	Sample concentration >4x spike - no qualification required	
	Calcium	156/143%	1	67%	Sample concentration >4x spike - no qualification required	
	Iron	999/999%	1	0%	Sample concentration >4x spike - no qualification required	
	Potassium	363/144%	5	0%	Sample concentration >4x spike - no qualification required	
	Magnesium	667/413%	4	0%	Sample concentration >4x spike - no qualification required	
	Manganese	999/0%	77	0%	Sample concentration >4x spike - no qualification required	
	Antimony	43/41%	5	73%	J-/UJ	RI-Waste

LCS/ LSD(90-110)

	%R
6010B	
129350	acceptable
Hg	
128636	acceptable

Blanks

	Analyte	Results	Qualifier	Associated Samples
6010B	non-detect			
Hg	non-detect			
%Moisture	non-detect			

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/15/07

Reviewer: Cherie Zakowski Date: 6/9/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229401
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8270C

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-8-01	229401-1	RISB-52-913	229401-7
RISB-9-01	229401-2	RISB-9-59	229401-8
RISB-33-1720	229401-3	RISB-8-58	229401-9
RISB-533	229401-4	RISB-44-01	229401-10
RISB-34-1113	229401-5	RI-Waste	229401-11
RISB-10-59	229401-6	RISB-33-59	229401-12

Full Validation Sample: A Level III evaluation was performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates -** Samples RISB-33-1720/RISB-533 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	Yes
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Batch 129667 sample RISB-8-01

Precision **%RPD**

Field Duplicates
RISB-33-1720/RISB-533 acceptable

Laboratory Duplicate **%RPD**
RISB-9-59

Accuracy

MS/MSD **MS/MSD RPD**
Batch 129667
RISB-8-01 acceptable

%R
LCS/LCSD
Batch 129667 acceptable

	Analyte	**Qualifier**	**Associated Sample/ Qualification**
Blanks			
Batch 129667	non-detect		

		Qualifier	Associated sample
Rinsate Blank	**N/A**		
ICV	Acceptable		
CCV	Acceptable		

Surr.	**%R**	**Qualifier**	**Associated sample**
Batch 129667	acceptable		

Internal Standard	not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/15/07

Reviewer: Cherie Zakowski Date: 6/9/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229401
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-8-01	229401-1	RISB-52-913	229401-7
RISB-9-01	229401-2	RISB-9-59	229401-8
RISB-33-1720	229401-3	RISB-8-58	229401-9
RISB-533	229401-4	RISB-44-01	229401-10
RISB-34-1113	229401-5	RI-Waste	229401-11
RISB-10-59	229401-6	RISB-33-59	229401-12

Full Validation Sample: A Level III evaluation was performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates** - Samples RISB-33-1720/RISB-533 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Batch 129582 sample RISB-8-01
Surrogate - Toluene-d8 and 4-Bromofluorobenzene out in sample RISB-34-1113

Precision

Field Duplicates — **%RPD**
RISB-33-1720/RISB-533 — acceptable

Laboratory Duplicate
N/A

Accuracy

MS/MSD		**MS/MSD RPD**
		(70-130)
129582	RISB-8-01	acceptable

	%R
LCS/LSCD	(70-130)
129582	acceptable

		Results in ug/L	**Qualifier**	**Associated Sample/ Qualification**
Blanks				
129582		acceptable		
Trip Blank	N/A			
Holding Blank	N/A			

		RRF	%RSD	Qualifier	Associated sample
Rinsate Blank	N/A				

ICV		**RRF**	**%RSD**	**Qualifier**	**Associated sample**
PT1/PT2	4/26/2006 A Files	acceptable			
PT1	4/26/2006 A Files Extra 1				
	Methyl Acetate		0.019	R	All Samples except for RI-Waste(11)
PT2	4/26/2006 A Files Extra 2				
	Methyl Acetate		0.017	J	RI-Waste(11)

CCV		**RRF**	**%RSD**	**Qualifier**	**Associated sample**
PT1	6/8/2006 0958 A16911 Extra 1				
	Methyl Acetate		53.50%	UJ	Already qual. due to ICV
PT1	6/8/2006 1041 A16913 8260				
		acceptable			

		RRF	**%RSD**	**Qualifier**	**Associated sample**
PT1	6/8/2006 2157 A16945 Extra 1				
	Methyl Acetate		46.60%	UJ	Already qual. due to ICV
PT2	6/8/2006 2239 A16947 8260				
		acceptable			

		RRF	**%RSD**	**Qualifier**	**Associated sample**
PT2	6/9/2006 1015 A16978 Extra 2				
	Methyl Acetate		35.62%	J	Already qual. due to ICV
PT2	6/9/2006 1057 A16980 8260				
		acceptable			

Surr.		**%R (70-130)**	**Qualifier**	**Associated sample**
129582				
	RISB-34-1113			
	Toluene-d8	687%	J	RISB-34-1113
	4-Bromofluorobenzene	178%	J	

Internal Standard	not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met ? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No
Comments (note deviations): Cooler temperatures 4.0° C	

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes
Comments (note deviations):	

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes
Comments (note deviations):	

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator:	Carrie Madrid	Date:	4/15/07
Reviewer:	Cherie Zakowski	Date:	6/9/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229403
Laboratory: Analytical Services, Inc.
Analysis/Methods: 6010B/7470/%Moist

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-4-01	229403-1	RISB-4-59	229403-4
RISB-44-5-8.5	229403-2	RISB-951	229403-5
RISB-51-913	229403-3	RISB-52-01	229403-6

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%, 35%for soils)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%, 35% for soils)	No

Comments (note deviations): **Field Duplicates -** Samples RISB-51-913/RISB-951 are field duplicates.
Sample Duplicates - See below.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	No
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - See below.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	Yes

Comments (note deviations): Sample cooler was received at 4.0 ° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision	**%RPD**
Field Duplicate	
RISB-51-913/RISB-951	
Chromium	57.14%
Vanadium	55.67%

No action taken on field duplicate data.

Laboratory Duplicate		%RPD	Qualifier	Associated Samples
6010B				
129350	RISB-51-913			
	Cadmium	41%	none sample amount < 5x's the R.L.	
	Chromium	80%	J	RISB-4-01, RISB-44-5-8.5, RISB-51-913
	Vanadium	66%	J	RISB-4-01, RISB-44-5-8.5, RISB-51-913
129357	RISB-951	acceptable		
Hg				
128636	diff. SDG 229401-3	acceptable		
128638	diff. SDG 229404-1	acceptable		
%Moist				
129664	diff. SDG 229404-12			
	diff. SDG 229403-4			

Accuracy

Serial Dilution	%RPD
	N/A

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
6010B	(76-124)					
129350	RISB-51-913					
	Aluminum	999/999%	8%	999%	No action - sample result greater than 4x the spike concentration	
	Barium	125/112%	6%	110%	No action - sample result greater than 4x the spike concentration	
	Calcium	247/999%	14%	999%	No action - sample result greater than 4x the spike concentration	
	Copper	110/129%	9%	118%	No action - sample result greater than 4x the spike concentration	
	Iron	999/999%	8%	999%	No action - sample result greater than 4x the spike concentration	
	Magnesium	999/999%	11%	966%	No action - sample result greater than 4x the spike concentration	
	Manganese	0/50%	25%	0%	No action - sample result greater than 4x the spike concentration	
	Sodium	429/524%	6%	227%	No action - sample result greater than 4x the spike concentration	
	Antimony	45/47%	4%	77%	UJ	RISB-4-01, RISB-44-5-8.5, RISI
129357	RISB-951					
	Aluminum	999/999%	4%	470%	No action - sample result greater than 4x the spike concentration	
	Barium	117/125%	3%	97%	No action - sample result greater than 4x the spike concentration	
	Calcium	999/999%	9%	360%	No action - sample result greater than 4x the spike concentration	
	Iron	999/999%	2%	0%	No action - sample result greater than 4x the spike concentration	
	Potassium	153/148%	2%	111%	No action - sample result greater than 4x the spike concentration	
	Magnesium	999/873%	2%	0%	No action - sample result greater than 4x the spike concentration	
	Manganese	0/88%	24%	0%	No action - sample result greater than 4x the spike concentration	
	Sodium	670/633%	2%	212%	No action - sample result greater than 4x the spike concentration	
	Antimony	47/47%	1%	87%	UJ	RISB-4-59, RISB-951, RISB-52-
Hg						
128636	diff. SDG 229401-3	acceptable				
128638	diff. SDG 229404-1	acceptable				

LCS/ LSD(90-110)

		%R
6010B	129350/129357	acceptable
Hg	128636/128638	acceptable

Blanks

	Analyte	Results	Qualifier	Associated Samples
6010B				
129350	non-detect			
129357	Aluminum	2.4mg/Kg	no action all results > 5x's the blank	
	Zinc	0.30mg/Kg	no action all results > 5x's the blank	
Hg				
128636	non-detect			
128638	non-detect			

%Moist

129664	non-detect

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator:	Carrie Madrid	Date:	4/20/07
Reviewer:	Cherie Zakowski	Date:	10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229403
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8270C

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-4-01	229403-1	RISB-4-59	229403-4
RISB-44-5-8.5	229403-2	RISB-951	229403-5
RISB-51-913	229403-3	RISB-52-01	229403-6

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates -** Samples RISB-51-913/RISB-951 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	Yes
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Matrix spike performed on a sample from a different SDG 229401-2.

Precision — **%RPD**

Field Duplicates
RISB-51-913/RISB-951 — acceptable

Laboratory Duplicate — **%RPD**

N/A

Accuracy

MS/MSD — **MS/MSD RPD**
129667 Diff. SDG 229401-2 — acceptable

%R

LCS/LCSD
129667 — acceptable

	Analyte	**Qualifier**	**Associated Sample/ Qualification**
Blanks			
129667	non-detect		

					Qualifier	Associated sample
Rinsate Blank	**N/A**					

		RRF	%RSD	Qualifier	Associated sample
ICV	**6/5/06**				
	8270/Benzaldehyde/ TCL ICV's	acceptable			
	6/13/06				
	8270/TCL	acceptable			
	6/14/06				
	8270C	acceptable			

		RRF	%D	Qualifier	Associated sample
CCV	**6/12/06**				
	8270/Benzaldehyde/ TCL CCV's	acceptable			
	6/13/06				
	8270/Benzaldehyde/ TCL CCV's	acceptable			
	6/14/06				
	8270/Benzaldehyde/ TCL CCV's	acceptable			

Surr.		%R	Qualifier	Associated sample
	RISB-4-01			
129667	2-Fluorobiphenyl (36-101)	32%	No action, one surrogate per fraction allowed out.	
	RISB-4-01 RR1 re-extraction 2-Fluorobiphenyl	33%		

Internal Standard	not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No
Comments (note deviations): Cooler temperatures 4.0° C.	

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes
Comments (note deviations):	

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes
Comments (note deviations):	

Do all data in this SDG meet the Data Quality Objectives?	Yes
Comments:	

Validator:	Carrie Madrid	Date:	4/20/07
Reviewer:	Cherie Zakowski	Date:	10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229403
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-4-01	229403-1	RISB-4-59	229403-4
RISB-44-5-8.5	229403-2	RISB-951	229403-5
RISB-51-913	229403-3	RISB-52-01	229403-6
		Trip Blank	229403-7

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates -** Samples RISB-51-913/RISB-951 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **Matrix Spike** - See below.
Trip Blank - Non-detect

Precision — **%RPD**

Field Duplicates
RISB-51-913/RISB-951 — acceptable
No action taken on field duplicate data.

Laboratory Duplicate — N/A

Accuracy		**MS/MSD** (70-130)	**RPD**
MS/MSD			
129583	RISB-51-913	acceptable	
	trans-1,3-Dichloro propene	66/70%	6%
	cis-1,3-Dichloro propene	66/70%	6%
129627Aq	Diff. SDG 229404-13		
	Bromoform	52/49%	6%
	Dibromochloromethane	56/53%	6%
	1,1,2-Trichloroethane	60/55	9%
	trans-1,3-Dichloropropene	53/50%	6%
	cis-1,3-Dichloropropene	62/60%	3%
	Trichlorofluoromethane	142/136%	4%
	Chloroethane	139/134%	4%

No action taken based solely on MS/MSD data.

LCS/ LCSD	**%R** (70-130)
129583	acceptable
129627Aq	acceptable

Blanks		**Results in ug/L**	**Qualifier**	**Associated Samples**
129583	non-detect			
129627Aq	non-detect			

Trip Blank		**Results in ug/L**	**Qualifier**	**Associated Samples**
	Trip Blank	non-detect		

Holding Blank	N/A				

				Qualifier	**Associated sample**
Rinsate Blank	N/A				

ICV		**RRF**	**%RSD**	**Qualifier**	**Associated sample**
PT1/PT2	4/26/2006 A Files	acceptable			
PT1	4/26/2006 A Files Extra 1/2				
	Methyl Acetate	0.019/0.017		R	All samples in this SDG

CCV		**RRF**	**%RSD**	**Qualifier**	**Associated sample**
PT1	6/8/2006 0958 A16911 Extra 1				
	Methyl Acetate		53.50%	UJ	Already qual. due to ICV
PT1	6/8/2006 1041 A16913 8260				
		acceptable			

		RRF	**%RSD**	**Qualifier**	**Associated sample**
PT1	6/8/2006 2157 A16945 Extra 1				
	Methyl Acetate		46.60%	UJ	Already qual. due to ICV
PT2	6/8/2006 2239 A16947 8260				
		acceptable			

		RRF	**%RSD**	**Qualifier**	**Associated sample**
PT2	6/9/2006 1015 A16978 Extra 2				
	Methyl Acetate		35.62%	J	Already qual. due to ICV
PT2	6/9/2006 1057 A16980 8260				
		acceptable			

Surr.	**%R (70-130)**	**Qualifier**	**Associated sample**
129583	acceptable		
129627Aq	acceptable		

Internal Standard	not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/20/07
Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229404
Laboratory: Analytical Services, Inc.
Analysis/Methods: 6010B/7471A/%Moist.

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISS-1	229404-1	RISD-1	229404-15
RISS-2	229404-2	RISD-2	229404-16
RISS-3	229404-3	RISD-3	229404-17
RISS-4	229404-4	RISD-4	229404-18
RISS-5	229404-5	RISD-5	229404-19
RISS-6	229404-6	RISD-WCBK6	229404-20
RISS-7	229404-7	RISD-FCBK6	229404-21
RISS-8	229404-8	RISD-54	229404-22
RISS-9	229404-9	RIBCK1-01	229404-23
RISS-10	229404-10	RIBCK1-34	229404-24
RISS-510	229404-11	RIBCK2-01	229404-25
RICB-3	229404-12	RIBCK2-34	229404-26
		IDW(TCLP)	229404-27

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%, 35% for soils)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%, 35% for soils)	Yes

Comments (note deviations):
Field Duplicate - Samples RISS-10/RISS-510 AND RISD-4/RISD-54 are identified as field duplicates.
Laboratory Duplicate - Dup. analysis performed on sample RIBCK2-34 for 6010B all %RPD within limits with the exception of Ba, Co, Cu, Mn, and Pb. Another dup. analyzed for 6010B on a sample from another SDG.
Dup. analysis performed for Hg(7471) on samples RISS-1 and RIBCK2-01 all RPD all RPD within criteria.
Hg (7470) also performed on a sample from another SDG.
%Moisture performed on samples RISD-54 and RICB-3 as well as samples from another SDG.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	No
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations):
Matrix Spike - See below.
Blanks - Aluminum and zinc were detected in the blank for batch 129357.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Sample cooler was received at 4.0 ° C.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Precision

Field Duplicate	Analyte	%RPD
RISS-10/RISS-510	Chromium	50%
RISD-4/RISD-54	Calcium	87.27%
	No action taken on field duplicates	

Laboratory Duplicate		%RPD	Qualifier	Associated Samples
6010B	RIBCK2-34			RISD-WCBK6, RISD-FCBK6, RISD-54,
129358	Barium	58%	J/UJ	RIBCK1-01, RIBCK1-34, RIBCK2-01,
	Cobalt	51%	J/UJ	"
	Copper	36%	J/UJ	"
	Manganese	92%	J/UJ	"
	Lead	41%	J/UJ	"
129357	Diff. SDG 229403-5		acceptable	
TCLP				
129368	Diff. SDG 229424-1		acceptable	
Hg (7471)				
	RISS-1			
128638	acceptable			
129707	RIBCK2-01			
	acceptable			
Hg (7470)				
128639	Diff. SDG 229269-1			
	acceptable			
%Mois.				
129587	RISD-54		acceptable	
129664	RICB-3		acceptable	

Accuracy

Serial Dilution	%RPD
not included	

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
Hg(7471)						
128638	RISS-1	Accep.		N/A		
129707	RIBCK2-01	Accep.		N/A		
Hg(7470)						
128639	Diff. SDG 229269-1	Accep.		N/A		
6010B TCLP						
129368	Diff. SDG 229424-1	Accep.		N/A		
6010B	(76-124)					

						Associated Samples
						RISD-WCBK6, RISD-FCBK6, RISD-54,
129358	RIBCK2-34					RIBCK1-01, RIBCK1-34, RIBCK2-01,
	Aluminum	999/999%	6%	0%	Sample concentration >4x spike - no qualification required	
	Barium	433/75%	54%	0%	Sample concentration >4x spike - no qualification required	
	Calcium	156/143%	1%	67%	Sample concentration >4x spike - no qualification required	
	Iron	999/999%	4%	0%	Sample concentration >4x spike - no qualification required	
	Potassium	363/144%	5%	0%	Sample concentration >4x spike - no qualification required	
	Magnesium	667/413%	4%	0%	Sample concentration >4x spike - no qualification required	
	Mangenese	999/0%	77%	0%	Sample concentration >4x spike - no qualification required	
	Antimony	43/41%	5%	73%	UJ	Samples listed above
						RISS-1-RISS-10, RISD-1, RISS-510,
129357	Diff. SDG 229403-5					RICB-3, RISD-2-RISD-5
	Aluminum	999/999%	4%	470%	Sample concentration >4x spike - no qualification required	
	Barium	117/125%	3%	360%	Sample concentration >4x spike - no qualification required	
	Calcium	999/999%	9%	0%	Sample concentration >4x spike - no qualification required	
	Iron	999/999%	2%		Sample concentration >4x spike - no qualification required	
	Potassium	153/148%	2%	0%	Sample concentration >4x spike - no qualification required	
	Magnesium	999/873%	2%	0%	Sample concentration >4x spike - no qualification required	
	Manganese	0/88%	24%	212%	Sample concentration >4x spike - no qualification required	
	Sodium	670/633%	2%		Sample concentration >4x spike - no qualification required	
	Antimony	47/47%	1%		UJ	

LCS/LCSD - 6010B(90-110);Hg (62-136)

	%R
6010B	
129357	acceptable
Hg (7471)	
128638	acceptable
Hg (7470)	
128639	acceptable

Blanks

	Analyte	Results	Qualifier	Associated Samples
6010B				
129357	Aluminum	2.40 mg/Kg	20U	no action all > R.L.
	Zinc	0.300mg/Kg	6U	no action all > R.L.
129358	non-detect			
Hg (7471)				
128638	non-detect			
129707	non-detect			
Hg (74710				
128639	non-detect			
%Moist				
129587				
129664	non-detect			
TCLP	non-detect			

ICV/CCV

not included

ICSA/ICSAB

not included

CRI

not included

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/15/07

Reviewer: Cherie Zakowski Date: 10/7/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229404
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8270C

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISS-1	229404-1	RISD-1	229404-15
RISS-2	229404-2	RISD-2	229404-16
RISS-3	229404-3	RISD-3	229404-17
RISS-4	229404-4	RISD-4	229404-18
RISS-5	229404-5	RISD-5	229404-19
RISS-6	229404-6	RISD-WCBK6	229404-20
RISS-7	229404-7	RISD-FCBK6	229404-21
RISS-8	229404-8	RISD-54	229404-22
RISS-9	229404-9	RIBCK1-01	229404-23
RISS-10	229404-10	RIBCK1-34	229404-24
RISS-510	229404-11	RIBCK2-01	229404-25
RICB-3	229404-12	RIBCK2-34	229404-26
		IDW(TCLP)	229404-27

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicate -** Samples RISS-10/RISS-510 and RISD-4/RISD-54 are identified as field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Batch 129693 sample RISS-6, batch 129786 sample RIBCK2-01, and spiked. and batch 129817 (TCLP) sample IDW were spiked.

Precision	**%RPD**
Field Duplicates	
RISS-10/RISS-510	acceptable
RISD-4/RISD-54	**acceptable**

Laboratory Duplicate	**%RPD**
N/A	

Accuracy

MS/MSD	**MS/MSD RPD**
129693 RISS-6	acceptable
129786 RIBCK2-01	acceptable
129817(TCLP) IDW	acceptable

LCS/LCSD	**%R**
129693	acceptable
129786	acceptable
129817 TCLP	acceptable

Blanks	**Analyte**	**Qualifier**	**Associated Sample/ Qualification**
129693	non-detect		
129786	non-detect		
129817	non-detect		

Rinsate Blank				Qualifier	Associated sample
	N/A				

ICV	6/14/2006 8270	RRF	%RPD	Qualifier	Associated sample
	Benzoic Acid		32.31%	none	not a target compound

CCV	6/14/2006 8270 1354	RRF	%RPD	Qualifier	Associated sample
	Benzidine	0.038	78.3%	analyte not a target compound	IDW(TCLP) IDW MS/MSD

Surr.	%R	Qualifier	Associated sample
129693	acceptable		
129786	acceptable		
129817 TCLP	acceptable		

Internal Standard not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/15/07

Reviewer: Cherie Zakowski Date: 10/7/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 229404
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RICB-3	229404-12	RISD-FCBK6	229404-21
RITW-12	229404-13	RISD-54	229404-22
RITW-34	229404-14	RIBCK1-01	229404-23
RISD-1	229404-15	RIBCK1-34	229404-24
RISD-2	229404-16	RIBCK2-01	229404-25
RISD-3	229404-17	RIBCK2-34	229404-26
RISD-4	229404-18	IDW(TCLP)	229404-27
RISD-5	229404-19	Trip Blank	229404-28
RISD-WCBK6	229404-20		

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicate -** Samples RISD-4/RISD-54 are identified as field dups.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Batch 129582 and 129583 spiked a sample from another SDG.
TCLP 129798 sample IDW was spiked.
Aqueous 129627 sample RITW-12 was spiked.

Surrogate - 4-Bromofluorobenzene out in sample RICB-3

Precision

Field Duplicates — **%RPD**
RISD-4/RISD-54 — acceptable

Laboratory Duplicate
N/A

Accuracy

MS/MSD		**MS/MSD**	**RPD**
		(70-130)	
129582/129583 soil		acceptable	
	diff. SDG		
129583	trans-1,3-Dichloropropene	66/70%	6%
	cis-1, 3-Dichloropropene	66/70%	6%
129627 aqueous			
	Bromoform	52/49%	6%
	Dibromochloromethane	56/53%	6%
	1,1,2-Trichloroethane	60/55%	9%
	trans-1,3-Dichloropropene	53/50%	6%
	cis-1,3-Dichloropropene	62/60%	3%
	Trichlorofluoromethane	142/136%	4%
	Chloroethane	139/134%	4%

no action taken on MS/MSD data

129798 TCLP IDW — acceptable

LCS/LCSD	%R (70-130)
129582/129583 soil	acceptable
129627 Aq.	acceptable
129798 TCLP	acceptable

Blanks		Results in ug/L	Qualifier	Associated Sample/ Qualification
129582/129583 soil		non-detect		
129627 Aq.		non-detect		
129798 TCLP		non-detect		
Trip Blank	229404-28 Trip Blank	non-detect		
Holding Blank	N/A			

		Qualifier	Associated sample
Rinsate Blank	N/A		

ICV		RRF	%RSD	Qualifier	Associated sample
PT1/PT2	4/26/2006 A Files	acceptable			
PT1	4/26/2006 A Files Extra 1				
	Methyl Acetate		0.019	R	RIBCK1-34, RIBCK2-01, RIBCK2-34
PT2	4/26/2006 A Files Extra 2				
	Methyl Acetate		0.017	J	RICB-3, RISD-4, RISD-54,
				R	RISD-1, RISD-2, RISD-3, RISD-5, RISD-WCBK6, RISD-FCBK6, RIBCK1-01
PT1	6/2/2006 B Files				
	Bromomethane		0.035	R	RITW-12, RITW-34, Trip Blank
PT2	6/2/2006 B Files				
	Bromomethane		0.037	R	none
PT1	5/26/2006 B Files Extra 1				
	Methyl Acetate		0.034	R	RITW-12, RITW-34, Trip Blank
PT2	5/26/2006 B Files Extra 2				
	Methyl Acetate		0.026	R	

CCV		RRF	%D	Qualifier	Associated sample
PT1	6/8/2006 0958 A16911 Extra 1				
	Methyl Acetate		53.50%	UJ	Qual. due to ICV
PT2	6/8/2006 1020 A16912 Extra 2				
	Methyl Acetate		32.00%	UJ	Qual. due to ICV
PT1	6/8/2006 1041 A16913 8260				
		acceptable			
PT2	6/8/2006 1102 A16914 8260				
	Carbon Disulfide		22.60%	UJ	RISD-1, RISD-2, RIBCK1-01

		RRF	%D	Qualifier	Associated sample
PT1	6/8/2006 2157 A16945 Extra 1				
	Methyl Acetate		46.60%		none
PT2	6/8/2006 2218 A16946 Extra 2				
	Methyl Acetate		29.02%	UJ	Qual. due to ICV
PT1	6/8/2006 2239 A16947				
		acceptable			
PT2	6/8/2006 2301 A16948				
	Chloroethane		52.9%(L)	UJ	RISD-5, RISD-WCBK6, RISD-FCBK6
		(L) Linear			

		RRF	%D	Qualifier	Associated sample
PT2	6/9/2006 1015 A16978 Extra 2				
	Methyl Acetate		35.62%	UJ	Qual. due to ICV

		RRF	%D	Qualifier	Associated sample
PT2	6/9/2006 1057 A16980 8260				
		acceptable			

		RRF	%D	Qualifier	Associated sample
PT1	6/12/2006 1046 A17037 Extra 1				
	Methyl Acetate		49.28%		none
PT2	6/12/2006 1108 A17038 Extra 2				
		acceptable			
PT1	6/12/2006 1129 A17039 8260				
		acceptable			
PT2	6/12/2006 1150 A17040 8260				
	trans-1,2-dichloro ethene		26.60%		none

		RRF	%D	Qualifier	Associated sample
PT2	6/14/2006 1116 A17126 Extra 2				
	Methyl Acetate		90.80%		none
PT2	6/14/2006 1159 A17128 8260				
	Acetone		74.6%(L)		none
	2-Butanone		39.6%(L)	UJ	IDW - not analyte of concern - no qualification
		(L) Linear			

		RRF	%D	Qualifier	Associated sample
PT1	6/9/2006 0835 B24661 Extra 1				
		acceptable			
PT1	6/9/2006 1039 B24665 8260				
	Bromomethane		48.60%	UJ	Qual. due to ICV
	Acetone		95.1%(L)	UJ	RITW-34, Trip Blank
	2-Butanone		45.10%	UJ	RITW-34, Trip Blank
	2-Hexanone		44.40%	UJ	RITW-34, RITW-12, Trip Blank
		(L) Linear			

Surr.		%R (70-130)	Qualifier	Associated sample
129583 RICB-3				
	4-Bromofluorobenzene	132%	J	RICB-3 Toluene and Methyl Acetate
129582		acceptable		
129627 Aq.		acceptable		
129798 TCLP		acceptable		

Internal Standard not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met ? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator:	Carrie Madrid	Date:	4/15/07
Reviewer:	Cherie Zakowski	Date:	10/7/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	237552
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8260B/ %Moisture

Samples in SDG:

Client ID	Lab ID
RISB-57:0-1	237552-1
RISB-57:3-5	237552-2
RISB-57:10-14	237552-3
RISB-57:14-18	237552-4
RISB-57:18-22	237552-5

Full Validation Sample: Level III evaluation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations): **Laboratory Duplicate -** A laboratory duplicate was performed for % moisture on samples from a different SDG (237535-1 and 237372-3).

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Sample RISB-57:0-1(136228) was spiked.

Precision	**%RPD**	
Field Duplicates	N/A	
Laboratory Duplicate	N/A	(8260)
136214 %moist.	acceptable	

Accuracy		**MS/MSD**	**RPD**
		(70-130)	
MS/MSD			
136228	RISB-57:0-1		
	Carbon Tetrachloride	55/55%	0%
	Chloroethane	63/69%	9%

No action taken based solely on MS/MSD data.

	%R
LCS/ LCSD	(70-130)
136228	acceptable

		Results in ug/L	Qualifier	Associated Samples
Blanks				
136228		non-detect		
136214 % Moist.		non-detect		

		Results in ug/L	Qualifier	Associated Samples
Trip Blank	N/A			

Holding Blank N/A

		Qualifier	Associated sample
Rinsate Blank	N/A		

		RRF	%RSD	Qualifier	Associated sample
ICV	**12/4/06**				
Batch	Bromomethane	0.048		R	All samples
136228	Chloroethane	0.048		R	All samples
	11/29/2006 Extra A files				
	Methyl Acetate	0.035		R	All Samples

		RRF	%RSD	Qualifier	Associated sample
CCV	**12/11/2006 1224 A21877**				
	Bromomethane	0.04			Qual. due to ICV
	Chloroethane	0.04			Qual. due to ICV
	12/11/2006 1142 A21875 Extra				
		acceptable			

	%R (70-130)	Qualifier	Associated sample
Surr.			
136228	acceptable		

Internal Standard not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperature 2.0° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments: Continuing Calibration reports were not included with the extra standards, therefore only %D was evaluated.
Extra analytes are cyclohexane, methylcyclohexane, and methyl acetate.

Validator: Carrie Madrid Date: 4/19/07
Reviewer: Cherie Zakowski Date: 5/24/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	237752
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8260B / % Moist/ 9060 TOC

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RIMW-17:10-12	237752-1	RIMW-6:0-1	237752-7
RIMW-17:18-20	237752-2	RIMW-6:4-6	237752-8
RIMW-13:14-16	237752-3	RIMW-6:8-10	237752-9
RIMW-19:8-10	237752-4	RIMW-6:10-12	237752-10
RIMW-19:12-14	237752-5	RIMW-6:18-19	237752-11
RIMW-19:16-18	237752-6	Trip Blank	237752-12

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils and a water.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	No
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **Matrix Spike** - See below.
Trip Blank - Toluene was detected in the trip blank.

Precision **%RPD**

Field Duplicates
N/A

Laboratory Duplicate

		%RPD
%Moist		
136388	Diff. SDG's 237753-1	acceptable
	and RIMW-17:10-12	acceptable
136400	RIMW-19:18-10	acceptable
TOC		
136672	RIMW-17:18-20	acceptable

Accuracy

MS/MSD		**MS/MSD** (70-130)	**RPD**
136378	Diff. SDG 237914-6		
	Tetrachloroethene	0/0%	NC
	Trichloroethene	0/0%	NC
	1,1-Dichloroethane	0/0%	NC
	Chloroethane	58/66%	12%
	Vinyl Chloride	59/53%	6%
136441Aq	Spike not listed on batch information sheet. 0% R listed for all analytes.		
TOC	RIMW-6:10-12		
	TOC	155/149%	4%

No action taken based solely on MS/MSD data. Also spiked sample is from another SDG.

	%R		
LCS/ LCSD	(70-130)		
136378	acceptable		
136441Aq	acceptable		
TOC			
136672	acceptable		

		Results in ug/L	Qualifier	Associated Samples
Blanks				
136378	non-detect			
136441Aq	non-detect			
%Moist				
136388	non-detect			
136400	non-detect			
TOC				
136672	non-detect			

		Results in ug/L	Qualifier	Associated Samples
Trip Blank	Trip Blank	Toluene 0.30 ug/L	Result raised to detection limit and qualified U	RIMW-6:0-1 RIMW-6:8-10

Holding Blank	N/A

		Qualifier	Associated sample
Rinsate Blank	N/A		

		RRF	%RSD	Qualifier	Associated sample
ICV	**12/4/07**				
	136228/136378				
	Bromomethane	0.048		R	RIMW-19:8-10, RIMW-19:12-14, RIMW-19:16-18, RIMW-6:0-1, RIMW-6:4-6, RIMW--6:8-10
	Chloroethane	0.048		R	RIMW-19:8-10, RIMW-19:12-14, RIMW-19:16-18, RIMW-6:0-1, RIMW-6:4-6, RIMW-6:8-10
	12/8/07				
	136441	acceptable			

		RRF	%RSD	Qualifier	Associated sample
CCV	**12/11/2006 1224**				
	Bromomethane	0.04		R	
	Chloroethane	0.04		R	
	1/14/2007 1255				
	Bromomethane	0.04		R	
	Chloroethane	0.042		R	
	1/15/2007 1333				
	Bromomethane	0.039		R	
	Chloroethane	0.036		R	
	12/15/2007 1354				
	Bromomethane	0.045		R	
	Chloroethane	0.034		R	

No action taken for CCV standards, bromomethane and chloroethane already qualified due to ICV.

	%R	Qualifier	Associated sample
Surr.	**(70-130)**		
136378	acceptable		
136441Aq	acceptable		

Internal Standard	not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	Yes

Comments (note deviations): Cooler temperatures 2.0° C. Toluene was found in the Trip Blank.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	No

Comments (note deviations): Sample results for bromomethane and chloroethane were rejected and are not usable.

Do all data in this SDG meet the Data Quality Objectives? No

Comments: See previous comment.

Validator:	Carrie Madrid	Date:	4/23/07
Reviewer:	Cherie Zakowski	Date:	10/13/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 237914
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B/ %Moist.

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RIMW-5:0-1	237914-1	RISB-56:4-6	237914-6
RIMW-5:4-6	237914-2	RISB-56:8-10	237914-7
RIMW-5:12-14	237914-3	RISB-56:12-14	237914-8
RIMW-5:18-20	237914-4	Trip Blank	237914-9
RISB-56:0-1	237914-5		

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	NA
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **Matrix Spike** - See below.
Trip Blank - Non-detect

Precision — **%RPD**

Field Duplicates
N/A

Laboratory Duplicate — N/A
%Moist
136582 RIMW-5:0-1 acceptable
Diff. SDG 237819-7 acceptable

Accuracy

			MS/MSD	**RPD**
			(70-130)	
MS/MSD				
136518	RISB-56:4-6		acceptable	
136617Aq	Diff. SDG 238041-20	1,2-Dichloroethane	47/15	103
		Chloroethane	50/54	8

No qualifications are made based on MS/MSD alone.

	%R
LCS/ LCSD	(70-130)
136518	acceptable
136617Aq	acceptable

		Results in ug/L		Qualifier	Associated Samples
Blanks					
136518	non-detect				
136617Aq	non-detect				
%Moist					
136582	non-detect				

		Results in ug/L	Qualifier	Associated Samples
Trip Blank	Trip Blank	non-detect		

Holding Blank	N/A

		Qualifier	Associated sample
Rinsate Blank	N/A		

ICV	12/4/07	RRF	%RSD	Qualifier	Associated sample
	136228/136378				
	Bromomethane	0.048		R	RIMW-5:0-1, RIMW-5:4-6, RIMW-5:12-14, RIMW-5:18-20, RISB-56:0-1, RISB-56:4-6, RISB-56:8-10, Trip Blank
				J	RISB-56:12-14
	Chloroethane	0.048		R	RIMW-5:0-1, RIMW-5:4-6, RIMW-5:12-14, RIMW-5:18-20, RISB-56:0-1, RISB-56:4-6, Trip Blank
				J	RISB-56:8-10, RISB-56:12-14
	11/29/2006 Extra A files				
	Methyl Acetate	0.035		R	All samples

CCV	12/19/2006 1113	RRF	%RSD	Qualifier	Associated sample
	Bromomethane	0.046		R	Qual. due to ICV
	Chloroethane	0.04		R	Qual. due to ICV
	12/19/2006 1134				
	Chloroethane	0.037		R	Qual. due to ICV
	12/19/2006 2312				
	Bromomethane	0.047		R	Qual. due to ICV
	Chloroethane	0.033		R	Qual. due to ICV
	12/20/2006 1110				
	Bromomethane	0.049		R	Qual. due to ICV
	Chloroethane	0.041		R	Qual. due to ICV
	12/20/2006 1132				
	Chloroethane	0.04		R	Qual. due to ICV
	12/21/2006 1245				
	Chloroethane	0.033		R	Qual. due to ICV
	12/19/2007 1030 Extra A22127				
	Methyl Acetate		30.64%		Qual. due to ICV
	12/19/2007 1052 Extra A22128				
	Methyl Acetate		37.42%		Qual. due to ICV
	12/19/2007 2230 Extra A22161				
	Cyclohexane		33.42%		No samples were associated with this std.
	Methyl Acetate		38.70%		
	12/19/2007 1028 Extra A22179				
		acceptable			

12/20/2007 1049 Extra A22180		
Methyl Acetate	28.32%	Qual. due to ICV
12/21/2007 1202 Extra A22218		
Methyl Acetate	28.30%	Qual. due to ICV

Surr.	**%R (70-130)**	**Qualifier**	**Associated sample**
136518	acceptable		
136518Aq	acceptable		

Internal Standard not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? No

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? No

Comments: Extra analytes are cyclohexane, methylcyclohexane, and methyl acetate.
Continuing Calibration reports were not included with the extra standards, therefore only %D was evaluated.
Some results for bromomethane, chloroethane, and methyl acetate were rejected due to initial and continuing calibration results.

Validator: Carrie Madrid Date: 4/29/07
Reviewer: Cherie Zakowski Date: 10/13/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 237943
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B / % Moisture

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-63:0-1	237943-1	Trip Blank	237943-9
RISB-63:4-6	237943-2	RISB-58:0-1	237943-10
RISB-63:8-10	237943-3	RISB-58:4-6	237943-11
RISB-63:14-16	237943-4	RISB-58:10-12	237943-12
RISB-63:16-18	237943-5	RISB-58:14-16	237943-13
RISB-61:10-12	237943-6	RISB-58:18-20	237943-14
RISB-61:16-18	237943-7	RISB-59 0-1	237943-15
RISB-61:20-22	237943-8	RISB-59 4-6	237943-16

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils and a water.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **Matrix Spike** - See below.

Precision **%RPD**

Field Duplicates

N/A

Laboratory Duplicate		**%RPD**
%Moist		
136582	Diff. SDG's 237914-1	acceptable
	and 237819-7	acceptable
136583	RISB-58:18-20	acceptable
	RISB-59 4-6	acceptable

Accuracy

MS/MSD		**MS/MSD** (70-130)	**RPD**
136518	Diff. SDG 237914-6	acceptable	
136590	RISB-59 4-6	acceptable	
136617Aq	Diff. SDG 238041-20		
	1,2-Dichloroethane	47/15%	103%
	1,1-Dichloroethene	70/59%	17%
	Chloroethane	50/54%	8%

No action taken based solely on MS/MSD data. Also spiked sample is from another SDG.

LCS/ LCSD	**%R** (70-130)
136518	acceptable
136590	acceptable
136617Aq	acceptable

		Results in ug/L	Qualifier	Associated Samples
Blanks				
136518	non-detect			
136590	non-detect			
136617Aq	non-detect			
%Moist				
136582	non-detect			
136583	non-detect			

		Results in ug/L	Qualifier	Associated Samples
Trip Blank	Trip Blank	non-detect		

Holding Blank N/A

		Qualifier	Associated sample
Rinsate Blank	N/A		

ICV	12/4/07	RRF	%RSD	Qualifier	Associated sample
	136518/136617				
	Bromomethane	0.048		R	RISB-63:0-1, RISB-63:4-6, RISB-63:8-10, RISB-63:14-16, RISB-63:16-18, RISB-61:10-12, Trip Blank
	Chloroethane	0.048		R	RISB-63:0-1, RISB-63:4-6, RISB-63:8-10, RISB-63:14-16, RISB-63:16-18, RISB-61:10-12, Trip Blank
	12/8/07				
	136590	acceptable			
	11/29/2006 Extra A files				
	136518/136617				
	Methyl Acetate	0.035R		R	RISB-63:0-1, RISB-63:4-6, RISB-63:8-10, RISB-63:14-16, RISB-63:16-18, RISB-61:10-12
	11/28/2006 Extra D files				
	136590	acceptable			

CCV	12/19/2007 1113	RRF	%RSD	Qualifier
	Bromomethane	0.046		R
	Chloroethane	0.04		R
	12/19/2007 1134			
	Chloroethane	0.037		R
	12/19/2007 2312			
	Bromomethane	0.047		R
	Chloroethane	0.033		R
	12/20/2007 1110			
	Bromomethane	0.049		R
	Chloroethane	0.041		R

	RRF	%RSD
12/19/2007 1401 (ICV 12/8/07)	acceptable	
12/20/2007 1224 (ICV 12/8/07)	acceptable	

No action taken for CCV standards, bromomethane and chloroethane already qualified due to ICV.

	RRF	%RSD	Qualifier	Associated sample
12/19/2006 Extra 1030 A22127				
Methyl Acetate		30.64%		Qual due to ICV
12/19/2006 Extra 1052 A22128				
Methyl Acetate		37.42%		Qual due to ICV
12/19/2006 Extra 2230 A22161				
Cyclohexane		33.42%	UJ	RISB-63-8-10, RISB-63:14-16, RISB-63:16-18, RISB-61:10-12
Methyl Cyclohexane		38.70%	UJ	RISB-63-8-10, RISB-63:14-16, RISB-63:16-18, RISB-61:10-12
12/20/2006 Extra 1028 A22179				
	acceptable			

12/21/2006 Extra 1202 A22218			
Methyl Acetate	28.30%		Qual due to ICV
12/19/2006 Extra 1322 D8059			
Methyl Acetate	38.96%	UJ	RISB-61:16-18, RISB-61:20-22, Trip Blank, RISB-58:0-1, RISB-58:4-6, RISB-58:10-12, RISB-58:14-16, RISB-58:18-20, RISB-59:0-1, RISB-59:4-6
12/20/2006 Extra 1144 D8116			
Methyl Acetate	49.84%		Qual due to ICV

Surr.	**%R (70-130)**	**Qualifier**	**Associated sample**
136518	acceptable		
136590	acceptable		
136617Aq	acceptable		

Internal Standard not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperature 1.0° C.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? No

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? No

Comments:
Samples RIMW-18-44-56 and RIMW-18-56-68 are listed on the chain of custody, however the samples were not in the cooler.
Continuing Calibration reports were not included with the extra standards, therefore only %D was evaluated.
Extra analytes are cyclohexane, methylcyclohexane, and methyl acetate.
Some results for bromomethane, chloroethane, and methyl acetate were rejected due to initial and continuing calibration results.

Validator: Carrie Madrid Date: 4/23/07
Reviewer: Cherie Zakowski Date: 10/14/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	238041
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8260B/ % Moist/ TOC

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RISB-59:10-12	238041-1	RIMW-58:10-12	238041-13
RISB-59:12-14	238041-2	RISB-62:0-1	238041-14
RISB-559:12-14	238041-3	RISB-62:4-6	238041-15
RIMW-8:0-1	238041-4	RISB-62:8-10	238041-16
RIMW-8:2-4	238041-5	RISB-562:12-14	238041-17
RIMW-8:4-6	238041-6	RISB-62:12-14	238041-18
RIMW-8:6-8	238041-7	RIMW-19:63-75	238041-19
RIMW-8:10-12	238041-8	RIMW-19:76-88	238041-20
RIMW-8:12-14	238041-9	RIMW-18	238041-21
RIMW-8:8-10	238041-12	RIMW-8:14-16	238041-10
		RIMW-8:25-27	238041-11

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils and waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates -** Samples RISB-59:12-14/RISB-559-:12-14, RIMW-8:10-12/RIMW-58:10-12, RISB-62:12-14/RISB-562:12-14 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **Matrix Spike** - See below.
Trip Blank - Non-detect

Precision	**%RPD**
Field Duplicates	
RISB-59:12-14/RISB-559:12-14	
1,2-Dichloroethane	162.62%
1,1,1-Trichloroethane	103.49%
RIMW-8:10-12/RIMW-58:10-12	
Toluene	53.97%
1,1-Dichloroethane	50.50%
SB-62:12-14/RISB-562:12-14	
Chlorobenzene	98.31%
Chloroform	96.44%
1,3-Dichlorobenzene	109.84%
1,4-Dichlorobenzene	98.04%
1,2-Dichloropropane	85.70%
Tetrachlroethene	161.60%
Toluene	62.77%
1,2,4-Trichlorobenzene	66.99%
1,1,2-Trichloroethane	54.55%
Trichloroethene	142.73%

No action taken on field duplicate data.

Laboratory Duplicate		**%RPD**
TOC		
136672	Diff. SDG 237752-2	acceptable
%Moist		
136722	RISB-62:0-1	acceptable
136723	RIMW-8:4-6	acceptable

Accuracy		MS/MSD	RPD
		(70-130)	
MS/MSD			
136617	**RIMW-19:76-88**		
	1,2-Dichloroethane	47/15%	103%
	1,1-Dichloroethene	70/59%	17%
	Chloroethane	50/54%	8%
136620	**RISB-62:12-14**		
	1,2-Dichlorobenzene	0/0%	NC
	1,3-Dichlorobenzene	38/34%	11%
	Chlorobenzene	13/9%	36%
	1,1,2-Trichloroethane	0/0%	NC
	Trichloroethene	60/56%	7%
	1,2-Dichloroethane	0/0%	NC
	Chloroform	61/59%	3%
	Chloroethane	71/60%	17%
136623	**RISB-59:10-12**		
	Tetrachloroethene	69/68%	1%
	1,1,2-Trichloroethane	55/57%	4%
	1,1,1-Trichloroethane	36/42%	15%
	1,1-Dichloroethene	6/14%	80%
	Trichlorofluoro methane	62/66%	6%
TOC			
136672	Diff. SDG 237752-10	155/149%	4%

No action taken based solely on MS/MSD data.

LCS/ LCSD	%R (70-130)
136623	acceptable
136620	acceptable
136617Aq	acceptable
136672 TOC	acceptable

Blanks		Results in ug/L	Qualifier	Associated Samples
136620	non-detect			
136623	non-detect			
136617Aq	non-detect			
TOC				
136672	non-detect			
%Moist				
136722	non-detect			
136723	non-detect			

Trip Blank		Results in ug/L	Qualifier	Associated Samples
	N/A			

Holding Blank N/A

Rinsate Blank		Qualifier	Associated sample
	N/A		

ICV		RRF	%RSD	Qualifier	Associated sample
	12/4/07 136228/136378				
	Bromomethane	0.048		J/R	All samples
	Chloroethane	0.048		J/R	
	11/29/2006 Extra A files				
	Methyl Acetate	0.035		R	All samples

CCV		RRF	%RSD	Qualifier	Associated sample
	12/20/2006 1110				
	Bromomethane	0.049		R	Qual. due to ICV
	Chloroethane	0.041		R	Qual. due to ICV
	12/20/2006 1132				
	Chloroethane	0.04		R	Qual. due to ICV

Surr.	%R (70-130)	Qualifier	Associated sample
136620	acceptable		
136623	acceptable		
136617Aq	acceptable		

Internal Standard not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 4.0° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments: A trip blank was listed on the Chain of Custody, however a trip blank was not present in the cooler.

Validator: Carrie Madrid Date: 4/21/07
Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	238119
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8260B/ %Moisture

Samples in SDG:	Client ID	Lab ID
	RIMW-1:10-12	238119-1
	RIMW-1:12-14	238119-2
	RIMW-51:12-14	238119-3
	RIMW-7:0-1	238119-4
	RIMW-7:4-6	238119-5
	RIMW-7:8-10	238119-6
	RIMW-18:44-56	238119-7

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations): **Field Duplicate -** Samples RIMW-1:12-14/RIMW-51:12-14 are field duplicates.

Laboratory Duplicate - A laboratory duplicate was performed for % moisture on samples from a different SDG (238041-14 and 238066-1).

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Sample RIMW-7:8-10(136688) was spiked.

Precision		**%RPD**
Field Duplicates		
	RIMW-1:12-14/RIMW-51:12-14	
	Benzene	110.25%
	1,2-Dichloroethane	82.79%
	cis-1,2-Dichloroethene	140.11%
	Tetrachloroethene	77.64%
	Trichloroethene	150.67%
		No action taken on field duplicate data.
Laboratory Duplicate - %moisture		Acceptable

Accuracy		**MS/MSD** (70-130)	**RPD**
MS/MSD			
136688	RIMW-7:8-10	acceptable	
136732	RIMW-18:44-56		
	Tetrachloroethene	35/33%	6%
	Toluene	16/22%	32%
		No action taken based solely on MS/MSD data.	

	%R (70-130)
LCS/ LCSD	
136688	acceptable
136732	acceptable

		Results in ug/L	Qualifier	Associated Samples
Blanks				
136688		non-detect		
136732		non-detect		
136722 % Moist.		non-detect		

		Results in ug/L	Qualifier	Associated Samples
Trip Blank	N/A			

Holding Blank	N/A

		Qualifier	Associated sample
Rinsate Blank	N/A		

ICV	12/7/06	RRF	%RSD	Qualifier	Associated sample
	136688				
	Chloroethane	0.04		R	All samples
	11/29/2006 Extra A files				
	Methyl Acetate	0.035		R	All Samples

CCV	12/21/2006 1223	RRF	%RSD	Qualifier	Associated sample
	136688				
	Chloroethane	0.041		R	Qual. Due to ICV
	12/22/2006 1156				
	136732				
	Bromomethane	0.049		R	RIMW-18:44-56
	Chloroethane	0.042		R	Qual. Due to ICV
	12/21/2006 Extra 1141 A22217				
		acceptable			
	12/22/2006 Extra 1114 A22253				
		acceptable			

Surr.	%R (70-130)	Qualifier	Associated sample
136228	acceptable		

Internal Standard	not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperature 2.0° C.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? No

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? No

Comments: RIMW-18:44-56 was not listed on the Chain of Custody as a sample. The laboratory noted it as a previously missing sample.
The trip blank was not present in the cooler.
ICV and CCV results required the rejection of some results for cloroethane, methyl acetate, and bromomethane.
Extra analytes are cyclohexane, methylcyclohexane, and methyl acetate.

Validator: Carrie Madrid Date: 4/19/07
Reviewer: Cherie Zakowski Date: 10/14/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	238907
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	TCLP 6010B

Samples in SDG:

Client ID	Lab ID
R-84607	238907-1
R-84610	238907-2

Full Validation Sample: Level III data evaluation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%, 35%for soils)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%, 35% for soils)	Yes

Comments (note deviations): **Sample Duplicates -** See below.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Post Digestion Spike criteria met (if applicable)?	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - See below.
Hg - RPD 23 (limit 0-14) no action required

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Sample cooler was received at 4.0 ° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision	**%RPD**
Field Duplicate	

N/A

Laboratory Duplicate		%RPD	Qualifier	Associated Samples
6010B				
137157	R-84607	acceptable		
Hg				
137277	R-84610	acceptable		

Accuracy

Serial Dilution	%RPD
	N/A

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
6010B	(76-124)					
137157	R-84607	acceptable				
Hg						
137277	R-84610	acceptable				

LCS/ LSD(90-110)

		%R
6010B	137157	acceptable

Blanks

	Analyte	Results	Qualifier	Associated Samples
6010B				
137157	non-detect			
TC1951	non-detect			
ZH1952	non-detect			

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator:	Carrie Madrid	Date:	4/20/07
Reviewer:	Cherie Zakowski	Date:	4/29/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	238907
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	TCLP 8270C

	Client ID	Lab ID
Samples in SDG:	R-84607	238907-1
	R-84610	238907-2

Full Validation Sample: Level III data evaluation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	Yes
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Matrix spike performed on sample R-84607.

Precision **%RPD**

Field Duplicates

N/A

Laboratory Duplicate **%RPD**

N/A

Accuracy

MS/MSD		**MS/MSD RPD**
137313	R-84607	acceptable

LCS/LCSD	**%R**
137313	acceptable

Blanks	**Analyte**	**Qualifier**	**Associated Sample/ Qualification**
137313	non-detect		

		RRF	%RSD	Qualifier	Associated sample
Rinsate Blank	**N/A**				
ICV	**12/26/06**	**RRF**	**%RSI**	**Qualifier**	**Associated sample**
	8270 TCLP	acceptable			
CCV	**1/17/07**	**RRF**	**%D**	**Qualifier**	**Associated sample**
	8270 TCLP	acceptable			
Surr.			**%R**	**Qualifier**	**Associated sample**
137313			accpetable		
Internal Standard	not included				

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No
Comments (note deviations): Cooler temperatures 4.0° C.	

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes
Comments (note deviations):	

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes
Comments (note deviations):	

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/21/07

Reviewer: Cherie Zakowski Date: 4/29/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	238907
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	TCLP 8260B

	Client ID	Lab ID
Samples in SDG:	R-84607	238907-1
	R-84610	238907-2

Full Validation Sample: Level III data evaluation performed on all samples. No raw data was present. Samples are soils.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	Yes
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **Matrix Spike** - See below.

Precision — **%RPD**

Field Duplicates
N/A

Laboratory Duplicate — **%RPD**
N/A

Accuracy — **MS/MSD RPD**
(70-130)

MS/MSD
137344 R-84607 acceptable

%R
(70-130)

LCS/ LCSD
137344 acceptable

	Results in ug/L	**Qualifier**	**Associated Samples**
Blanks 137313	non-detect		

	Results in ug/L	**Qualifier**	**Associated Samples**
Trip Blank N/A			

Holding Blank N/A

	Qualifier	**Associated sample**
Rinsate Blank N/A		

ICV		RRF	%RSD	Qualifier
	1/12/07	acceptable		

CCV		RRF	%RSD	Qualifier
CCV	**1/18/2007 1059**	acceptable		

Surr.	%R (70-130)	Qualifier	Associated sample
137313	acceptable		

Internal Standard not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met? Yes

Were holding times met? Yes

Were preservation criteria met? (4°C ± 2°C) Yes

Were Chain-of-Custody records complete and provided in data package? Yes

Were contaminants present in blanks? No

Comments (note deviations): Cooler temperatures 4.0° C.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/21/07

Reviewer: Cherie Zakowski Date: 4/29/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239274
Laboratory: Analytical Services, Inc.
Analysis/Methods: 6010B/7471A/%Moist

Samples in SDG:

Client ID	Lab ID
RIMW-11	239274-1
RIMW-18	239274-3
RIMW-12	239274-4
RIMW-10	239274-8
RIMW-9	239274-10

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:

	Yes No N/A
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations): **Sample Duplicates -** RIMW-11(6010B), RIMW-18 (thallium), and RIMW-9 (Hg) were analyzed as sample duplicates.

Accuracy:

	Yes No N/A
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	No
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Serial Dilution -** 6010B on sample RIMW-11, on sample RIMW-9 for thallium, and thallium and Hg. However no data was present for validation.
Matrix Spike - 6010B spike performed on sample RIMW-11, thallium on sample RIMW-18, and sample RIMW-10 for Hg.

Representativeness:

	Yes No N/A
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	No
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	Yes

Comments (note deviations): Sample cooler was received at 1.0 ° C, however no action taken based on temperature.

Comparibility:

	Yes No N/A
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):

	Yes No N/A
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision

Field Duplicate		%RPD
		N/A

Laboratory Duplicate		%RPD	Qualifier	Associated Samples
6010B	RIMW-11	acceptable		
137461				
Thallium	RIMW-18	acceptable		
137456				
Hg	RIMW-9	acceptable		
137458				

Accuracy

Serial Dilution	%RPD
	N/A

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
6010B	(76-124)					
RIMW-11	Calcium	79/33%	1	16%	No action - sample result greater than 4x the spike concentration	
137461	Magnesium	90/66%	1	58%	No action - sample result greater than 4x the spike concentration	
	Sodium	93/64%	1	46%	No action - sample result greater than 4x the spike concentration	
RIMW-18	Thallium(54-136)	Accep.		Accep.		
137456						
RIMW-10	Hg(85-115)	Accep.		Accep.		
137458						

LCS/ LSD(90-110)

		%R
137461	6010B	acceptable
137456	Thallium	acceptable
137458	Hg	acceptable

Blanks

6010B	Analyte	Results	Qualifier	Associated Samples
137461	Nickel	0.0040mg/L	0.04U	RIMW-11, RIMW-18, RIMW-10
	Zinc	0.0037	0.06U	RIMW-11, RIMW-18, RIMW-12, RIMW-9
137456	Thallium	non-detect		
137458	Hg	non-detect		

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/17/07

Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	239274
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8270C

Samples in SDG:

Client ID	Lab ID
RIMW-11	239274-1
RIMW-18	239274-3
RIMW-12	239274-4
RIMW-10	239274-8
RIMW-9	239274-10

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations):
MS/MSD - performed on a sample from another SDG 235847-6..
CCV - 8270 CCV standard analyzed at 1356 Di-n-octylphthalate out.

Precision — **%RPD**

Field Duplicates

N/A

Laboratory Duplicate — **%RPD**

N/A

Accuracy

MS/MSD	**MS/MSD RPD**
137514	MS/MSD from another SDG 235847-6. acceptable

LCS/LCSD	**%R**
137514	acceptable

Blanks	**Analyte**	**Qualifier**	**Associated Sample/ Qualification**
137514	non-detect		

		RRF	%RSI	Qualifier	Associated sample
Rinsate Blank	**N/A**				

		RRF	%RSI	Qualifier	Associated sample
ICV	**12/14/06**				
	TCL compounds	acceptable			
	12/15/06				
	Benzaldehyde	acceptable			
	1/22/06				
	8270C				
	Pentachlorophenol		35.61%	UJ	All samples

		RRF	%D		Associated sample
CCV	**1/26/07**				
	8270C 1302				
	2,4-Dinitrophenol		32.80%	UJ	All samples
	Pentachlorophenol		40.80%	UJ	All samples
	Benzaldehyde 1343	acceptable			
	TCL cpds. 1405	acceptable			

		%R	Qualifier	Associated sample
Surr.				
137514		acceptable		

Internal Standard	not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met? Yes

Were holding times met? Yes

Were preservation criteria met? (4°C ± 2°C) Yes

Were Chain-of-Custody records complete and provided in data package? Yes

Were contaminants present in blanks? No

Comments (note deviations): Cooler temperatures 1.0° C, however no action taken based on temperature.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/17/07

Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239274
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RIMW-11	239274-1	RIMW-10	239274-8
RIMW-102	239274-2	MW-106	239274-9
RIMW-18	239274-3	RIMW-9	239274-10
RIMW-12	239274-4	MW-101	239274-11
MW-108	239274-5	RIMW-59	239274-12
W-2	239274-6	MW-100	239274-13
MW-107	239401-7	MW-105	239274-14
		TRIP BLANK	239274-15

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates** - Samples RIMW-9/RIMW-59 were identified as field duplicates

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	No
Trip Blanks/Rinsate Blanks	No
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	N/A
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	N/A
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Batch 137517 sample RIMW-11; batch 137531 sample MW-106 spiked.

Precision | **%RPD**

Field Duplicates
RIMW-9/RIMW-59

1,1-Dichloroethene	24.40%
cis-1,2-Dichloroethene	35.30%

No action taken on field duplicate data.

Laboratory Duplicate
N/A

Accuracy

MS/MSD		**MS/MSD**	**RPD**
RIMW-11		(70-130)	
137517			
	Tetrachloroethene	53/25%	72%
	1,1-Dichloroethane	65/32%	68%
	Chloroethane	0/0%	NC

No action taken based solely on MS/MSD data.

MW-106
137531 Acceptable

	%R
LCS/ **LCSD**	(70-130)
137517	acceptable
137531	acceptable

		Results in ug/L	Qualifier	Associated Samples
Blanks				
137517	none	non-detect		
137531	Chlorobenzene	0.59ug/L	10U	MW-106, RIMW-9, MW-101, RIMW-59, MW-100, MW-105, TRIP BLANK
	1,2-Dichlorobenzene	0.29	10U	RIMW-9
	Toluene	0.21	10U	MW-106, RIMW-9, MW-101, RIMW-59, MW-100, MW-105, TRIP BLANK
Trip Blank	**Trip Blank**			
	Acetone	1.95ug/L	10U	MW-106, MW-101, RIMW-59, MW-100, MW-105,
	Methylene Chloride	1.05 ug/L	10U	RIMW-11, RIMW-18,RIMW-10
	Chlorobenzene	0.53	None qual. ND by method blank	
	Toluene	0.19	None qual. ND by method blank	

Holding Blank	**N/A**			

			Qualifier	Associated sample
Rinsate Blank	**N/A**			

ICV		RRF	%RSD	Qualifier	Associated sample
	12/7/06				
	137517				
	Chloroethane	0.04		J	RIMW-11, RIMW-10
				R	MW-102, RIMW-18, RIMW-12, MW-108, W-2, MW-107
	1/12/07				
	137531	acceptable			
	11/29/2006 Extra inst A				
	Methyl Acetate	0.035		R	RIMW-11, MW-102, RIMW-18, RIMW-12, MW-108, W-2, MW-107, RIMW-10
	1/11/2007 Extra inst C				
		acceptable			

CCV		RRF	%RSD	Qualifier	Associated sample
	1/25/2007 1241				
	Chloroethane	0.035		R	Qual. due to ICV, no further action
	1/26/2007 1444				
	Chloroethane	0.039		R	Qual. due to ICV, no further action
	1/25/2007 1245				
	Bromomethane		37.80%	UJ	MW-106, RIMW-9, MW-101, RIMW-59, MW-100, MW-105, Trip Blank
	1/29/2007 Extra 1159 A23051				
	Cyclohexane		28.58%	UJ	RIMW-11, MW-102, RIMW-18, RIMW-12, MW-108, W-2, MW-107, RIMW-10
	Methyl Cyclohexane		35.94%	UJ	RIMW-11, MW-102, RIMW-18, RIMW-12, MW-108, W-2, MW-107, RIMW-10
	1/25/2007 Extra 1206 C32966				
		acceptable			

Surr.	%R (70-130)	Qualifier	Associated sample
	acceptable		

Internal Standard	not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met? Yes

Were holding times met? Yes

Were preservation criteria met? (4°C ± 2°C) Yes

Were Chain-of-Custody records complete and provided in data package? Yes

Were contaminants present in blanks? Yes

Comments (note deviations): Cooler temperatures 1.0° C, however no action taken based on temperature.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments: Continuing Calibration reports were not included with the extra standards, therefore only %D was evaluated.
Extra analytes are cyclohexane, methylcyclohexane, and methyl acetate.

Validator: Carrie Madrid Date: 4/17/07
Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239341
Laboratory: Analytical Services, Inc.
Analysis/Methods: 6010B/ 415.1/ %Moist.

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RIP2-3	239341-12	RISB-65-510	239341-32
RISB-64-05	239341-26	RISB-65-1015	239341-33
RISB-64-510	239341-27	RISB-65-1520	239341-34
RISB-64-1015	239341-28	RISB-66-05	239341-35
RITW-64	239341-29	RISB-66-59	239341-36
RITW-65	239341-30	RISB-67-05	239341-37
RISB-65-05	239341-31	RISB-67-510	239341-38
MW-115A	239341-1		

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils and a water.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%, 35%for soils)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%, 35% for soils)	Yes

Comments (note deviations): **Sample Duplicates -** See below.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	No
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - See below.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	Yes

Comments (note deviations): Sample cooler was received at 2.0 ° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision

Field Duplicate	%RPD
N/A	

Laboratory Duplicate	%RPD	Qualifier	Associated Samples
6010B/137466	acceptable		
Tl /137468	acceptable		
Hg/137469	acceptable		
415.1/137602	acceptable		

Accuracy

Serial Dilution	%RPD
	N/A

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
6010B	(76-124)					
137466	Diff. SDG 239396-14					
	Calcium	29/189%	4%	14%	No action - sample result greater than 4x the spike concentration	
	Magnesium	54/141%	4%	44%	No action - sample result greater than 4x the spike concentration	
	Sodium	47/128%	4%	50%	No action - sample result greater than 4x the spike concentration	
137468 Tl	RIP2-3	acceptable				
137469 Hg	Diff. SDG 239391-1	acceptable				
415.1 137602	Diff. SDG 239396-1	acceptable				

LCS/ LSD(90-110)

	%R
6010B/137466	acceptable
Tl /137468	acceptable
Hg/137469	acceptable
415.1/137602	acceptable

Blanks

	Analyte	Results	Qualifier	Associated Samples
6010B				
137466	Aluminum	0.012 mg/L	No action - sample result greater than blank action level	
	Nickel	0.0040mg/L	.02U	RIP2-3
7841 Tl				
137468	Thallium	0.0007mg/L	.025U	RIP2-3
%Moist.				
137586	non-detect			
415.1				
137602	non-detect			

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments: Method 415.1 is listed as Dissolved Organic Carbon. This should be Total Organic Carbon

Validator: Carrie Madrid Date: 4/22/07

Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239341
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8270C

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RIP2-3	239341-12	RISB-65-05	239341-31
RISB-64-05	239341-26	RISB-65-510	239341-32
RISB-64-510	239341-27	RISB-65-1015	239341-33
RISB-64-1015	239341-28		

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils and a water.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations):

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	Yes
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Matrix spike analyzed on a sample from another SDG.
Calibrations - See Below.

Precision — **%RPD**

Field Duplicates
N/A

Laboratory Duplicate — **%RPD**
N/A

Accuracy

MS/MSD		**MS/MSD**	**RPD**
137579Aq	Diff. SDG 239334-16		
	Pentachlorophenol	147/154%	4%
137592	Diff. SDG 239340-1		
	2,4-Dinitrotoluene (28-95)	265/275%	4%
	4-Chloro-3-methyl-phenol (15-123)	125/125%	0%
	N-Nitrosodipropyl-amine (14-104)(53)	19/115%	143%

No action taken based solely on MS/MSD data.

LCS/LCSD	**%R**
137579Aq	acceptable
137592	acceptable

		Analyte	Qualifier	Associated Sample/ Qualification
Blanks				
137579Aq		non-detect		
137592		non-detect		

			Qualifier	Associated sample
Rinsate Blank	**N/A**			

		RRF	%RSI	Qualifier	Associated sample
ICV	**1/30/07**				
	8270C	acceptable			
	1/31/07				
	TCL/Benzaldehyde	acceptable			

		RRF	%D	Qualifier	Associated sample
CCV	**1/30/07**				
	8270C/Benzaldehyde/ TCL compounds	acceptable			

		%R	Qualifier	Associated sample
Surr.				
137579Aq		accpetable		
137592		accpetable		

Internal Standard not included

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 2.0° C.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/22/02
Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239341
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
MW-115A	239341-1	P-2	239341-21
MW-115B	239341-2	RIP2-53	239341-22
OB-900	239341-3	MW-118	239341-23
OB-23	239341-4	MW-111	239341-24
OB-901	239341-5	Trip Blank #1	239341-25
OB-902	239341-6	RISB-64-05	239341-26
MW-104	239341-7	RISB-64-510	239341-27
MW-116	239341-8	RISB-64-1015	239341-28
MW-119	239341-9	RITW-64	239341-29
MW-113A	239341-10	RITW-65	239341-30
MW-113B	239341-11	RISB-65-05	239341-31
RIP2-3	239341-12	RISB-65-510	239341-32
MW-114	239341-13	RISB-65-1015	239341-33
MW-112	239341-14	RISB-65-1520	239341-34
OB-22	239341-15	RISB-66-05	239341-35
OB-21	239341-16	RISB-66-59	239341-36
PW-2A	239341-17	RISB-67-05	239341-37
OB-13	239341-18	RISB-67-510	239341-38
OB-12	239341-19	Trip Blank #2	239341-39
OB-11	239341-20		

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are soils and waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates -** RIP2-3/RIP2-53 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	No
Trip Blanks/Rinsate Blanks	Yes
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations): **Matrix Spike** - See below.

Precision **%RPD**

Field Duplicates

RIP2-3/RIP2-53	
1,2-Dichlorobenzene	36.78%
trans-1,2-Dichloro-ethene	20.34%
1,1,2-Trichloro-ethane	54.17%

No action on field duplicate data.

Laboratory Duplicate **%RPD**

N/A

Accuracy

MS/MSD		**MS/MSD** (70-130)	**RPD**
137581	Diff. Sample 239341-38	acceptable	
137592	Diff. SDG 239340-1	acceptable	
137594Aq	MW-115A	acceptable	
137673Aq	MW-114		
	Chloromethane	60/59%	2%
	Chloroethane	72/69%	4%
137739	OB-13		
	Chloroethane	440/435%	1%

No action taken based solely on MS/MSD data.

LCS/ LCSD	%R (70-130)
137581	acceptable
137592	acceptable
137594Aq	acceptable
137673Aq	acceptable
137739	acceptable

Blanks		Results in ug/L	Qualifier	Associated Samples
137581	non-detect			
137592	non-detect			
137594Aq	Toluene	0.11 ug/L J2	10U	MW-115A, MW-115B, OB-900, OB-23, OB-901, OB-902, MW-104, MW-116, MW-119, MW-113A, MW-113B
137673Aq	non-detect			
137739	non-detect			

Trip Blank		Results in ug/L	Qualifier	Associated Samples
	Trip Blank	non-detect		

Holding Blank	N/A

		Qualifier	Associated sample
Rinsate Blank	N/A		

ICV batch		RRF	%RSD	Qualifier	Associated sample
	12/7/2006 A files				
137581	Chloroethane	0.04		R	RISB-64-05, RISB-64-510, RISB-64-1015, RISB-65-05, RISB-65-510, RISB-65-1015, RISB-66-59, RISB-67-05, RISB-67-510
				J	RISB-65-1520, RISB-66-05
	1/12/2007 B files				
137594		acceptable			
	1/12/2007 C files				
137594		acceptable			
	11/29/2006 A files Extra				
137581	Methyl Acetate	0.035		R	RISB-64-05, RISB-64-510, RISB-64-1015, RISB-65-05, RISB-65-510, RISB-65-1015, RISB-65-1520, RISB-66-05, RISB-66-59, RISB-67-05, RISB-67-510
137673/ 137739					RIP2-3, MW-114, MW-112, OB-22, OB-21, PW-2A, OB-12, OB-11, P-2, RIP2-53, MW-118, OB-13, MW-111, Trip Blank 1, RITW-64, RITW-65, Trip Blank 2
	1/4/2007 B files Extra				
137594		acceptable			

CCV		RRF	%RSD	Qualifier	Associated sample
137581	**1/26/2007 1423 A23089**				
	Chloroethane	0.034			Already qual. due to ICV
	1/26/2007 1444 A23090				
	Chloroethane	0.039			Already qual. due to ICV
	1/29/2007 1016 A23149				
	Dichlorodifluoro-methane		35.20%		No action these analytes not reported from this run.
	Chloromethane		26.50%		
	Chloroethane	0.031	35.4%		
	Bromomethane	0.047			
	1/29/2007 1037 A23150				Not used
	Dichlorodifluoro-methane		36.50%		
	Chloroethane	0.033			
137673/ 137739	**1/30/2007 0935 A23191**				
	Bromomethane	0.049		R	RIP2-3, MW-114, MW-112, RIP2-53, Trip Blank 1, RITW-64, RIT-65, Trip Blank 2
	Chloroethane	0.033		J	RIP2-3, RIP2-53, RITW-65
				R	MW-114, MW-112, Trip Blank 1, RITW-64, Trip Blank 2
	1/30/2007 2217 A23227				
	Bromomethane	0.049		R	OB-22, OB-21, PW-2A,
	Chloroethane	0.033	25.8%	R	OB-22, OB-21, PW-2A,

	1/31/2007 1401 A23248				
	Bromomethane	0.049		R	P-2, OB-11, OB-12, RIP2-3, MW-118, MW-111
	Chloroethane	0.031	28.9%	J	P-2, RIP2-3,
				R	OB-11, OB-12, MW-118, MW-111
	1/31/2007 1401 A23248				
	Chloroethane	0.028			
	2/1/2007 1117 A23289				Not used
	Bromomethane	0.045			
	Chloroethane	0.031	29.5%		
	2/1/2007 1138 A23290				Not used
	Bromomethane	0.047			
	Chloroethane	0.028			
	2/2/2007 1111 A23320				Not used
	Bromomethane	0.045			
	Chloroethane	0.030	32.7%		
137594	**1/29/2007 1259 B31004**				
	Acetone		68.50%	J	OB-901, OB-900
				UJ	MW-115A, MW-115B, OB-902, MW-104, MW-119, MW-113A, MW-113B, OB-23, MW-116
	2-Butanone		41.10%	J	OB-901
				UJ	MW-115A, MW-115B, OB-902, MW-104, MW-119, MW-113A, MW-113B, OB-900, OB-23, MW-116
	1/30/2007 1017 B31049				
	Bromomethane		31.00%		Not used
	Acetone		88.50%		
	2-Butanone		60.70%		
	2-Hexanone		41.90%		
	1/30/2007 0958 C33093				
	Bromomethane		33.30%		Not used
137581	**1/26/2007 1340 A23087**				
	Methyl Acetate		29.18%		Not used
	1/26/2007 1401 A23088				
	Methyl Acetate		28.02%		Not used
	1/29/2007 0933 A23147				
	Methyl Acetate		32.46%		Not used
	1/29/2007 0955 A23148				
	Methyl Acetate		32.00%		Not used
137673/	**1/30/2007 0853 A23189**				
137739	Methyl Acetate		37.04%		Not used
	1/30/2007 2135 A23225				
	Methyl Cyclohexane		27.16%	J	OB-22, OB-21, PW-2A
	1/31/2007 1236 A23246				
	Methyl Acetate		27.22%		Not used
	2/1/2007 1034 A23287				
	Methyl Acetate		26.08%		Not used
137594	**1/29/2007 1137 B31000**				
		acceptable			

Surr.		**%R (70-130)**	**Qualifier**	**Associated sample**
137581		acceptable		
137592		acceptable		
137594Aq	4-Bromofluoro benzene (70-130)	150%	J	Acetone only, all other analytes from another run.
137673Aq	Toluene D-8	165%	J	P-2 - positive results qualified J
	4-Bromofluorobenzene	239%		
137739		acceptable		

Internal Standard not included

Representativeness:

	Yes No N/A
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 2.0° C.

Comparibility:

	Yes No N/A
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):

	Yes No N/A
Are all data in this SDG useable?	Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments: Continuing Calibration reports were not included with the extra standards, therefore only %D was evaluated.
Extra analytes are cyclohexane, methylcyclohexane, and methyl acetate.

Validator: Carrie Madrid Date: 4/21/07
Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	239396
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	6010B/7470/%Moist

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RIMW-6	239396-13	RIMW-15	239396-16
RIMW-7	239396-14	RIMW-515	239396-17
RIMW-13	239396-15	RIMW-16	239396-18

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations): **Field Duplicates -** Samples RIMW-15/RIMW-515 are field duplicates.
Sample Duplicates - See below.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Post Digestion Spike criteria met (if applicable)?	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	No
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - See below.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	No
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	Yes

Comments (note deviations): Sample cooler was received at 1.0 ° C, however no action taken based on temperature.

Comparibility:	**Yes No N/A**
Does data compare with similar analysis and data sets?	Yes

Comments (note deviations):

Completeness (90%):	**Yes No N/A**
Are all data in this SDG useable?	Yes

Comments (note deviations):

Precision	**%RPD**
Field Duplicate	
RIMW-15/RIMW-515	
Beryllium	28.57%

No action taken on field duplicate data.

Laboratory Duplicate		%RPD	Qualifier	Associated Samples
6010B				
137466	RIMW-13	acceptable		
Hg				
128636	diff. SDG 239391-2	acceptable		
Tl				
137468	RIMW-6	acceptable		

Accuracy

Serial Dilution	%RPD
	N/A

MS/MSD	Analyte	MS/MSD %R	RPD	Post %R	Qualifier	Associated Samples
6010B	(76-124)					
137466	RIMW-7					
	Calcium	29/189%	4	14%	No Action - sample result greater than 4x the spike concentration	
	Magnesium	54/141%	4	44%	No Action - sample result greater than 4x the spike concentration	
	Sodium	47/128%	4	50%	No Action - sample result greater than 4x the spike concentration	
	Thallium	77/71%	8	81%	J	RIMW-6, RIMW-7, RIMW-515
					UJ	RIMW-13, RIMW-15, RIMW-16
Hg						
137469	diff. SDG 239391-1	acceptable				
Tl						
137468	diff. SDG 239341-12	acceptable				

LCS/ LSD(90-110)

		%R
137466	6010B	acceptable
137468	Thallium	acceptable
137469	Hg	acceptable

Blanks

	Analyte	Results	Qualifier	Associated Samples
6010B				
137466	Aluminum	0.0120mg/L	0.2U	All samples
	Nickel	0.004	0.2U	RIMW-6
Tl	Thallium	0.007	0.2U	RIMW-6, RIMW-7, RIMW-515
137468				
Hg				
137469	non-detect			

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/20/07

Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239396
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8270C

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RIMW-6	239396-13	RIMW-15	239396-16
RIMW-7	239396-14	RIMW-515	239396-17
RIMW-13	239396-15	RIMW-16	239396-18

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates -** Samples RIMW-15/RIMW-515 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	Yes
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Matrix spike performed on a sample from a different SDG 236472-1.
CCV - 8270 CCV standard analyzed at 0825 Atrazine out.

Precision		**%RPD**
Field Duplicates		
	RIMW-15/RIMW-515	acceptable

Laboratory Duplicate	**%RPD**
	N/A

Accuracy

MS/MSD		**MS/MSD RPD**
137624	Diff. SDG 236472-1	acceptable

	%R
LCS/LCSD	
137624	acceptable

	Analyte	**Qualifier**	**Associated Sample/ Qualification**
Blanks			
137624	non-detect		

				Qualifier	Associated sample
Rinsate Blank	**N/A**				
		RRF	**%RSI**	**Qualifier**	**Associated sample**
ICV	**1/30/07**				
	8270/Benzaldehyde/ TCL ICV's	acceptable			
		RRF	**%D**	**Qualifier**	**Associated sample**
CCV	**1/30/07**				
	8270/Benzaldehyde/ TCL CCV's	acceptable			
Surr.		**%R**		**Qualifier**	**Associated sample**
	RIMW-13				
129580	Nitrobenzene(24-119)	156%		J	RIMW-13 Bis(2-ethylhexyl)phthalate
	2-Fluorobiphenyl (39-130)	178%		J	RIMW-13 Bis(2-ethylhexyl)phthalate
Internal Standard	not included				

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met? Yes

Were holding times met? Yes

Were preservation criteria met? (4°C ± 2°C) No

Were Chain-of-Custody records complete and provided in data package? Yes

Were contaminants present in blanks? No

Comments (note deviations): Cooler temperatures 1.0° C, however no action based on temperature.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/20/07

Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239396
Laboratory: Analytical Services, Inc.
Analysis/Methods: 415.1

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
W-1	239396-7	RIMW-15	239396-16
RIMW-6	239396-13	RIPZ-1	239396-19

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations): **Laboratory Duplicate -** Dup. analysis performed on a sample from a different SDG 239401-3 all %RPDwithin limits.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Post Digestion Spike criteria met (if applicable)?	N/A
Laboratory Control Sample criteria met?	N/A
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Matrix Spike** - performed on sample RIMW-15.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	No
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	Yes

Comments (note deviations): Sample cooler was received at 1.0 ° C, however no action taken based on temperature.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Precision

Field Duplicate

N/A

Laboratory Duplicate		%RPD	Qualifier
415.1			
137602	RIMW-15	acceptable	
	diff. SDG 239401-3	acceptable	

Accuracy

Serial Dilution	**%RPD**
N/A	

MS/MSD	**Analyte**	**MS/MSD %F**	**RPD**	**Post %R**	**Qualifier**	**Associated Samples**
415.1	RIMW-15	acceptable				

LCS/ LSD(80-110)

%R
N/A

Blanks

	Analyte	**Results**	**Qualifier**	**Associated Samples**
415.1	non-detect			

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments: On the form 1's the analysis is listed as dissolved organic carbon. Should really be total organic carbon.

Validator: Carrie Madrid Date: 4/20/07

Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239396
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
BP-1A	239396-1	MW-121B	239396-10
BP-1B	239396-2	MW-122B	239396-11
MW-103	239396-3	EW-1	239396-12
MW-117	239396-4	RIMW-6	239396-13
MW-1175	239396-5	RIMW-7	239396-14
MW-120A	239396-6	RIMW-13	239396-15
W-1	239396-7	RIMW-15	239396-16
W-4	239396-8	RIMW-515	239396-17
MW-120B	239396-9	RIMW-16	239396-18

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicate -** Samples RIMW-1:12-14/RIMW-51:12-14 are field duplicates.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	No
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	No
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Samples MW-122B(137667) and MW-103(137668) were spiked.
Trip Blank - A trip blank was listed on the chain of custody but was not present in the cooler.

Precision		**%RPD**
Field Duplicates		
	MW-117/MW1175	
	1,2-Dichlorobenzene	41.67%
	Toluene	27.03%
	RIMW-15/RIMW-515	
	Tetrachloroethene	21.38%
		No action taken on field duplicate data.
Laboratory Duplicate		N/A

Accuracy		**MS/MSD**	**RPD**
		(70-130)	
MS/MSD			
137667	MW-122B	acceptable	
	1,1,2-Trichloroethane	67/72%	7%
137668	MW-103		
	Chloromethane	68/71%	4%

No action taken based solely on MS/MSD data.

	%R
	(70-130)
LCS/ LCSD	
137667	acceptable
137668	acceptable

		Results in ug/L	Qualifier	Associated Samples
Blanks				
137667	Toluene	0.13ug/L	10U	All samples except for MW-120A, W-1, MW-120B, MW-121B, RIMW-6,
137668	Toluene	0.13ug/L	10U	All samples except for MW-120A, W-1, MW-120B, MW-121B, RIMW-6,

		Results in ug/L	Qualifier	Associated Samples
Trip Blank	N/A			

Holding Blank	N/A

		Qualifier	Associated sample
Rinsate Blank	N/A		

ICV		RRF	%RSD	Qualifier
PT1	1/4/07 Extra 1	acceptable		
PT2	1/4/07 Extra 2	acceptable		
PT1	1/12/07 8260 B files	acceptable		
PT2	1/12/07 8260 B files	acceptable		

CCV		RRF	%RSD	Qualifier	Associated sample
PT1	1/30/07 Extra 1 0854 B31045	acceptable			
PT2	1/30/07 Extra 2 0915 B31046	acceptable			
PT1	1/30/07 0956 B31048 8260	acceptable			
	1/30/07 1017 B31049 8260				
	Acetone		88.50%	UJ	All samples except RIMW-6 and RIMW-16
				J	RIMW-16
	Bromomethane		31.00%	UJ	All samples
	2-Butanone		48.40%	UJ	All samples
	2-Hexanone		41.90%	UJ	All samples

Surr.	%R (70-130)	Qualifier	Associated sample
137667	acceptable		
137668	acceptable		

Internal Standard	not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	No
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 1.0° C, however no action taken based on temperature.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator:	Carrie Madrid	Date:	4/20/07
Reviewer:	Cherie Zakowski	Date:	10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	239401
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8270C

Samples in SDG:

Client ID	Lab ID
RIMW-8	239401-1
RIMW-58	239401-2
RIMW-4	239401-11
RIMW-1	239401-14
RIMW-5	239401-15
RIMW-14	239401-17
RIMW-19	239401-18
RIMW-3	239401-22

Full Validation Sample: Cursory validation performed on all samples. No raw data was present.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field duplicates -** Samples RIMW-8/RIMW-58 were identified as field duplicates. All %RPD's were within criteria with the exceptions listed below.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
Trip Blanks/Rinsate Blanks	N/A
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	Yes
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	Yes
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** performed on a sample from another SDG 236472-1.
CCV - 8270 CCV standard analyzed at 1356 Di-n-octylphthalate out.

Precision	**%RPD**
Field Duplicates	
RIMW-8/RIMW-58	
Butylbenzylphthalate	77.78%
Bis(2-ethylhexyl)phthalate	62.07%
4-Chloroaniline	28.57%
	No action taken on field duplicate data.

Laboratory Duplicate	**%RPD**
N/A	

Accuracy

MS/MSD	**MS/MSD RPD**
Batch 137624	MS/MSD from another SDG 236472-1. acceptable

LCS/LCSD	**%R**
Batch 137624	acceptable

Blanks	**Analyte**	**Qualifier**	**Associated Sample/ Qualification**
Batch 137624	non-detect		

		RRF	%RSI	Qualifier	Associated sample
Rinsate Blank	**N/A**				
ICV	1/31/07 8270/Benzaldehyde/ TCL compounds	acceptable			

		RRF	%D		Associated sample
CCV	**1/31/07** 8270/Benzaldehyde/ TCL compounds	acceptable			
	1/31/07 8270 1356 Di-n-octylphthalate		29.40%	none	No action, only 2-chlorophenol was reported from this run.

Surr.	%R	Qualifier	Associated sample
Batch 137624	acceptable		

Internal Standard not included

Representativeness: — Yes No N/A

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No
Comments (note deviations):	Cooler temperatures 2.0° C

Comparibility: — Yes No N/A

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): — Yes No N/A

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/17/07

Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239401 groundwater
Laboratory: Analytical Services, Inc.
Analysis/Methods: 415.1

Samples in SDG:

Client ID	Lab ID
OB-110A	239401-3
OB-110B	239401-7
MW-123A	239401-10
RIMW-5	239401-15
RIMW-14	239401-17

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20%)	N/A
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	Yes

Comments (note deviations): **Laboratory Duplicate -** Dup. analysis performed on sample OB-110A all %RPD within limits.

Accuracy:	**Yes No N/A**
Serial Dilutions ± 10%	Yes
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Post Digestion Spike criteria met (if applicable)?	N/A
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate? (± 25%)	N/A
Laboratory Blanks criteria met (within control limits)?	Yes
ICV/CCV % Recoveries within 90-110%?	N/A
ICSA/ICSAB % Recoveries acceptable?	N/A
CRI %	N/A

Comments (note deviations): **Serial Dilution -** performed on sample MW-123A
Matrix Spike - performed on a sample from another SDG.

Representativeness:	**Yes No N/A**
Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4° C ± 2° C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	Yes

Comments (note deviations): Sample cooler was received at 2.0 ° C.

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Precision

Field Duplicate

N/A

Laboratory Duplicate	**%RPD**	**Qualifier**
415.1		
OB-110A	acceptable	

Accuracy

Serial Dilution	**%RPD**
6010B	
MW-123A	acceptable

MS/MSD	**Analyte**	**MS/MSD %R**	**RPD**	**Post %R**	**Qualifier**	**Associated Samples**
	N/A	performed on a sample from another SDG				

LCS/ LSD(80-110)

	%R
415.1	acceptable

Blanks

	Analyte	**Results**	**Qualifier**	**Associated Samples**
415.1	non-detect			

ICV/CCV

not present

ICSA/ICSAB

not present

CRI

not present

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments: On the form 1's the analysis is listed as dissolved organic carbon. Should really be total organic carbon.

Validator: Carrie Madrid Date: 4/18/07

Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number: 239401
Laboratory: Analytical Services, Inc.
Analysis/Methods: 8260B

Samples in SDG:

Client ID	Lab ID	Client ID	Lab ID
RIMW-8	239401-1	RIMW-54	239401-12
RIMW-58	239401-2	PW-1	239401-13
OB-110A	239401-3	RIMW-1	239401-14
EW-4	239401-4	RIMW-5	239401-15
P-3	239401-5	RIMW-55	239401-16
P-1	239401-6	RIMW-14	239401-17
OB-110B	239401-7	RIMW-19	239401-18
OB-8A	239401-8	TRIP BLANK	239401-19
MW-123B	239401-9	OB-109	239401-20
MW-123A	239401-10	OB-109B	239401-21
RIMW-4	239401-11	RIMW-3	239401-22

Full Validation Sample: Cursory validation performed on all samples. No raw data was present. Samples are waters.

Precision:

	Yes No N/A
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	No
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): **Field Duplicates** - Samples RIMW-4/RIMW54, RIMW-5/RIMW-55, and RIMW-8/RIMW-58 are field duplicates. All %RPD's were within criteria with the exceptions listed below.

Accuracy:

	Yes No N/A
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	Yes
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	No
Trip Blanks/Rinsate Blanks	No
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	N/A
Surrogate % Recoveries?	No
Internal Standards	N/A

Comments (note deviations): **MS/MSD -** Batch 137712 sample OB-110B; batch 137713 sample OB-109 spiked.
Surrogate - Several surrogates out. See below

Precision

Field Duplicates

	%RPD		%RPD
RIMW-4/RIMW-54		RIMW-5/RIMW-55	
1,4-Dichlorobenzene	88.89%	Chlorobenzene	26.21%
trans-1,2-Dichloroethene	119.61%	1,4-Dichlorobenzene	31.98%
Toluene	48.78%	trans-1,2-Dichloroethene	62.86%
Xylenes	160.04%		
RIMW-8/RIMW-58			
1,1-Dichlororethene	22.22%		
2-Hexanone	48.95%		

No action taken on field duplicate data.

Laboratory Duplicate
N/A

Accuracy

MS/MSD	**MS/MSD RPD** (70-130)
Batch 137712	
OB-110B	acceptable
Batch 137713	
OB-109	acceptable

		%R (70-130)
LCS/ LCSD	Batch 137712	acceptable
	Batch 137713	acceptable

		Results in ug/L	Qualifier	Associated Samples
Blanks	Batch 137712			
	Toluene	0.91	10U	P-3, P-1, OB-110B, RIMW-4
	Vinyl Chloride	0.49	10U	All results > Reporting Limit
	Batch 137713			
	Vinyl Chloride	0.46	10U	RIMW-5, RIMW-55, Trip Blank, OB-109B
Trip Blank	**Trip Blank**			
	1,2-Dichloroethane	0.27	10U	OB-109, OB-109B
	Methylene Chloride	0.74	10U	EW-4, P-3, P-1, RIMW-5, RIMW-55,
	Toluene	0.29	10U	P-3, P-1, OB-110B, RIMW-4, RIMW-54, PW-1, RIMW-1, RIMW-5, RIMW-55, RIMW-18, OB-109, OB-109B,RIMW-3
	Trichloroethene	0.18	10U	OB-110A, EW-4, PW-1, RIMW-14
	Vinyl chloride	0.64	10U	P-3, RIMW-5, RIMW-55, OB-109

Holding Blank	**N/A**	

		Qualifier	Associated sample
Rinsate Blank	**N/A**		

		RRF	%RSD	Qualifier	Associated sample
ICV	**ICV 1/12/2007 8260 B files**				
	PT 1 and PT 2	acceptable			
	Extra				
	PT 1 and PT 2	acceptable			
	ICV 12/07/2006 8260 A files				
PT 1	Chloroethane	0.04		J	EW-4, RIMW-4, RIMW-54, RIMW-5
PT2		acceptable			
	ICV 1/12/2007 8260 C files				
	PT 1 and PT 2	acceptable			
	ICV 1/12/2007 8260 D files				
	PT 1 and PT 2	acceptable			
	ICV 1/12/2007 Extra D files				
	PT 1 and PT 2	acceptable			

		RRF	%RSD	Qualifier	Associated sample
CCV	**1/31/2007 0850 B31089 Extra1**				
		acceptable			
PT1	**1/31/2007 0932 B31091 82601**				
		acceptable			
	1/31/2007 0952 B31089 Extra2				
		acceptable			
	1/31/2007 1033 B31094 82602				
		acceptable			
PT1	**1/31/2007 2314 B31131 Extra1**				
		acceptable			
PT1	**1/31/2007 2355 B31133 8260**				
	Methylene Chloride		25.00%	J	MW-123B, P-1
PT2	**1/31/2007 2335 B31132 Extra2**				
		acceptable			
PT2	**1/31/2007 0016 B31134 8260**				
		acceptable			
PT1	**2/2/2007 1128 B31200 Extra1**				
		acceptable			
PT1	**2/2/2007 1209 B31202 8260**				
	Methylene Chloride		25.00%	J	RIMW-58
PT2	**2/2/2007 1149 B31201 Extra2**				
	Methyl Acetate		26.84%	UJ	RIMW-8

PT2	**2/2/2007 1230 B31203 8260**				
		acceptable			
PT1	**2/5/2007 1041 B31227 8260**				
	Bromomethane		35.00%		Acetone and Chloroethane only analytes with this run
PT2	**2/5/2007 1102 B31228 8260**				
		acceptable			
PT1	**2/1/2007 1117 A23289 8260**				
	Bromomethane	0.045		R	RIMW-54, RIMW-4, EW-4
	Chloroethane	.031	29.5%		Qual. Due to ICV
PT1	**2/2/2007 1111 A23320 8260**				
	Bromomethane	0.045			Reported from 1/31/07 run.
	Chloroethane	.030	32.7%		Qual. Due to ICV
Pt2	**2/2/2007 1132 A23321 8260**				
	Bromomethane	0.04			No action bromomethane and chloroethane reported
	Chloroethane	0.031			from another run.
PT1	**2/1/2007 1051 C33167 8260**				
	Bromochloromethane		26.10%		Toluene only reported from this run
	Acetone		79.10%		
PT2	**2/1/2007 1111 C33168 8260**				
	Bromomethane		30.90%		not used
	Nothing on quant sheet after bromobenzene				
PT1	**2/1/2007 1326 D8750 8260**				
		acceptable			
PT2	**2/1/2007 1406 D8752 8260**				
	CCV not processed for %D and RRF				

Surr.		**%R**	**Qualifier**	**Associated sample**
	Dibromofluoromethane	**(70-130)**		
RIMW-8		44%	J/UJ	RIMW-8
RIMW-58		47%	J/UJ	RIMW-58
	1,2-Dichloroethane-d4			
RIMW-5		61%	J/UJ	RIMW-5
RIMW-55		63%	J/UJ	RIMW-55

Internal Standard not included

Representativeness: **Yes No N/A**

Were sampling procedures and design criteria met?	Yes
Were holding times met?	Yes
Were preservation criteria met? (4°C ± 2°C)	Yes
Were Chain-of-Custody records complete and provided in data package?	Yes
Were contaminants present in blanks?	No

Comments (note deviations): Cooler temperatures 2.0° C

Comparibility: **Yes No N/A**

Does data compare with similar analysis and data sets? Yes

Comments (note deviations):

Completeness (90%): **Yes No N/A**

Are all data in this SDG useable? Yes

Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes

Comments:

Validator: Carrie Madrid Date: 4/17/07

Reviewer: Cherie Zakowski Date: 10/20/07

PSC
Data Evaluation Worksheet

Sample Delivery Group (SDG) Number:	249441
Laboratory:	Analytical Services, Inc.
Analysis/Methods:	8260B

Samples in SDG:

	Lab ID		Lab ID
RIMW-21	249441-1	MW-122B	249441-10
RIMW-30	249441-2	MW-121B	249441-11
RIMW-20	249441-3	RIMW-24	249441-12
RIMW-29	249441-4	RIMW-23	249441-13
RIMW-25	249441-5	RIMW-22	249441-14
DUP-01	249441-6	DUP-02	249441-15
RIMW-28	249441-7	RIMW-27	249441-16
TB-01	249441-8	RIMW-15	249441-17
RIMW-26	249441-9		

Precision:	**Yes No N/A**
Field Duplicates RPD criteria met? (frequency 10% and control limits ± 20% water and ± 50% soil)	Yes
Laboratory Duplicates RPD criteria met? (frequency 20% and control limits ± 20%)	N/A

Comments (note deviations): Field Duplicates - Field duplicate sample pairs are as follows: DUP-01/RIMW-25; and DUP-02/RIMW-27. All RPD results were within criteria.

Accuracy:	**Yes No N/A**
Matrix Spike/Matrix Spike Duplicates criteria met? (frequency 20% and control limits-lab defined)	Yes
Laboratory Control Sample criteria met?	N/A
Laboratory Control Sample Duplicate?	N/A
Laboratory Blanks criteria met (within control limits)?	No
Trip Blanks/Rinsate Blanks	No
ICV% Recoveries within 30%(Corr.Coeff. 0.99) and Ave. RRF greater than or equal to 0.05?	No
CCV % Recoveries within 30% and RRF greater than or equal to 0.05?	No
Tuning (abundance criteria and 12 hour time frame)?	Yes
Surrogate % Recoveries?	Yes
Internal Standards	Yes

Comments (note deviations):

Precision	**Analyte**	**%RPD**	**Analyte**	**%RPD**
Field Duplicates	DUP-01/RIMW-25, DUP-02/RIMW-27			
Acceptable				

Laboratory Duplicate

Not included

Accuracy

MS/MSD		**MS/MSD**	**RPD**
	145175		
	Acceptable		
	145238		
	Tetrachloroethene	0/0	0
	Trichloroethene	0/0	0
	1,2-Dichloroethane	98/68	36
	1,1-Dichloroethene	73/60	20

No action taken on MS/MSD Data

LCS/ LCSD Not included

			Qualifier	**Associated Sample/ Qualification**	
Blanks	VBLK1-09-24-07	All non-detect	None	No reported samples associated with this blank	
	VBLK1-09-25-07	Toluene - 0.66 ug/L 1-2 -Dichlorobenzene - 0.51 ug/L	None	No reported samples associated with this blank	
	VBLK1-09-26-07	Toluene - 0.24 ug/L	U	RIMW-21	
			U	RIMW-30	
			None	RIMW-28	
			U	TB-01	
			U	RIMW-26	
			U	MW-122B	
			None	MW-121B	
	VBLK3-09-26-07	All non-detect	None	RIMW-29	RIMW-24
				RIMW-25	RIMW-22
				DUP-01	DUP-02
	VBLK2-09-26-07	1,2,3-Trichlorobenzene - 1.95 ug/L	None	RIMW-27	
		1,2,4-Trichlorobenzene - 0.56 ug/L	None	RIMW-15	
	VBLK1-09-27-07	Toluene - 0.78 ug/L	None	RIMW-25	
				DUP-01	

Holding Blank	Not included					
Trip Blanks	Trip Blank 9/22/07 1344	Toluene - 0.42 ug/L			**Qualifier** None	**Associated Sample/ Qualification** Toluene already qualified due to method blanks
Rinsate Blank	NA					**Associated sample**
ICV		**RRF**	**%RSD**	**Qualifier**		**Associated sample**
PT1	9/20/07 Trans-1, 3-Dichloropropene		30.70%	J/UJ		All samples in SDG
PT2	9/20/07	acceptable				
CCV		**RRF**	**%RSD**	**Qualifier**		**Associated sample**
	9/26/2007 - 12:30	acceptable				
	9/26/07 - 13:08					
	Methyl Acetate		43.51%	J/UJ		RIMW-27, RIMW-15
	Methyl Cyclohexane		47.37%	J/UJ		RIMW-27, RIMW-15
	Cyclohexanone		48.52%	J/UJ		RIMW-27, RIMW-15
	9/26/07 - 11:03	acceptable				
	9/26/07 - 23:05					
	Cyclohexane		57.34%	J/UJ		RIMW-29, RIMW-25, DUP-01, RIMW-24, RIMW-22, DUP-02
	9/26/07 - 23:45	acceptable				
	9/27/07 - 11:00					
	Methyl Cyclohexane		68.12%	J/UJ		RIMW-23, RIMW-20, RIMW-15
	9/27/07 11:39	acceptable				
Surr.	Acceptable		**%R**	**Qualifier**		**Associated sample**
Internal Standard	Acceptable					

Representativeness: — **Yes No N/A**

Were sampling procedures and design criteria met? Yes
Were holding times met? Yes
Were preservation criteria met? (4°C ± 2°C) Yes
Were Chain-of-Custody records complete and provided in data package? Yes
Were contaminants present in blanks? Yes
Comments (note deviations):

Comparibility: — **Yes No N/A**

Does data compare with similar analysis and data sets? Yes
Comments (note deviations):

Completeness (90%): — **Yes No N/A**

Are all data in this SDG useable? Yes
Comments (note deviations):

Do all data in this SDG meet the Data Quality Objectives? Yes
Comments:

Validator: Cherie Zakowski Date: 10/12/07
Reviewer: Carrie Madrid Date: 10/20/07

Appendix H
Risk Assessment Calculations

H-1 Contaminants of Potential Concern Screening

Table H-1.1
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site-wide Surface Soil

Chemical	Units	Number of Samples	Number of Detects	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Minimum Detected Concentration	Maximum Detected Concentration	Twice the Arithmetic Average Background Concentration	Screening Criteria Residential PRGs	COPC (Yes/ No)	Rationale for Selection or Deletion
Aluminum	mg/kg	56	56	100%	20	30	5000	58000	34,300	7.6E+04	**No**	BSL
Antimony	mg/kg	56	0	0%	6	9.1	ND	ND	ND	3.1E+01	**No**	IFD
Arsenic	mg/kg	56	54	96%	1	1.5	ND	8.9	2.5	3.9E-01	**Yes**	ASL
Barium	mg/kg	56	56	100%	20	30	27	670	331	5.4E+03	**No**	BSL
Beryllium	mg/kg	56	56	100%	0.51	0.76	0.08	1.9	2.1	1.5E+02	**No**	BSL
Cadmium	mg/kg	56	27	48%	0.51	0.76	ND	2.6	ND	3.7E+01	**No**	BSL
Calcium	mg/kg	56	56	100%	510	760	150	38000	1,505	NA	**No**	NUT
Chromium	mg/kg	56	56	100%	1	1.5	4	100	24	2.1E+02	**No**	BSL
Cobalt	mg/kg	56	56	100%	5.1	7.6	1.9	300	23	9.0E+02	**No**	BSL
Copper	mg/kg	56	56	100%	2.5	3.8	3	130	20	3.1E+03	**No**	BSL
Iron	mg/kg	56	56	100%	10	15	7400	99000	66,500	2.3E+04	**Yes**	ASL
Lead	mg/kg	56	56	100%	1	1.5	2.3	170	20	4.0E+02	**No**	BSL
Magnesium	mg/kg	56	55	98%	510	760	ND	28000	5,955	NA	**No**	NUT
Manganese	mg/kg	56	56	100%	1.5	2.3	80	7300	1,125	1.8E+03	**Yes**	ASL
Nickel	mg/kg	56	56	100%	4	6.1	1.8	180	10	1.6E+03	**No**	BSL
Potassium	mg/kg	56	56	100%	510	760	67	5000	3,425	NA	**No**	NUT
Selenium	mg/kg	56	40	71%	3.5	5.3	ND	4.9	1.0	3.9E+02	**No**	BSL
Silver	mg/kg	56	1	2%	1	1.5	ND	0.42	ND	3.9E+02	**No**	IFD
Sodium	mg/kg	56	56	100%	510	760	11	6800	62	NA	**No**	NUT
Thallium	mg/kg	56	56	100%	2.5	3.8	7.75	99	70	5.2E+00	**Yes**	ASL
Vanadium	mg/kg	56	56	100%	5.1	7.6	13	510	201	7.8E+01	**Yes**	ASL
Zinc	mg/kg	56	56	100%	6.1	9.1	9	230	81	2.3E+04	**No**	BSL
Mercury	mg/kg	56	20	36%	0.1	0.15	ND	0.41	ND	2.3E+01	**No**	BSL
Aroclor 1016	ug/kg	2	0	0%	40	47	ND	ND	NA	3.9E+03	**No**	IFD
Aroclor 1221	ug/kg	2	0	0%	40	47	ND	ND	NA	3.9E+03	**No**	IFD
Aroclor 1232	ug/kg	2	0	0%	40	47	ND	ND	NA	3.9E+03	**No**	IFD
Aroclor 1242	ug/kg	2	0	0%	40	47	ND	ND	NA	3.9E+03	**No**	IFD
Aroclor 1248	ug/kg	2	0	0%	40	47	ND	ND	NA	2.2E+02	**No**	IFD
Aroclor 1254	ug/kg	2	0	0%	40	47	ND	ND	NA	2.2E+02	**No**	IFD
Aroclor 1260	ug/kg	2	0	0%	40	47	ND	ND	NA	2.2E+02	**No**	IFD
1,2,4,5-Tetrachlorobenzene	ug/kg	56	0	0%	330	1900	ND	ND	NA	1.8E+04	**No**	IFD
2,4,5-Trichlorophenol	ug/kg	56	0	0%	840	4800	ND	ND	NA	6.1E+06	**No**	IFD
2,4,6-Trichlorophenol	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.1E+03	**No**	IFD
2,4-Dichlorophenol	ug/kg	56	0	0%	330	1900	ND	ND	NA	1.8E+05	**No**	IFD
2,4-Dimethylphenol	ug/kg	56	0	0%	330	1900	ND	ND	NA	1.2E+06	**No**	IFD
2,4-Dinitrophenol	ug/kg	56	0	0%	840	4800	ND	ND	NA	1.2E+05	**No**	IFD
2,4-Dinitrotoluene	ug/kg	56	0	0%	330	1900	ND	ND	NA	1.2E+05	**No**	IFD
2,6-Dinitrotoluene	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.1E+04	**No**	IFD
2-Chloronaphthalene	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
2-Chlorophenol	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.3E+04	**No**	IFD
2-Methylnaphthalene	ug/kg	56	1	2%	330	1900	ND	255	NA	NA	**No**	IFD
2-Methylphenol	ug/kg	56	0	0%	330	1900	ND	ND	NA	3.1E+06	**No**	IFD
2-Nitroaniline	ug/kg	56	0	0%	840	4800	ND	ND	NA	1.8E+05	**No**	IFD
2-Nitrophenol	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
3,3'-Dichlorobenzidine	ug/kg	56	0	0%	330	1900	ND	ND	NA	1.1E+03	**No**	IFD
3+4-Methylphenol	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
3-Nitroaniline	ug/kg	56	0	0%	840	4800	ND	ND	NA	1.8E+04	**No**	IFD
4,6-Dinitro-o-cresol	ug/kg	56	0	0%	840	4800	ND	ND	NA	6.1E+03	**No**	IFD
4-Bromophenyl phenyl ether	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
4-Chloroaniline	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.4E+05	**No**	IFD
4-Chlorophenyl phenyl ether	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
4-Nitroaniline	ug/kg	56	0	0%	840	4800	ND	ND	NA	2.3E+04	**No**	IFD
4-Nitrophenol	ug/kg	56	0	0%	840	4800	ND	ND	NA	NA	**No**	IFD
Acenaphthene	ug/kg	56	0	0%	330	1900	ND	ND	NA	3.7E+06	**No**	IFD
Acenaphthylene	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
Acetophenone	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
Anthracene	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.2E+07	**No**	IFD
Atrazine	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.2E+03	**No**	IFD
Benzaldehyde	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.1E+06	**No**	IFD
Benzo(a)anthracene	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.2E+02	**No**	IFD
Benzo(a)pyrene	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.2E+01	**No**	IFD
Benzo(b)fluoranthene	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.2E+02	**No**	IFD
Benzo(ghi)perylene	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
Benzo(k)fluoranthene	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.2E+03	**No**	IFD
Biphenyl	ug/kg	56	2	4%	330	1900	ND	2700	NA	3.0E+06	**No**	IFD
Bis(2-chloroethoxy)methane	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
Bis(2-chloroethyl)ether	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.2E+02	**No**	IFD
Bis(2-chloroisopropyl)ether	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.9E+03	**No**	IFD
Bis(2-ethylhexyl)phthalate	ug/kg	56	28	50%	330	3900	ND	29000	NA	3.5E+04	**No**	BSL
Butyl benzyl phthalate	ug/kg	56	6	11%	330	1900	ND	720	NA	1.2E+07	**No**	BSL
Caprolactam	ug/kg	56	1	2%	330	1900	ND	220	NA	3.1E+07	**No**	IFD
Carbazole	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.4E+04	**No**	IFD
Chrysene	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.2E+04	**No**	IFD
Dibenzo(a,h)anthracene	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.2E+01	**No**	IFD
Dibenzofuran	ug/kg	56	0	0%	330	1900	ND	ND	NA	1.5E+05	**No**	IFD
Diethyl phthalate	ug/kg	56	0	0%	330	1900	ND	ND	NA	4.9E+07	**No**	IFD
Dimethyl phthalate	ug/kg	56	0	0%	330	1900	ND	ND	NA	1.0E+08	**No**	IFD
Di-n-butylphthalate	ug/kg	56	5	9%	330	1900	ND	2400	NA	NA	**No**	NTX
Di-n-octylphthalate	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.4E+06	**No**	IFD
Fluoranthene	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.3E+06	**No**	IFD
Fluorene	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.7E+06	**No**	IFD

Table H-1.1
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site-wide Surface Soil

Chemical	Units	Number of Samples	Number of Detects	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Minimum Detected Concentration	Maximum Detected Concentration	Twice the Arithmetic Average Background Concentration	Screening Criteria Residential PRGs	COPC (Yes/ No)	Rationale for Selection or Deletion
Hexachlorobenzene	ug/kg	56	1	2%	330	1900	ND	255	NA	3.0E+02	**No**	IFD
Hexachlorobutadiene	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.2E+03	**No**	IFD
Hexachlorocyclopentadiene	ug/kg	56	0	0%	330	1900	ND	ND	NA	3.7E+05	**No**	IFD
Hexachloroethane	ug/kg	56	0	0%	330	1900	ND	ND	NA	3.5E+04	**No**	IFD
Indeno(1,2,3-cd)pyrene	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.2E+02	**No**	IFD
Isophorone	ug/kg	56	0	0%	330	1900	ND	ND	NA	5.1E+05	**No**	IFD
Naphthalene	ug/kg	56	1	2%	330	1900	ND	175	NA	5.6E+04	**No**	IFD
NDPA/DPA	ug/kg	56	0	0%	330	1900	ND	ND	NA	9.9E+04	**No**	IFD
Nitrobenzene	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.0E+04	**No**	IFD
n-Nitrosodi-n-propylamine	ug/kg	56	0	0%	330	1900	ND	ND	NA	6.9E+01	**No**	IFD
p-Chloro-m-cresol	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
Pentachlorophenol	ug/kg	56	0	0%	840	4800	ND	ND	NA	3.0E+03	**No**	IFD
Phenanthrene	ug/kg	56	0	0%	330	1900	ND	ND	NA	NA	**No**	IFD
Phenol	ug/kg	56	0	0%	330	1900	ND	ND	NA	1.8E+07	**No**	IFD
Pyrene	ug/kg	56	0	0%	330	1900	ND	ND	NA	2.3E+06	**No**	IFD
1,1,1-Trichloroethane	ug/kg	58	3	5%	7.7	970	ND	120	NA	1.2E+06	**No**	IFD
1,1,2,2-Tetrachloroethane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	4.1E+02	**No**	IFD
1,1,2-Trichloro-1,2,2-	ug/kg	58	2	3%	7.7	970	ND	2.3	NA	NA	**No**	IFD
1,1,2-Trichloroethane	ug/kg	58	1	2%	7.7	970	ND	7.42	NA	7.3E+02	**No**	IFD
1,1-Dichloroethane	ug/kg	58	8	14%	7.7	970	ND	37	NA	5.1E+05	**No**	BSL
1,1-Dichloroethene	ug/kg	58	10	17%	7.7	970	ND	340	NA	1.2E+05	**No**	BSL
1,2,3-Trichlorobenzene	ug/kg	58	3	5%	7.7	970	ND	270.3	NA	NA	**No**	IFD
1,2,4-Trichlorobenzene	ug/kg	58	5	9%	7.7	970	ND	10250	NA	6.2E+04	**No**	BSL
1,2-Dibromo-3-chloropropane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	4.6E+02	**No**	IFD
1,2-Dibromoethane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	3.2E+01	**No**	IFD
1,2-Dichlorobenzene	ug/kg	58	9	16%	7.7	970	ND	2215	NA	6.0E+05	**No**	BSL
1,2-Dichloroethane	ug/kg	58	9	16%	7.7	970	ND	1400	NA	2.8E+02	**Yes**	ASL
1,2-Dichloropropane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	3.4E+02	**No**	IFD
1,3-Dichlorobenzene	ug/kg	58	2	3%	7.7	970	ND	3135	NA	5.3E+05	**No**	IFD
1,4-Dichlorobenzene	ug/kg	58	7	12%	7.7	970	ND	2205	NA	3.4E+03	**No**	BSL
2-Butanone	ug/kg	58	8	14%	7.7	970	ND	120	NA	2.2E+07	**No**	BSL
2-Hexanone	ug/kg	58	0	0%	7.7	970	ND	ND	NA	NA	**No**	IFD
4-Methyl-2-pentanone	ug/kg	58	4	7%	7.7	970	ND	1200	NA	5.3E+06	**No**	BSL
Acetone	ug/kg	58	11	19%	7.7	970	ND	270	NA	1.4E+07	**No**	BSL
Benzene	ug/kg	58	8	14%	7.7	970	ND	150	NA	6.4E+02	**No**	BSL
Bromochloromethane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	NA	**No**	IFD
Bromodichloromethane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	8.2E+02	**No**	IFD
Bromoform	ug/kg	58	0	0%	7.7	970	ND	ND	NA	6.2E+04	**No**	IFD
Bromomethane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	3.9E+03	**No**	IFD
Carbon disulfide	ug/kg	58	5	9%	7.7	970	ND	8	NA	3.6E+05	**No**	BSL
Carbon tetrachloride	ug/kg	58	0	0%	7.7	970	ND	ND	NA	2.5E+02	**No**	IFD
Chlorobenzene	ug/kg	58	6	10%	7.7	970	ND	1280	NA	1.5E+05	**No**	BSL
Chloroethane	ug/kg	58	1	2%	7.7	970	ND	23	NA	3.0E+03	**No**	IFD
Chloroform	ug/kg	58	6	10%	7.7	970	ND	3.57	NA	2.2E+02	**No**	BSL
Chloromethane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	4.7E+04	**No**	IFD
cis-1,2-Dichloroethene	ug/kg	58	15	26%	7.9	970	ND	3400	NA	4.3E+04	**No**	BSL
cis-1,3-Dichloropropene	ug/kg	58	0	0%	7.7	970	ND	ND	NA	NA	**No**	IFD
Cyclohexane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	1.4E+05	**No**	IFD
Dibromochloromethane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	1.1E+03	**No**	IFD
Dichlorodifluoromethane	ug/kg	58	0	0%	7.7	970	ND	ND	NA	9.4E+04	**No**	IFD
Ethylbenzene	ug/kg	58	12	21%	7.7	970	ND	1445	NA	4.0E+05	**No**	BSL
Isopropylbenzene	ug/kg	58	4	7%	7.7	970	ND	8.5	NA	5.7E+05	**No**	BSL
Methyl acetate	ug/kg	58	0	0%	7.7	970	ND	ND	NA	2.2E+07	**No**	IFD
Methyl tert butyl ether	ug/kg	58	0	0%	7.7	970	ND	ND	NA	3.2E+04	**No**	IFD
Methylcyclohexane	ug/kg	58	6	10%	7.7	970	ND	395	NA	2.6E+06	**No**	BSL
Methylene chloride	ug/kg	58	3	5%	7.7	970	ND	54	NA	9.1E+03	**No**	IFD
Styrene	ug/kg	58	0	0%	7.7	970	ND	ND	NA	1.7E+06	**No**	IFD
Tetrachloroethene	ug/kg	58	18	31%	7.9	970	ND	2800	NA	4.8E+02	**Yes**	ASL
Toluene	ug/kg	58	20	34%	7.7	970	ND	14350	NA	5.2E+05	**No**	BSL
trans-1,2-Dichloroethene	ug/kg	58	3	5%	7.7	970	ND	19	NA	7.0E+04	**No**	IFD
trans-1,3-Dichloropropene	ug/kg	58	0	0%	7.7	970	ND	ND	NA	NA	**No**	IFD
Trichloroethene	ug/kg	58	15	26%	7.7	970	ND	300	NA	4.8E+02	**No**	BSL
Trichlorofluoromethane	ug/kg	58	1	2%	7.7	970	ND	1.5	NA	3.9E+05	**No**	IFD
Vinyl chloride	ug/kg	58	5	9%	7.7	970	ND	29	NA	7.9E+01	**No**	BSL
Xylenes (Total)	ug/kg	58	13	22%	7.7	970	ND	6150	NA	2.7E+05	**No**	BSL

Notes:
Rationale Codes:

Selection Reason: ASL = Above Screening Level.
NSL- Detected, No Screening Level Available.
TOX = Group A Carcinogen.
Deletion Reason: BSL = Below Screening Level.
IFD = Infrequent detection (less than or equal to 5%)
NUT = Essential Nutrient.
NTX = No Toxicity Value Available.

Table H-1.2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site-wide Subsurface Soil

Chemical	Units	Number of Samples	Number of Detects	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Minimum Detected Concentration	Maximum Detected Concentration	Twice the Arithmetic Average Background Concentrations	Screening Criteria Residential PRGs	COPC (Yes/No)	Rationale for Selection or Deletion
Aluminum	mg/kg	105	105	100%	20	30	5000	58000	34,300	7.6E+04	**NO**	**BSL**
Antimony	mg/kg	105	0	0%	6	9.1	ND	ND	ND	3.1E+01	**NO**	**IFD**
Arsenic	mg/kg	105	81	77%	1	1.5	ND	8.9	2.5	3.9E-01	**YES**	**ASL**
Barium	mg/kg	105	105	100%	20	30	22	670	331	5.4E+03	**NO**	**BSL**
Beryllium	mg/kg	105	105	100%	0.51	0.76	0.08	1.6	2.1	1.5E+02	**NO**	**BSL**
Cadmium	mg/kg	105	44	42%	0.51	0.76	ND	2.6	ND	3.7E+01	**NO**	**BSL**
Calcium	mg/kg	105	105	100%	510	760	185	38000	1,505	NA	**NO**	**NUT**
Chromium	mg/kg	105	105	100%	1	1.5	0.63	100	24	2.1E+02	**NO**	**BSL**
Cobalt	mg/kg	105	105	100%	5.1	7.6	1.9	300	23	9.0E+02	**NO**	**BSL**
Copper	mg/kg	105	105	100%	2.5	3.8	3	190	20	3.1E+03	**NO**	**BSL**
Iron	mg/kg	105	105	100%	10	15	7400	99000	66,500	2.3E+04	**YES**	**ASL**
Lead	mg/kg	105	104	99%	1	1.5	ND	170	20	4.0E+02	**NO**	**BSL**
Magnesium	mg/kg	105	104	99%	510	760	ND	28000	5,955	NA	**NO**	**NUT**
Manganese	mg/kg	105	105	100%	1.5	2.3	60	7300	1,125	1.8E+03	**YES**	**ASL**
Nickel	mg/kg	105	105	100%	4	6.1	2.4	180	10	1.6E+03	**NO**	**BSL**
Potassium	mg/kg	105	105	100%	510	760	32	5000	3,425	NA	**NO**	**NUT**
Selenium	mg/kg	105	78	74%	3.5	5.3	ND	4.9	1.0	3.9E+02	**NO**	**BSL**
Silver	mg/kg	105	1	1%	1	1.5	ND	0.42	ND	3.9E+02	**NO**	**IFD**
Sodium	mg/kg	105	105	100%	510	760	11	6800	62	NA	**NO**	**NUT**
Thallium	mg/kg	105	105	100%	2.5	3.8	7.75	99	70	5.2E+00	**YES**	**ASL**
Vanadium	mg/kg	105	105	100%	5.1	7.6	12	510	201	7.8E+01	**YES**	**ASL**
Zinc	mg/kg	105	105	100%	6.1	9.1	5.8	230	81	2.3E+04	**NO**	**BSL**
Mercury	mg/kg	105	22	21%	0.1	0.15	ND	0.41	ND	2.3E+01	**NO**	**BSL**
Aroclor 1016	ug/kg	6	0	0%	38	47	ND	ND	NA	3.9E+03	**NO**	**IFD**
Aroclor 1221	ug/kg	6	0	0%	38	47	ND	ND	NA	3.9E+03	**NO**	**IFD**
Aroclor 1232	ug/kg	6	0	0%	38	47	ND	ND	NA	3.9E+03	**NO**	**IFD**
Aroclor 1242	ug/kg	6	0	0%	38	47	ND	ND	NA	3.9E+03	**NO**	**IFD**
Aroclor 1248	ug/kg	6	0	0%	38	47	ND	ND	NA	2.2E+02	**NO**	**IFD**
Aroclor 1254	ug/kg	6	0	0%	38	47	ND	ND	NA	2.2E+02	**NO**	**IFD**
Aroclor 1260	ug/kg	6	0	0%	38	47	ND	ND	NA	2.2E+02	**NO**	**IFD**
1,2,4,5-Tetrachlorobenzene	ug/kg	110	0	0%	330	1900	ND	ND	NA	1.8E+04	**NO**	**IFD**
2,4,5-Trichlorophenol	ug/kg	110	0	0%	840	4800	ND	ND	NA	6.1E+06	**NO**	**IFD**
2,4,6-Trichlorophenol	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.1E+03	**NO**	**IFD**
2,4-Dichlorophenol	ug/kg	110	0	0%	330	1900	ND	ND	NA	1.8E+05	**NO**	**IFD**
2,4-Dimethylphenol	ug/kg	110	0	0%	330	1900	ND	ND	NA	1.2E+06	**NO**	**IFD**
2,4-Dinitrophenol	ug/kg	110	0	0%	840	4800	ND	ND	NA	1.2E+05	**NO**	**IFD**
2,4-Dinitrotoluene	ug/kg	110	0	0%	330	1900	ND	ND	NA	1.2E+05	**NO**	**IFD**
2,6-Dinitrotoluene	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.1E+04	**NO**	**IFD**
2-Chloronaphthalene	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
2-Chlorophenol	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.3E+04	**NO**	**IFD**
2-Methylnaphthalene	ug/kg	110	6	5%	330	48000	ND	110000	NA	NA	**NO**	**IFD**
2-Methylphenol	ug/kg	110	1	1%	330	1900	ND	170	NA	3.1E+06	**NO**	**IFD**
2-Nitroaniline	ug/kg	110	0	0%	840	4800	ND	ND	NA	1.8E+05	**NO**	**IFD**
2-Nitrophenol	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
3,3'-Dichlorobenzidine	ug/kg	110	0	0%	330	1900	ND	ND	NA	1.1E+03	**NO**	**IFD**
3+4-Methylphenol	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
3-Nitroaniline	ug/kg	110	0	0%	840	4800	ND	ND	NA	1.8E+04	**NO**	**IFD**
4,6-Dinitro-o-cresol	ug/kg	110	0	0%	430	4800	ND	ND	NA	6.1E+03	**NO**	**IFD**
4-Bromophenyl phenyl ether	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
4-Chloroaniline	ug/kg	110	0	0%	330	1900	ND	ND	NA	2.4E+05	**NO**	**IFD**
4-Chlorophenyl phenyl ether	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
4-Nitroaniline	ug/kg	110	0	0%	840	4800	ND	ND	NA	2.3E+04	**NO**	**IFD**
4-Nitrophenol	ug/kg	110	0	0%	840	4800	ND	ND	NA	NA	**NO**	**IFD**
Acenaphthene	ug/kg	110	1	1%	330	4800	ND	9200	NA	3.7E+06	**NO**	**IFD**
Acenaphthylene	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
Acetophenone	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
Anthracene	ug/kg	110	0	0%	330	1900	ND	ND	NA	2.2E+07	**NO**	**IFD**
Atrazine	ug/kg	110	0	0%	330	1900	ND	ND	NA	2.2E+03	**NO**	**IFD**
Benzaldehyde	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.1E+06	**NO**	**IFD**
Benzo(a)anthracene	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.2E+02	**NO**	**IFD**
Benzo(a)pyrene	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.2E+01	**NO**	**IFD**
Benzo(b)fluoranthene	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.2E+02	**NO**	**IFD**
Benzo(ghi)perylene	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
Benzo(k)fluoranthene	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.2E+03	**NO**	**IFD**
Biphenyl	ug/kg	110	5	5%	330	4800	ND	15000	NA	3.0E+06	**NO**	**IFD**
Bis(2-chloroethoxy)methane	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
Bis(2-chloroethyl)ether	ug/kg	110	0	0%	330	1900	ND	ND	NA	2.2E+02	**NO**	**IFD**
Bis(2-chloroisopropyl)ether	ug/kg	110	0	0%	330	1900	ND	ND	NA	2.9E+03	**NO**	**IFD**
Bis(2-ethylhexyl)phthalate	ug/kg	110	39	35%	330	4400	ND	29000	NA	3.5E+04	**NO**	**BSL**
Butyl benzyl phthalate	ug/kg	110	8	7%	330	1900	ND	1400	NA	1.2E+07	**NO**	**BSL**
Caprolactam	ug/kg	110	1	1%	330	1900	ND	220	NA	3.1E+07	**NO**	**IFD**
Carbazole	ug/kg	110	0	0%	330	1900	ND	ND	NA	2.4E+04	**NO**	**IFD**
Chrysene	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.2E+04	**NO**	**IFD**
Dibenzo(a,h)anthracene	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.2E+01	**NO**	**IFD**
Dibenzofuran	ug/kg	110	0	0%	330	1900	ND	ND	NA	1.5E+05	**NO**	**IFD**
Diethyl phthalate	ug/kg	110	0	0%	330	1900	ND	ND	NA	4.9E+07	**NO**	**IFD**
Dimethyl phthalate	ug/kg	110	0	0%	330	1900	ND	ND	NA	1.0E+08	**NO**	**IFD**
Di-n-butylphthalate	ug/kg	110	10	9%	330	1900	ND	2400	NA	NA	**NO**	**NTX**
Di-n-octylphthalate	ug/kg	110	0	0%	330	1900	ND	ND	NA	2.4E+06	**NO**	**IFD**

Table H-1.2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site-wide Subsurface Soil

Chemical	Units	Number of Samples	Number of Detects	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Minimum Detected Concentration	Maximum Detected Concentration	Twice the Arithmetic Average Background Concentrations	Screening Criteria Residential PRGs	COPC (Yes/No)	Rationale for Selection or Deletion
Fluoranthene	ug/kg	110	1	1%	330	1900	ND	1200	NA	2.3E+06	**NO**	**IFD**
Fluorene	ug/kg	110	1	1%	330	4800	ND	15000	NA	2.7E+06	**NO**	**IFD**
Hexachlorobenzene	ug/kg	110	1	1%	330	1900	ND	255	NA	3.0E+02	**NO**	**IFD**
Hexachlorobutadiene	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.2E+03	**NO**	**IFD**
Hexachlorocyclopentadiene	ug/kg	110	0	0%	330	1900	ND	ND	NA	3.7E+05	**NO**	**IFD**
Hexachloroethane	ug/kg	110	0	0%	330	1900	ND	ND	NA	3.5E+04	**NO**	**IFD**
Indeno(1,2,3-cd)pyrene	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.2E+02	**NO**	**IFD**
Isophorone	ug/kg	110	0	0%	330	1900	ND	ND	NA	5.1E+05	**NO**	**IFD**
Naphthalene	ug/kg	110	6	5%	330	4800	ND	27000	NA	5.6E+04	**NO**	**IFD**
NDPA/DPA	ug/kg	110	2	2%	330	4800	ND	13000	NA	9.9E+04	**NO**	**IFD**
Nitrobenzene	ug/kg	110	0	0%	330	1900	ND	ND	NA	2.0E+04	**NO**	**IFD**
n-Nitrosodi-n-propylamine	ug/kg	110	0	0%	330	1900	ND	ND	NA	6.9E+01	**NO**	**IFD**
p-Chloro-m-cresol	ug/kg	110	0	0%	330	1900	ND	ND	NA	NA	**NO**	**IFD**
Pentachlorophenol	ug/kg	110	0	0%	840	4800	ND	ND	NA	3.0E+03	**NO**	**IFD**
Phenanthrene	ug/kg	110	1	1%	330	4800	ND	31000	NA	NA	**NO**	**IFD**
Phenol	ug/kg	110	1	1%	330	1900	ND	940	NA	1.8E+07	**NO**	**IFD**
Pyrene	ug/kg	110	1	1%	330	1900	ND	4200	NA	2.3E+06	**NO**	**IFD**
1,1,1-Trichloroethane	ug/kg	161	17	11%	7.6	5400	ND	3600	NA	1.2E+06	**NO**	**BSL**
1,1,2,2-Tetrachloroethane	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	4.1E+02	**NO**	**IFD**
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/kg	161	9	6%	7.6	1100	ND	33	NA	NA	**NO**	**NTX**
1,1,2-Trichloroethane	ug/kg	161	17	11%	7.6	1100	ND	280	NA	7.3E+02	**NO**	**BSL**
1,1-Dichloroethane	ug/kg	161	46	29%	7.6	5400	ND	1600	NA	5.1E+05	**NO**	**BSL**
1,1-Dichloroethene	ug/kg	161	56	35%	7.6	5400	ND	480	NA	1.2E+05	**NO**	**BSL**
1,2,3-Trichlorobenzene	ug/kg	161	8	5%	7.6	1100	ND	270.3	NA	NA	**NO**	**IFD**
1,2,4-Trichlorobenzene	ug/kg	161	12	7%	7.6	1100	ND	10250	NA	6.2E+04	**NO**	**BSL**
1,2-Dibromo-3-chloropropane	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	4.6E+02	**NO**	**IFD**
1,2-Dibromoethane	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	3.2E+01	**NO**	**IFD**
1,2-Dichlorobenzene	ug/kg	161	29	18%	7.6	4800	ND	22000	NA	6.0E+05	**NO**	**BSL**
1,2-Dichloroethane	ug/kg	161	60	37%	7.6	11000	ND	45000	NA	2.8E+02	**YES**	**ASL**
1,2-Dichloropropane	ug/kg	161	3	2%	7.6	1100	ND	3.12	NA	3.4E+02	**NO**	**IFD**
1,3-Dichlorobenzene	ug/kg	161	12	7%	7.6	1100	ND	3135	NA	5.3E+05	**NO**	**BSL**
1,4-Dichlorobenzene	ug/kg	161	21	13%	7.6	1100	ND	4000	NA	3.4E+03	**YES**	**ASL**
2-Butanone	ug/kg	161	40	25%	6.4	26000	ND	33000	NA	2.2E+07	**NO**	**BSL**
2-Hexanone	ug/kg	161	7	4%	7.6	1100	ND	56	NA	NA	**NO**	**IFD**
4-Methyl-2-pentanone	ug/kg	161	30	19%	7.6	26000	ND	48000	NA	5.3E+06	**NO**	**BSL**
Acetone	ug/kg	161	50	31%	6.4	26000	ND	36000	NA	1.4E+07	**NO**	**BSL**
Benzene	ug/kg	161	45	28%	7.6	1100	ND	5600	NA	6.4E+02	**YES**	**ASL**
Bromochloromethane	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	NA	**NO**	**IFD**
Bromodichloromethane	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	8.2E+02	**NO**	**IFD**
Bromoform	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	6.2E+04	**NO**	**IFD**
Bromomethane	ug/kg	161	3	2%	7.6	1100	ND	60	NA	3.9E+03	**NO**	**IFD**
Carbon disulfide	ug/kg	161	11	7%	7.6	1100	ND	8.4	NA	3.6E+05	**NO**	**BSL**
Carbon tetrachloride	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	2.5E+02	**NO**	**IFD**
Chlorobenzene	ug/kg	161	35	22%	7.6	1100	ND	1280	NA	1.5E+05	**NO**	**BSL**
Chloroethane	ug/kg	161	10	6%	7.6	1100	ND	72	NA	3.0E+03	**NO**	**BSL**
Chloroform	ug/kg	161	31	19%	7.6	1100	ND	750	NA	2.2E+02	**YES**	**ASL**
Chloromethane	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	4.7E+04	**NO**	**IFD**
cis-1,2-Dichloroethene	ug/kg	161	81	50%	7.6	11000	ND	58000	NA	4.3E+04	**YES**	**ASL**
cis-1,3-Dichloropropene	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	NA	**NO**	**IFD**
Cyclohexane	ug/kg	161	4	2%	7.6	1100	ND	1.41	NA	1.4E+05	**NO**	**IFD**
Dibromochloromethane	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	1.1E+03	**NO**	**IFD**
Dichlorodifluoromethane	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	9.4E+04	**NO**	**IFD**
Ethylbenzene	ug/kg	161	50	31%	7.6	26000	ND	150000	NA	4.0E+05	**NO**	**BSL**
Isopropylbenzene	ug/kg	161	32	20%	7.6	5400	ND	4400	NA	5.7E+05	**NO**	**BSL**
Methyl acetate	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	2.2E+07	**NO**	**IFD**
Methyl tert butyl ether	ug/kg	161	1	1%	7.6	1100	ND	0.86	NA	3.2E+04	**NO**	**IFD**
Methylcyclohexane	ug/kg	161	37	23%	7.6	26000	ND	85000	NA	2.6E+06	**NO**	**BSL**
Methylene chloride	ug/kg	161	31	19%	7.6	1100	ND	402	NA	9.1E+03	**NO**	**BSL**
Styrene	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	1.7E+06	**NO**	**IFD**
Tetrachloroethene	ug/kg	161	79	49%	7.7	11000	ND	72000	NA	4.8E+02	**YES**	**ASL**
Toluene	ug/kg	161	75	47%	7.6	260000	ND	1900000	NA	5.2E+05	**YES**	**ASL**
trans-1,2-Dichloroethene	ug/kg	161	14	9%	7.6	1100	ND	70	NA	7.0E+04	**NO**	**BSL**
trans-1,3-Dichloropropene	ug/kg	161	0	0%	7.6	1100	ND	ND	NA	NA	**NO**	**IFD**
Trichloroethene	ug/kg	161	80	50%	7.6	11000	ND	150000	NA	4.8E+02	**YES**	**ASL**
Trichlorofluoromethane	ug/kg	161	10	6%	7.6	1100	ND	130	NA	3.9E+05	**NO**	**BSL**
Vinyl chloride	ug/kg	161	32	20%	7.6	1100	ND	370	NA	7.9E+01	**YES**	**ASL**
Xylenes (Total)	ug/kg	161	57	35%	7.6	26000	ND	650000	NA	2.7E+05	**YES**	**ASL**

Notes:
Rationale Codes:
Selection Reason: ASL = Above Screening Level.
NSL- Detected, No Screening Level Available.
TOX = Group A Carcinogen.
Deletion Reason: BSL = Below Screening Level.
IFD = Infrequent detection (less than or equal to 5%)
NUT = Essential Nutrient.
NTX = No Toxicity Value Available.

Table H-1.3
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site-wide Shallow Groundwater

Chemical	Units	Number of Samples	Number of Detects	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Minimum Detected Concentration	Maximum Detected Concentration	Screening Criteria Tap Water PRGs	COPC (Yes/ No)	Rationale for Selection or Deletion
Aluminum	mg/L	14	14	100%	0.2	0.2	0.038	0.6	3.6E+01	**NO**	BSL
Antimony	mg/L	14	0	0%	0.05	0.05	ND	ND	1.5E-02	**NO**	IFD
Arsenic	mg/L	14	0	0%	0.01	0.01	ND	ND	4.5E-05	**NO**	IFD
Barium	mg/L	14	14	100%	0.01	0.01	0.02	0.15	2.6E+00	**NO**	BSL
Beryllium	mg/L	14	10	71%	0.005	0.005	ND	0.0007	7.3E-02	**NO**	BSL
Cadmium	mg/L	14	0	0%	0.005	0.005	ND	ND	1.8E-02	**NO**	IFD
Calcium	mg/L	14	14	100%	0.05	0.05	28	140	NA	**NO**	NUT
Chromium	mg/L	14	0	0%	0.01	0.01	ND	ND	NA	**NO**	IFD
Cobalt	mg/L	14	8	57%	0.05	0.05	ND	0.12	7.3E-01	**NO**	BSL
Copper	mg/L	14	2	14%	0.02	0.02	ND	0.0105	1.5E+00	**NO**	BSL
Iron	mg/L	14	12	86%	0.1	0.1	ND	12.5	1.1E+01	**YES**	ASL
Lead	mg/L	14	0	0%	0.01	0.01	ND	ND	NA	**NO**	IFD
Magnesium	mg/L	14	14	100%	0.05	0.05	14	75	NA	**NO**	NUT
Manganese	mg/L	14	14	100%	0.015	0.015	0.032	12	8.8E-01	**YES**	ASL
Nickel	mg/L	14	11	79%	0.02	0.02	ND	0.05	7.3E-01	**NO**	BSL
Potassium	mg/L	14	14	100%	0.2	0.2	0.3	3.3	NA	**NO**	NUT
Selenium	mg/L	14	11	79%	0.035	0.035	ND	0.033	1.8E-01	**NO**	BSL
Silver	mg/L	14	0	0%	0.01	0.01	ND	ND	1.8E-01	**NO**	IFD
Sodium	mg/L	14	14	100%	0.05	0.05	11	36	NA	**NO**	NUT
Thallium	mg/L	14	8	57%	0.025	0.025	ND	0.0014	2.4E-03	**NO**	BSL
Vanadium	mg/L	14	9	64%	0.05	0.05	ND	0.012	3.6E-02	**NO**	BSL
Zinc	mg/L	14	8	57%	0.02	0.02	ND	0.03	1.1E+01	**NO**	BSL
Mercury	mg/L	14	2	14%	0.0002	0.0002	ND	0.000057	1.1E-02	**NO**	BSL
1,2,4,5-Tetrachlorobenzene	ug/L	14	0	0%	10	10	ND	ND	1.1E+01	**NO**	IFD
2,4,5-Trichlorophenol	ug/L	14	0	0%	25	25	ND	ND	3.6E+03	**NO**	IFD
2,4,6-Trichlorophenol	ug/L	14	0	0%	10	10	ND	ND	3.6E+00	**NO**	IFD
2,4-Dichlorophenol	ug/L	14	0	0%	10	10	ND	ND	1.1E+02	**NO**	IFD
2,4-Dimethylphenol	ug/L	14	0	0%	10	10	ND	ND	7.3E+02	**NO**	IFD
2,4-Dinitrophenol	ug/L	14	0	0%	25	25	ND	ND	7.3E+01	**NO**	IFD
2,4-Dinitrotoluene	ug/L	14	0	0%	10	10	ND	ND	7.3E+01	**NO**	IFD
2,6-Dinitrotoluene	ug/L	14	0	0%	10	10	ND	ND	3.6E+01	**NO**	IFD
2-Chloronaphthalene	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
2-Chlorophenol	ug/L	14	1	7%	10	50	ND	145	3.0E+01	**YES**	ASL
2-Methylnaphthalene	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
2-Methylphenol	ug/L	14	1	7%	10	10	ND	88.5	1.8E+03	**NO**	BSL
2-Nitroaniline	ug/L	14	0	0%	25	25	ND	ND	1.1E+02	**NO**	IFD
2-Nitrophenol	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
3,3'-Dichlorobenzidine	ug/L	14	0	0%	10	10	ND	ND	1.5E-01	**NO**	IFD
3+4-Methylphenol	ug/L	14	1	7%	10	10	ND	52.5	1.80E+02	**NO**	BSL
3-Nitroaniline	ug/L	14	0	0%	25	25	ND	ND	3.2E+00	**NO**	IFD
4,6-Dinitro-o-cresol	ug/L	14	0	0%	25	25	ND	ND	3.6E+00	**NO**	IFD
4-Bromophenyl phenyl ether	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
4-Chloroaniline	ug/L	14	1	7%	10	10	ND	35	1.5E+02	**NO**	BSL
4-Chlorophenyl phenyl ether	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
4-Nitroaniline	ug/L	14	0	0%	25	25	ND	ND	3.2E+00	**NO**	IFD
4-Nitrophenol	ug/L	14	0	0%	25	25	ND	ND	NA	**NO**	IFD
Acenaphthene	ug/L	14	0	0%	10	10	ND	ND	3.7E+02	**NO**	IFD
Acenaphthylene	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
Acetophenone	ug/L	14	1	7%	10	10	ND	60	NA	**YES**	NSL
Anthracene	ug/L	14	0	0%	10	10	ND	ND	1.8E+03	**NO**	IFD
Atrazine	ug/L	14	0	0%	10	10	ND	ND	3.0E-01	**NO**	IFD
Benzaldehyde	ug/L	14	0	0%	10	10	ND	ND	3.6E+03	**NO**	IFD
Benzo(a)anthracene	ug/L	14	0	0%	10	10	ND	ND	9.2E-02	**NO**	IFD
Benzo(a)pyrene	ug/L	14	0	0%	10	10	ND	ND	9.2E-03	**NO**	IFD
Benzo(b)fluoranthene	ug/L	14	0	0%	10	10	ND	ND	9.2E-02	**NO**	IFD
Benzo(ghi)perylene	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
Benzo(k)fluoranthene	ug/L	14	0	0%	10	10	ND	ND	9.2E-01	**NO**	IFD
Biphenyl	ug/L	14	0	0%	10	10	ND	ND	3.04E+02	**NO**	IFD
Bis(2-chloroethoxy)methane	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
Bis(2-chloroethyl)ether	ug/L	14	0	0%	10	10	ND	ND	1.0E-02	**NO**	IFD
Bis(2-chloroisopropyl)ether	ug/L	14	0	0%	10	10	ND	ND	2.7E-01	**NO**	IFD
Bis(2-ethylhexyl)phthalate	ug/L	14	2	14%	10	10	ND	14.5	4.8E+00	**YES**	ASL
Butyl benzyl phthalate	ug/L	14	1	7%	10	10	ND	36	7.3E+03	**NO**	BSL
Caprolactam	ug/L	14	0	0%	10	10	ND	ND	1.8E+04	**NO**	IFD
Carbazole	ug/L	14	0	0%	10	10	ND	ND	3.4E+00	**NO**	IFD
Chrysene	ug/L	14	0	0%	10	10	ND	ND	9.2E+00	**NO**	IFD
Dibenzo(a,h)anthracene	ug/L	14	0	0%	10	10	ND	ND	9.2E-03	**NO**	IFD
Dibenzofuran	ug/L	14	0	0%	10	10	ND	ND	1.2E+01	**NO**	IFD
Diethyl phthalate	ug/L	14	1	7%	10	10	ND	6.85	2.9E+04	**NO**	BSL
Dimethyl phthalate	ug/L	14	1	7%	10	10	ND	19	3.6E+05	**NO**	BSL
Di-n-butylphthalate	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
Di-n-octylphthalate	ug/L	14	0	0%	10	10	ND	ND	1.46E+03	**NO**	IFD
Fluoranthene	ug/L	14	0	0%	10	10	ND	ND	1.5E+03	**NO**	IFD
Fluorene	ug/L	14	0	0%	10	10	ND	ND	2.4E+02	**NO**	IFD
Hexachlorobenzene	ug/L	14	0	0%	10	10	ND	ND	4.2E-02	**NO**	IFD

Table H-1.3
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site-wide Shallow Groundwater

Chemical	Units	Number of Samples	Number of Detects	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Minimum Detected Concentration	Maximum Detected Concentration	Screening Criteria Tap Water PRGs	COPC (Yes/ No)	Rationale for Selection or Deletion
Hexachlorobutadiene	ug/L	14	0	0%	10	10	ND	ND	8.6E-01	**NO**	IFD
Hexachlorocyclopentadiene	ug/L	14	0	0%	10	10	ND	ND	2.2E+02	**NO**	IFD
Hexachloroethane	ug/L	14	0	0%	10	10	ND	ND	4.8E+00	**NO**	IFD
Indeno(1,2,3-cd)pyrene	ug/L	14	0	0%	10	10	ND	ND	9.2E-02	**NO**	IFD
Isophorone	ug/L	14	1	7%	10	10	ND	16.5	7.1E+01	**NO**	BSL
Naphthalene	ug/L	14	3	21%	10	10	ND	30.5	6.2E+00	**YES**	ASL
NDPA/DPA	ug/L	14	0	0%	10	10	ND	ND	1.4E+01	**NO**	IFD
Nitrobenzene	ug/L	14	0	0%	10	10	ND	ND	3.4E+00	**NO**	IFD
n-Nitrosodi-n-propylamine	ug/L	14	0	0%	10	10	ND	ND	9.6E-03	**NO**	IFD
p-Chloro-m-cresol	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
Pentachlorophenol	ug/L	14	0	0%	25	25	ND	ND	5.6E-01	**NO**	IFD
Phenanthrene	ug/L	14	0	0%	10	10	ND	ND	NA	**NO**	IFD
Phenol	ug/L	14	1	7%	10	10	ND	44	1.1E+04	**NO**	BSL
Pyrene	ug/L	14	0	0%	10	10	ND	0	1.8E+02	**NO**	IFD
1,1,1-Trichloroethane	ug/L	60	17	28%	10	10000	ND	51000	3.2E+03	**YES**	ASL
1,1,2,2-Tetrachloroethane	ug/L	60	0	0%	10	10000	ND	ND	5.5E-02	**NO**	IFD
trifluoroethane	ug/L	60	10	17%	10	10000	ND	333	NA	**NO**	NTX
1,1,2-Trichloroethane	ug/L	60	19	32%	10	10000	ND	154	2.0E-01	**YES**	ASL
1,1-Dichloroethane	ug/L	60	34	57%	10	10000	ND	7200	8.1E+02	**YES**	ASL
1,1-Dichloroethene	ug/L	60	33	55%	10	10000	ND	8100	3.5E+02	**YES**	ASL
1,2,3-Trichlorobenzene	ug/L	60	1	2%	10	10000	ND	374	NA	**NO**	IFD
1,2,4-Trichlorobenzene	ug/L	60	3	5%	10	10000	ND	126	7.2E+00	**NO**	IFD
1,2-Dibromo-3-chloropropane	ug/L	60	0	0%	10	10000	ND	ND	4.8E-02	**NO**	IFD
1,2-Dibromoethane	ug/L	60	0	0%	10	10000	ND	ND	5.6E-03	**NO**	IFD
1,2-Dichlorobenzene	ug/L	60	20	33%	10	10000	ND	2500	3.7E+02	**YES**	ASL
1,2-Dichloroethane	ug/L	60	34	57%	10	10000	ND	52500	1.2E-01	**YES**	ASL
1,2-Dichloropropane	ug/L	60	3	5%	10	10000	ND	1.245	1.6E-01	**NO**	IFD
1,3-Dichlorobenzene	ug/L	60	9	15%	10	10000	ND	101.5	1.8E+02	**NO**	BSL
1,4-Dichlorobenzene	ug/L	60	11	18%	10	10000	ND	1300	5.0E-01	**YES**	ASL
2-Butanone	ug/L	60	9	15%	10	10000	ND	3150	7.0E+03	**NO**	BSL
2-Hexanone	ug/L	60	5	8%	10	10000	ND	478	NA	**YES**	NSL
4-Methyl-2-pentanone	ug/L	60	10	17%	10	10000	ND	11000	6.3E+03	**YES**	ASL
Acetone	ug/L	60	16	27%	10	10000	ND	4400	5.5E+03	**NO**	BSL
Benzene	ug/L	60	37	62%	10	10000	ND	1050	3.5E-01	**YES**	ASL
Bromochloromethane	ug/L	60	0	0%	10	10000	ND	ND	NA	**NO**	IFD
Bromodichloromethane	ug/L	60	3	5%	10	10000	ND	6.27	1.8E-01	**NO**	IFD
Bromoform	ug/L	60	0	0%	10	10000	ND	ND	8.5E+00	**NO**	IFD
Bromomethane	ug/L	60	0	0%	10	10000	ND	ND	8.7E+00	**NO**	IFD
Carbon disulfide	ug/L	60	2	3%	10	10000	ND	1.22	1.0E+03	**NO**	IFD
Carbon tetrachloride	ug/L	60	1	2%	10	10000	ND	11000	1.7E-01	**NO**	IFD
Chlorobenzene	ug/L	60	28	47%	10	10000	ND	3000	1.1E+02	**YES**	ASL
Chloroethane	ug/L	60	19	32%	10	10000	ND	2850	4.6E+00	**YES**	ASL
Chloroform	ug/L	60	21	35%	10	10000	ND	882	1.7E-01	**YES**	ASL
Chloromethane	ug/L	60	3	5%	10	10000	ND	14	1.6E+02	**NO**	IFD
cis-1,2-Dichloroethene	ug/L	60	41	68%	10	10000	ND	13000	6.10E+01	**YES**	ASL
cis-1,3-Dichloropropene	ug/L	60	0	0%	10	10000	ND	ND	NA	**NO**	IFD
Cyclohexane	ug/L	60	10	17%	10	10000	ND	770	1.0E+04	**NO**	BSL
Dibromochloromethane	ug/L	60	1	2%	10	10000	ND	3.32	1.3E-01	**NO**	IFD
Dichlorodifluoromethane	ug/L	60	1	2%	10	10000	ND	0.1375	3.9E+02	**NO**	IFD
Ethylbenzene	ug/L	60	26	43%	10	10000	ND	46000	1.3E+03	**YES**	ASL
Isopropylbenzene	ug/L	60	30	50%	10	10000	ND	36000	6.6E+02	**YES**	ASL
Methyl acetate	ug/L	60	0	0%	10	10000	ND	ND	6.1E+03	**NO**	IFD
Methyl tert butyl ether	ug/L	60	15	25%	10	10000	ND	444	1.1E+01	**YES**	ASL
Methylcyclohexane	ug/L	60	25	42%	10	10000	ND	19000	5.2E+03	**YES**	ASL
Methylene chloride	ug/L	60	22	37%	10	10000	ND	7900	4.3E+00	**YES**	ASL
Styrene	ug/L	60	0	0%	10	10000	ND	ND	1.6E+03	**NO**	IFD
Tetrachloroethene	ug/L	60	34	57%	10	10000	ND	13000	1.0E-01	**YES**	ASL
Toluene	ug/L	60	51	85%	10	10000	ND	52000	7.2E+02	**YES**	ASL
trans-1,2-Dichloroethene	ug/L	60	21	35%	10	10000	ND	49	1.22E+02	**NO**	BSL
trans-1,3-Dichloropropene	ug/L	60	0	0%	10	10000	ND	ND	NA	**NO**	IFD
Trichloroethene	ug/L	60	40	67%	10	10000	ND	14000	1.0E-01	**YES**	ASL
Trichlorofluoromethane	ug/L	60	8	13%	10	10000	ND	987	1.3E+03	**NO**	BSL
Vinyl chloride	ug/L	60	29	48%	10	10000	ND	1200	2.0E-02	**YES**	ASL
Xylenes (Total)	ug/L	60	31	52%	10	10000	ND	150000	2.1E+02	**YES**	ASL

Notes:
Rationale Codes:
Selection Reason: ASL = Above Screening Level.
NSL = Detected, No Screenling Level Available.
TOX = Group A Carcinogen.
Deletion Reason: BSL = Below Screening Level.
IFD = Infrequent detection (less than or equal to 5%).
NUT = Essential Nutrient.
NTX = No Toxicity Value Available.

Table H-1.4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site-wide Shallow and Bedrock Groundwater

Chemical	Units	Number of Samples	Number of Detects	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Minimum Detected Concentration	Maximum Detected Concentration	Criteria Tap Water PRGs	COPC (Yes/ No)	Rationale for Selection or Deletion
Aluminum	mg/L	18	18	100%	0.2	0.2	0.038	1.4	3.6E+01	**NO**	BSL
Antimony	mg/L	18	0	0%	0.05	0.05	ND	ND	1.5E-02	**NO**	IFD
Arsenic	mg/L	18	0	0%	0.01	0.01	ND	ND	4.5E-05	**NO**	IFD
Barium	mg/L	18	18	100%	0.01	0.01	0.0052	0.15	2.6E+00	**NO**	BSL
Beryllium	mg/L	18	13	72%	0.005	0.005	ND	0.0007	7.3E-02	**NO**	BSL
Cadmium	mg/L	18	0	0%	0.005	0.005	ND	ND	1.8E-02	**NO**	IFD
Calcium	mg/L	18	18	100%	0.05	0.05	28	140	NA	**NO**	NUT
Chromium	mg/L	18	1	6%	0.01	0.01	ND	0.0058	1.1E-01	**NO**	BSL
Cobalt	mg/L	18	8	44%	0.05	0.05	ND	0.12	7.3E-01	**NO**	BSL
Copper	mg/L	18	3	17%	0.02	0.02	ND	0.0105	1.5E+00	**NO**	BSL
Iron	mg/L	18	15	83%	0.1	0.1	ND	12.5	1.1E+01	**YES**	ASL
Lead	mg/L	18	0	0%	0.01	0.01	ND	ND	NA	**NO**	IFD
Magnesium	mg/L	18	18	100%	0.05	0.05	8.2	75	NA	**NO**	NUT
Manganese	mg/L	18	18	100%	0.015	0.015	0.022	12	8.8E-01	**YES**	ASL
Nickel	mg/L	18	12	67%	0.02	0.02	ND	0.05	7.3E-01	**NO**	BSL
Potassium	mg/L	18	18	100%	0.2	0.2	0.3	3.3	NA	**NO**	NUT
Selenium	mg/L	18	15	83%	0.035	0.035	ND	0.033	1.8E-01	**NO**	BSL
Silver	mg/L	18	0	0%	0.01	0.01	ND	ND	1.8E-01	**NO**	IFD
Sodium	mg/L	18	18	100%	0.05	0.05	11	36	NA	**NO**	NUT
Thallium	mg/L	18	8	44%	0.025	0.025	ND	0.0014	2.4E-03	**NO**	BSL
Vanadium	mg/L	18	11	61%	0.05	0.05	ND	0.013	3.6E-02	**NO**	BSL
Zinc	mg/L	18	12	67%	0.02	0.02	ND	0.03	1.1E+01	**NO**	BSL
Mercury	mg/L	18	3	17%	0.0002	0.0002	ND	0.000057	1.1E-02	**NO**	BSL
1,2,4,5-Tetrachlorobenzene	ug/L	18	0	0%	10	10	ND	ND	1.1E+01	**NO**	IFD
2,4,5-Trichlorophenol	ug/L	18	0	0%	25	25	ND	ND	3.6E+03	**NO**	IFD
2,4,6-Trichlorophenol	ug/L	18	0	0%	10	10	ND	ND	3.6E+00	**NO**	IFD
2,4-Dichlorophenol	ug/L	18	0	0%	10	10	ND	ND	1.1E+02	**NO**	IFD
2,4-Dimethylphenol	ug/L	18	0	0%	10	10	ND	ND	7.3E+02	**NO**	IFD
2,4-Dinitrophenol	ug/L	18	0	0%	25	25	ND	ND	7.3E+01	**NO**	IFD
2,4-Dinitrotoluene	ug/L	18	0	0%	10	10	ND	ND	7.3E+01	**NO**	IFD
2,6-Dinitrotoluene	ug/L	18	0	0%	10	10	ND	ND	3.6E+01	**NO**	IFD
2-Chloronaphthalene	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
2-Chlorophenol	ug/L	18	1	6%	10	50	ND	145	3.0E+01	**YES**	ASL
2-Methylnaphthalene	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
2-Methylphenol	ug/L	18	1	6%	10	10	ND	88.5	1.8E+03	**NO**	BSL
2-Nitroaniline	ug/L	18	0	0%	25	25	ND	ND	1.1E+02	**NO**	IFD
2-Nitrophenol	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
3,3'-Dichlorobenzidine	ug/L	18	0	0%	10	10	ND	ND	1.5E-01	**NO**	IFD
3+4-Methylphenol	ug/L	18	1	6%	10	10	ND	52.5	1.80E+02	**NO**	BSL
3-Nitroaniline	ug/L	18	0	0%	25	25	ND	ND	3.2E+00	**NO**	IFD
4,6-Dinitro-o-cresol	ug/L	18	0	0%	25	25	ND	ND	3.6E+00	**NO**	IFD
4-Bromophenyl phenyl ether	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
4-Chloroaniline	ug/L	18	1	6%	10	10	ND	35	1.5E+02	**NO**	BSL
4-Chlorophenyl phenyl ether	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
4-Nitroaniline	ug/L	18	0	0%	25	25	ND	ND	3.2E+00	**NO**	IFD
4-Nitrophenol	ug/L	18	0	0%	25	25	ND	ND	NA	**NO**	IFD
Acenaphthene	ug/L	18	0	0%	10	10	ND	ND	3.7E+02	**NO**	IFD
Acenaphthylene	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
Acetophenone	ug/L	18	1	6%	10	10	ND	60	NA	**YES**	NSL
Anthracene	ug/L	18	0	0%	10	10	ND	ND	1.8E+03	**NO**	IFD
Atrazine	ug/L	18	0	0%	10	10	ND	ND	3.0E-01	**NO**	IFD
Benzaldehyde	ug/L	18	0	0%	10	10	ND	ND	3.6E+03	**NO**	IFD
Benzo(a)anthracene	ug/L	18	0	0%	10	10	ND	ND	9.2E-02	**NO**	IFD
Benzo(a)pyrene	ug/L	18	0	0%	10	10	ND	ND	9.2E-03	**NO**	IFD
Benzo(b)fluoranthene	ug/L	18	0	0%	10	10	ND	ND	9.2E-02	**NO**	IFD
Benzo(ghi)perylene	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
Benzo(k)fluoranthene	ug/L	18	0	0%	10	10	ND	ND	9.2E-01	**NO**	IFD
Biphenyl	ug/L	18	0	0%	10	10	ND	ND	3.04E+02	**NO**	IFD
Bis(2-chloroethoxy)methane	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
Bis(2-chloroethyl)ether	ug/L	18	0	0%	10	10	ND	ND	1.0E-02	**NO**	IFD
Bis(2-chloroisopropyl)ether	ug/L	18	0	0%	10	10	ND	ND	2.7E-01	**NO**	IFD
Bis(2-ethylhexyl)phthalate	ug/L	18	3	17%	10	10	ND	14.5	4.8E+00	**YES**	ASL
Butyl benzyl phthalate	ug/L	18	1	6%	10	10	ND	36	7.3E+03	**NO**	BSL
Caprolactam	ug/L	18	0	0%	10	10	ND	ND	1.8E+04	**NO**	IFD
Carbazole	ug/L	18	0	0%	10	10	ND	ND	3.4E+00	**NO**	IFD
Chrysene	ug/L	18	0	0%	10	10	ND	ND	9.2E+00	**NO**	IFD
Dibenzo(a,h)anthracene	ug/L	18	0	0%	10	10	ND	ND	9.2E-03	**NO**	IFD
Dibenzofuran	ug/L	18	0	0%	10	10	ND	ND	1.2E+01	**NO**	IFD
Diethyl phthalate	ug/L	18	1	6%	10	10	ND	6.85	2.9E+04	**NO**	BSL
Dimethyl phthalate	ug/L	18	1	6%	10	10	ND	19	3.6E+05	**NO**	BSL
Di-n-butylphthalate	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
Di-n-octylphthalate	ug/L	18	0	0%	10	10	ND	ND	1.46E+03	**NO**	IFD
Fluoranthene	ug/L	18	0	0%	10	10	ND	ND	1.5E+03	**NO**	IFD
Fluorene	ug/L	18	0	0%	10	10	ND	ND	2.4E+02	**NO**	IFD
Hexachlorobenzene	ug/L	18	0	0%	10	10	ND	ND	4.2E-02	**NO**	IFD
Hexachlorobutadiene	ug/L	18	0	0%	10	10	ND	ND	8.6E-01	**NO**	IFD

Table H-1.4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site-wide Shallow and Bedrock Groundwater

Chemical	Units	Number of Samples	Number of Detects	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Minimum Detected Concentration	Maximum Detected Concentration	Criteria Tap Water PRGs	COPC (Yes/ No)	Rationale for Selection or Deletion
Hexachlorocyclopentadiene	ug/L	18	0	0%	10	10	ND	ND	2.2E+02	**NO**	IFD
Hexachloroethane	ug/L	18	0	0%	10	10	ND	ND	4.8E+00	**NO**	IFD
Indeno(1,2,3-cd)pyrene	ug/L	18	0	0%	10	10	ND	ND	9.2E-02	**NO**	IFD
Isophorone	ug/L	18	1	6%	10	10	ND	16.5	7.1E+01	**NO**	BSL
Naphthalene	ug/L	18	3	17%	10	10	ND	30.5	6.2E+00	**YES**	ASL
NDPA/DPA	ug/L	18	0	0%	10	10	ND	ND	1.4E+01	**NO**	IFD
Nitrobenzene	ug/L	18	0	0%	10	10	ND	ND	3.4E+00	**NO**	IFD
n-Nitrosodi-n-propylamine	ug/L	18	0	0%	10	10	ND	ND	9.6E-03	**NO**	IFD
p-Chloro-m-cresol	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
Pentachlorophenol	ug/L	18	0	0%	25	25	ND	ND	5.6E-01	**NO**	IFD
Phenanthrene	ug/L	18	0	0%	10	10	ND	ND	NA	**NO**	IFD
Phenol	ug/L	18	1	6%	10	10	ND	44	1.1E+04	**NO**	BSL
Pyrene	ug/L	18	0	0%	10	10	ND	ND	1.8E+02	**NO**	IFD
1,1,1-Trichloroethane	ug/L	88	22	25%	10	10000	ND	51000	3.2E+03	**YES**	ASL
1,1,2,2-Tetrachloroethane	ug/L	88	1	1%	10	10000	ND	3.09	5.5E-02	**NO**	IFD
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	88	13	15%	10	10000	ND	333	NA	**NO**	NTX
1,1,2-Trichloroethane	ug/L	88	23	26%	10	10000	ND	154	2.0E-01	**YES**	ASL
1,1-Dichloroethane	ug/L	88	48	55%	10	10000	ND	7200	8.1E+02	**YES**	ASL
1,1-Dichloroethene	ug/L	88	46	52%	10	10000	ND	8100	3.5E+02	**YES**	ASL
1,2,3-Trichlorobenzene	ug/L	88	1	1%	10	10000	ND	374	NA	**NO**	IFD
1,2,4-Trichlorobenzene	ug/L	88	5	6%	10	10000	ND	126	7.2E+00	**YES**	ASL
1,2-Dibromo-3-chloropropane	ug/L	88	0	0%	10	10000	ND	ND	4.8E-02	**NO**	IFD
1,2-Dibromoethane	ug/L	88	0	0%	10	10000	ND	ND	5.6E-03	**NO**	IFD
1,2-Dichlorobenzene	ug/L	88	25	28%	10	10000	ND	2500	3.7E+02	**YES**	ASL
1,2-Dichloroethane	ug/L	88	47	53%	10	10000	ND	52500	1.2E-01	**YES**	ASL
1,2-Dichloropropane	ug/L	88	4	5%	10	10000	ND	1.99	1.6E-01	**NO**	IFD
1,3-Dichlorobenzene	ug/L	88	12	14%	10	10000	ND	110	1.8E+02	**NO**	BSL
1,4-Dichlorobenzene	ug/L	88	14	16%	10	10000	ND	1300	5.0E-01	**YES**	ASL
2-Butanone	ug/L	88	11	13%	10	10000	ND	3150	7.0E+03	**NO**	BSL
2-Hexanone	ug/L	88	7	8%	10	10000	ND	478	NA	**YES**	NSL
4-Methyl-2-pentanone	ug/L	88	12	14%	10	10000	ND	11000	6.3E+03	**YES**	ASL
Acetone	ug/L	88	20	23%	10	10000	ND	4400	5.5E+03	**NO**	BSL
Benzene	ug/L	88	44	50%	10	10000	ND	1050	3.5E-01	**YES**	ASL
Bromochloromethane	ug/L	88	0	0%	10	10000	ND	ND	NA	**NO**	IFD
Bromodichloromethane	ug/L	88	6	7%	10	10000	ND	6.27	1.8E-01	**YES**	ASL
Bromoform	ug/L	88	0	0%	10	10000	ND	ND	8.5E+00	**NO**	IFD
Bromomethane	ug/L	88	0	0%	10	10000	ND	ND	8.7E+00	**NO**	IFD
Carbon disulfide	ug/L	88	3	3%	10	10000	ND	1.22	1.0E+03	**NO**	IFD
Carbon tetrachloride	ug/L	88	1	1%	10	10000	ND	11000	1.7E-01	**NO**	IFD
Chlorobenzene	ug/L	88	34	39%	10	10000	ND	3500	1.1E+02	**YES**	ASL
Chloroethane	ug/L	88	24	27%	10	10000	ND	2850	4.6E+00	**YES**	ASL
Chloroform	ug/L	88	33	38%	10	10000	ND	882	1.7E-01	**YES**	ASL
Chloromethane	ug/L	88	4	5%	10	10000	ND	14	1.6E+02	**NO**	IFD
cis-1,2-Dichloroethene	ug/L	88	60	68%	10	10000	ND	13000	6.10E+01	**YES**	ASL
cis-1,3-Dichloropropene	ug/L	88	0	0%	10	10000	ND	ND	NA	**NO**	IFD
Cyclohexane	ug/L	88	11	13%	10	10000	ND	770	1.0E+04	**NO**	BSL
Dibromochloromethane	ug/L	88	3	3%	10	10000	ND	3.85	1.3E-01	**NO**	IFD
Dichlorodifluoromethane	ug/L	88	1	1%	10	10000	ND	0.1375	3.9E+02	**NO**	IFD
Ethylbenzene	ug/L	88	31	35%	10	10000	ND	46000	1.3E+03	**YES**	ASL
Isopropylbenzene	ug/L	88	34	39%	10	10000	ND	36000	6.6E+02	**YES**	ASL
Methyl acetate	ug/L	88	0	0%	10	10000	ND	ND	6.1E+03	**NO**	IFD
Methyl tert butyl ether	ug/L	88	17	19%	10	10000	ND	444	1.1E+01	**YES**	ASL
Methylcyclohexane	ug/L	88	29	33%	10	10000	ND	19000	5.2E+03	**YES**	ASL
Methylene chloride	ug/L	88	29	33%	10	10000	ND	7900	4.3E+00	**YES**	ASL
Styrene	ug/L	88	0	0%	10	10000	ND	ND	1.6E+03	**NO**	IFD
Tetrachloroethene	ug/L	88	51	58%	10	10000	ND	13000	1.0E-01	**YES**	ASL
Toluene	ug/L	88	74	84%	10	10000	ND	52000	7.2E+02	**YES**	ASL
trans-1,2-Dichloroethene	ug/L	88	27	31%	10	10000	ND	49	1.22E+02	**NO**	BSL
trans-1,3-Dichloropropene	ug/L	88	0	0%	10	10000	ND	ND	NA	**NO**	IFD
Trichloroethene	ug/L	88	58	66%	10	10000	ND	14000	1.0E-01	**YES**	ASL
Trichlorofluoromethane	ug/L	88	11	13%	10	10000	ND	987	1.3E+03	**NO**	BSL
Vinyl chloride	ug/L	88	36	41%	10	10000	ND	1200	2.0E-02	**YES**	ASL
Xylenes (Total)	ug/L	88	35	40%	10	10000	ND	150000	2.1E+02	**YES**	ASL

Notes:
Rationale Codes:
Selection Reason: ASL = Above Screening Level.
NSL = Detected, No Screening Level Available.
TOX = Group A Carcinogen.
Deletion Reason: BSL = Below Screening Level.
IFD = Infrequent detection (less than or equal to 5%).
NUT = Essential Nutrient.
NTX = No Toxicity Value Available.

H-2 Exposure Assumptions

Exposure Assumptions
Current O&M Worker Scenario

PSC Site
Rock Hill, South Carolina

Parameter Abbreviation	Parameter	Units	Carcinogenic	Noncarcinogenic	Basis/Source
AE_d	Dermal absorption efficiency	Unitless	Chemical-Specific	Chemical-Specific	EPA, Region 4 Supplement to RAGS 2007
AE_i	Ingestion absorption efficiency	Unitless	1	1	EPA, RAGS 1989
AE_{inhal}	Inhalation Absorption efficiency	Unitless	1	1	EPA, RAGS 1989
At_c/AT_n	Averaging Time	days	25550	9125	EPA, RAGS 1989
BW	Body Weight	kg	70	70	EPA, Supplemental Guidance for Soil Screening Levels, 2002
ED	Exposure Duration	yrs	25	25	EPA, Supplemental Guidance for Soil Screening Levels, 2002
EF	Exposure Frequency	day/yr	250	250	EPA, Supplemental Guidance for Soil Screening Levels, 2002
FC	Fraction ingested from contaminated source	unitless	1	1	EPA, RAGS 1989
$IR_{air\text{-}hourly}$	Hourly Inhalation Rate	m^3/hour	1	1	EPA, Exposure Factors Handbook Revised, 1997
ET_{inh}	Inhalation Exposure Time	hours	8	8	Professional judgment
IR_{soil}	Soil Ingestion Rate	mg/day	50	50	EPA, Exposure Factors Handbook Revised, 1997
IR_w	Daily Water Ingestion Rate	L/day	1	1	EPA, RAGS Supplemental Guidance. Standard Default Exposure Factors, 1991
AF	Soil to Skin Adherence Factor	mg/cm^2-event	0.2	0.2	EPA, RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004a
SA	Skin Surface Area	cm^2	3300	3300	EPA, Supplemental Guidance for Soil Screening Levels, 2002

Exposure Assumptions
Current and Future Teen/Adolescent Trespasser-Recreational Scenarios

PSC Site
Rock Hill, South Carolina

Parameter Abbreviation	Parameter	Units	Carcinogenic	Noncarcinogenic	Basis/Source
AE_d	Dermal absorption efficiency	Unitless	Chemical-Specific	Chemical-Specific	EPA, Region 4 Supplement to RAGS 2007
AE_i	Ingestion absorption efficiency	Unitless	1	1	EPA, RAGS 1989
AE_{inhal}	Inhalation Absorption efficiency	Unitless	1	1	EPA, RAGS 1989
At_c/AT_n	Averaging Time	days	25550	4380	EPA, RAGS, 1989; Professional judgment (noncancer)
BW	Body Weight	kg	42	42	EPA, Exposure Factors Handbook Revised, 1997
ED	Exposure Duration	yrs	12	12	Professional judgment
EF	Exposure Frequency	day/yr	144	144	Professional judgment - Approx. 3 days per week of year-round exposure
FC	Fraction ingested from contaminated source	unitless	1	1	EPA, RAGS 1989
$IR_{air\text{-}hourly}$	Hourly Inhalation Rate	m^3/hour	0.52	0.52	EPA, Exposure Factors Handbook Revised, 1997 Light activity level
ET_{inh}	Inhalation Exposure Time	hours	4	4	Professional judgment
IR_{soil}	Soil Ingestion Rate	mg/day	100	100	Mean IR for child; EPA, Exposure Factors Handbook Revised, 1997
IR_w	Daily Water Ingestion Rate	L/day	NA	NA	NA
AF	Soil to Skin Adherence Factor	mg/cm^2-event	0.2	0.2	EPA, RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004a
SA	Skin Surface Area	cm^2	7605	7605	Mean SA for children 6-16 (head, arms, hands, legs); EPA, Exposure Factors Handbook Revised, 1997

Exposure Assumptions
Future Industrial Worker Scenario

PSC Site
Rock Hill, South Carolina

Parameter Abbreviation	Parameter	Units	Carcinogenic	Noncarcinogenic	Basis/Source
AE_d	Dermal absorption efficiency	Unitless	Chemical-Specific	Chemical-Specific	EPA, Region 4 Supplement to RAGS 2007
AE_i	Ingestion absorption efficiency	Unitless	1	1	EPA, RAGS 1989
AE_{inhal}	Inhalation Absorption efficiency	Unitless	1	1	EPA, RAGS 1989
At_c/AT_n	Averaging Time	days	25550	9125	EPA, RAGS 1989
BW	Body Weight	kg	70	70	EPA, Supplemental Guidance for Soil Screening Levels, 2002
ED	Exposure Duration	yrs	25	25	EPA, Supplemental Guidance for Soil Screening Levels, 2002
EF	Exposure Frequency	day/yr	250	250	EPA, Supplemental Guidance for Soil Screening Levels, 2002
FC	Fraction ingested from contaminated source	unitless	1	1	EPA, RAGS 1989
$IR_{air-hourly}$	Hourly Inhalation Rate	m^3/hour	1	1	EPA, Exposure Factors Handbook Revised, 1997
ET_{inh}	Inhalation Exposure Time	hours	8	8	Professional judgment
IR_{soil}	Soil Ingestion Rate	mg/day	50	50	EPA, Exposure Factors Handbook Revised, 1997
IR_w	Daily Water Ingestion Rate	L/day	1	1	EPA, RAGS Supplemental Guidance. Standard Default Exposure Factors, 1991
AF	Soil to Skin Adherence Factor	mg/cm^2-event	0.2	0.2	EPA, RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004a
SA	Skin Surface Area	cm^2	3300	3300	EPA, Supplemental Guidance for Soil Screening Levels, 2002

Exposure Assumptions
Current/Future Excavation Worker Scenario

PSC Site
Rock Hill, South Carolina

Parameter Abbreviation	Parameter	Units	Carcinogenic	Noncarcinogenic	Basis/Source
AE_d	Dermal absorption efficiency	Unitless	Chemical-Specific	Chemical-Specific	EPA, Region 4 Supplement to RAGS 2007
AE_i	Ingestion absorption efficiency	Unitless	1	1	EPA, RAGS 1989
AE_{inhal}	Inhalation Absorption efficiency	Unitless	1	1	EPA, RAGS 1989
At_c/AT_n	Averaging Time	days	25550	365	EPA, RAGS, 1989; Supplemental Guidance for Soil Screening Levels (2002) for noncancer
BW	Body Weight	kg	70	70	EPA, Supplemental Guidance for Soil Screening Levels, 2002
ED	Exposure Duration	yrs	1	1	EPA, Supplemental Guidance for Soil Screening Levels, 2002
EF	Exposure Frequency	day/yr	250	250	EPA, Supplemental Guidance for Soil Screening Levels, 2002
FC	Fraction ingested from contaminated source	unitless	1	1	EPA, RAGS 1989
$IR_{air-hourly}$	Hourly Inhalation Rate	m^3/hour	1	1	EPA, Exposure Factors Handbook Revised, 1997
ET_{inh}	Inhalation Exposure Time	hours	8	8	Professional judgment
IR_{soil}	Soil Ingestion Rate	mg/day	330	330	EPA, Supplemental Guidance for Soil Screening Levels, 2002
IR_w	Daily Water Ingestion Rate	L/day	NA	NA	NA
AF	Soil to Skin Adherence Factor	mg/cm^2-event	0.2	0.2	EPA, RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004a
SA	Skin Surface Area	cm^2	3300	3300	EPA, Supplemental Guidance for Soil Screening Levels, 2002

Exposure Assumptions
Future Residential Scenario

PSC Site
Rock Hill, South Carolina

Parameter Abbreviation	**Parameter**	**Units**	**Carcinogenic**	**Basis/Source**	**Noncarcinogenic**	**Basis/Source**
			Adult Resident (1-31)		Child Resident (1-6)	
Parameter Abbreviation	Parameter	Units	Carcinogenic	Basis/Source	Noncarcinogenic	Basis/Source
AE_d	Dermal absorption efficiency	Unitless	Chemical-Specific	EPA, Region 4 Supplement to RAGS 2007	Chemical-Specific	EPA, Region 4 Supplement to RAGS 2007
AE_i	Ingestion absorption efficiency	Unitless	1	EPA, RAGS 1989	1	EPA, RAGS 1989
AE_{inhal}	Inhalation Absorption efficiency	Unitless	1	EPA, RAGS 1989	1	EPA, RAGS 1989
At_c/AT_n	Averaging Time	days	25550	EPA, RAGS, 1989	2190	EPA, Supplemental Guidance for Soil Screening Levels, 2002
BW	Body Weight	kg	70	EPA, Supplemental Guidance for Soil Screening Levels, 2002	15	EPA, Supplemental Guidance for Soil Screening Levels, 2002
ED	Exposure Duration	yrs	30	EPA, Supplemental Guidance for Soil Screening Levels, 2002	6	EPA, Supplemental Guidance for Soil Screening Levels, 2002
EF	Exposure Frequency	day/yr	350	EPA, Supplemental Guidance for Soil Screening Levels, 2002	350	EPA, Supplemental Guidance for Soil Screening Levels, 2002
FC	Fraction ingested from c	unitless	1	EPA, RAGS 1989	1	EPA, RAGS 1989
$IR_{air-hourly}$	Hourly Inhalation Rate	m^3/hour	1	EPA, Exposure Factors Handbook Revised, 1997	0.26	EPA, Exposure Factors Handbook Revised, 1997 Light activity level for child 1-6 years
ET_{inh}	Inhalation Exposure Time	hours	16	Professional judgment	16	Professional judgment
IR_{soil}	Soil Ingestion Rate	mg/day	50	EPA, Exposure Factors Handbook Revised, 1997	200	EPA, Region 4 Supplement to RAGS 2007
IR_w	Daily Water Ingestion Rate	L/day	2	EPA, Region 4 Supplement to RAGS 2007	2	EPA, Region 4 Supplement to RAGS 2007
AF	Soil to Skin Adherence Factor	mg/cm^2-event			0.2	EPA, RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004a
SA	Skin Surface Area	cm^2			2800	EPA, Supplemental Guidance for Soil Screening Levels, 2002
SFS	Age-adjusted Dermal Factor	mg-year/kg-event	360	EPA, Supplemental Guidance for Soil Screening Levels, 2002		

H-3 Exposure Point Concentration Tables

Table H-3.1
Medium Specific Exposure Point Concentration Summary
Current Surface Soil, Excluding Hot Spots and Concrete Pad

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	44	42	95%	0.5	0.5	0.74	8.90	1.90	2.92	2.92	95% KM (Chebyshev) UCL
Iron	mg/kg	44	44	100%	1.6	1.6	7,400.00	86,000.00	33,065.91	38,116.00	38,116.00	95% Approximate Gamma UCL
Manganese	mg/kg	44	44	100%	0.5	0.5	80.00	1,500.00	549.20	646.10	646.10	95% Approximate Gamma UCL
Thallium	mg/kg	44	44	100%	2.4	2.4	7.75	91.00	36.91	42.94	42.94	95% Approximate Gamma UCL
Vanadium	mg/kg	44	44	100%	0.4	0.4	13.00	400.00	115.22	143.70	143.70	95% Approximate Gamma UCL
Di-n-butylphthalate	ug/kg	44	3	7%	200	200	230.00	240.00	109.09	--	--	---
1,2-Dichloroethane	ug/kg	43	9	21%	0.18	0.3	0.36	35.65	1.68	1.70	1.70	95% KM (t) UCL
Tetrachloroethene	ug/kg	43	9	21%	0.14	0.5	1.40	35.00	2.13	4.79	4.79	95% KM (t) UCL

Table H-3.2
Medium Specific Exposure Point Concentration Summary Future Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	52	50	96%	0.5	0.5	0.74	8.90	1.85	2.71	2.71	95% KM (Chebyshev) UCL
Iron	mg/kg	52	52	100%	1.6	1.6	7,400.00	86,000.00	34,575.00	39,124.00	39,124.00	95% Approximate Gamma UCL
Manganese	mg/kg	52	52	100%	0.5	0.5	80.00	7,300.00	664.71	767.30	767.30	95% H-UCL
Thallium	mg/kg	52	52	100%	2.4	2.4	7.75	91.00	38.31	42.93	42.93	95% Student's-t UCL
Vanadium	mg/kg	52	52	100%	0.4	0.4	13.00	400.00	122.30	148.10	148.10	95% Approximate Gamma UCL
Di-n-butylphthalate	ug/kg	52	4	8%	200	200	230.00	240.00	110.38	--	--	---
1,2-Dichloroethane	ug/kg	52	10	19%	0.18	0.3	0.36	1,400.00	28.33	321.30	321.30	99% KM (Chebyshev) UCL
Tetrachloroethene	ug/kg	52	14	27%	0.14	0.5	0.69	111.00	5.84	11.41	11.41	95% KM (t) UCL

Table H-3.3
Medium Specific Exposure Point Concentration Summary
Future Surface Soil, Hot Spot 1

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	3	3	100%	0.5	0.5	1.00	1.90	1.47	NA	1.90	Max Detect
Iron	mg/kg	3	3	100%	1.6	1.6	20,000.00	54,500.00	34,500.00	NA	54,500.00	Max Detect
Manganese	mg/kg	3	3	100%	0.5	0.5	490.00	1,700.00	963.33	NA	1,700.00	Max Detect
Thallium	mg/kg	3	3	100%	2.4	2.4	21.00	50.00	33.33	NA	50.00	Max Detect
Vanadium	mg/kg	3	3	100%	0.4	0.4	60.00	96.50	79.50	NA	96.50	Max Detect
Di-n-butylphthalate	ug/kg	3	1	33%	200	200	2,400.00	2,400.00	866.67	--	--	---
1,2-Dichloroethane	ug/kg	4	0	0%	0.3	0.3	ND	ND	0.15	NA	ND	Max Detect
Tetrachloroethene	ug/kg	4	2	50%	0.5	0.5	49.00	2,700.00	687.38	NA	2,700.00	Max Detect

Table H-3.4
Medium Specific Exposure Point Concentration Summary
Future Surface Soil, Hot Spot 2

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	NA	NA	100%	NA	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	NA	NA	100%	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	mg/kg	NA	NA	100%	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/kg	NA	NA	100%	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/kg	NA	NA	100%	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	ug/kg	NA	NA	100%	NA	NA	NA	NA	NA	--	--	---
1,2-Dichloroethane	ug/kg	1	0	0%	0.3	0.3	ND	ND	0.15	NA	ND	Max Detect
Tetrachloroethene	ug/kg	1	1	100%	0.5	0.5	800.00	800.00	800.00	NA	800.00	Max Detect

Table H-3.5
Medium Specific Exposure Point Concentration Summary
Future Surface Soil, Hot Spot 3

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	1	1	100%	0.5	0.5	1.80	1.80	1.80	NA	1.80	Max Detect
Iron	mg/kg	1	1	100%	1.6	1.6	99,000.00	99,000.00	99,000.00	NA	99,000.00	Max Detect
Manganese	mg/kg	1	1	100%	0.5	0.5	2,200.00	2,200.00	2,200.00	NA	2,200.00	Max Detect
Thallium	mg/kg	1	1	100%	2.4	2.4	99.00	99.00	99.00	NA	99.00	Max Detect
Vanadium	mg/kg	1	1	100%	0.4	0.4	510.00	510.00	510.00	NA	510.00	Max Detect
Di-n-butylphthalate	ug/kg	1	0	0%	200	200	ND	ND	100.00	--	--	---
1,2-Dichloroethane	ug/kg	1	0	0%	0.3	0.3	ND	ND	0.15	NA	ND	Max Detect
Tetrachloroethene	ug/kg	1	1	100%	0.5	0.5	2,800.00	2,800.00	2,800.00	NA	2,800.00	Max Detect

Table H-3.6
Medium Specific Exposure Point Concentration Summary
Current Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	101	78	77%	0.5	0.5	ND	8.90	1.34	1.62	1.62	95% KM (BCA) UCL
Iron	mg/kg	101	101	100%	1.6	1.6	7,400.00	99,000.00	33,410.48	36,293.00	36,293.00	Use 95% Student's-t UCL
Manganese	mg/kg	101	101	100%	0.5	0.5	60.00	7,300.00	616.86	695.50	695.50	Use 95% H-UCL
Thallium	mg/kg	101	101	100%	2.4	2.4	7.75	99.00	36.45	39.61	39.61	Use 95% Student's-t UCL
Vanadium	mg/kg	101	101	100%	0.4	0.4	12.00	510.00	120.23	5,563.00	5,563.00	97.5% KM (Chebyshev) UCL
Di-n-butylphthalate	ug/kg	103	7	7%	200	200	ND	2,400.00	129.63	--	--	---
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/kg	152	9	6%	0.8	0.8	ND	33.00	0.75	--	--	---
1,2-Dichloroethane	ug/kg	152	53	35%	0.18	0.3	ND	2,500.00	135.96	353.50	353.50	97.5% KM (Chebyshev) UCL
1,4-Dichlorobenzene	ug/kg	152	18	12%	0.21	0.3	ND	2,205.00	40.04	170.80	170.80	97.5% KM (Chebyshev) UCL
Benzene	ug/kg	152	40	26%	0.18	0.4	ND	490.00	12.89	43.11	43.11	97.5% KM (Chebyshev) UCL
Chloroform	ug/kg	152	27	18%	0.13	0.2	ND	63.00	1.24	2.16	2.16	95% KM (t) UCL
cis-1,2-Dichloroethene	ug/kg	152	72	47%	0.16	0.5	ND	3,200.00	93.08	269.90	269.90	97.5% KM (Chebyshev) UCL
Tetrachloroethene	ug/kg	152	70	46%	0.14	0.5	ND	2,800.00	80.42	275.60	275.60	97.5% KM (Chebyshev) UCL
Toluene	ug/kg	152	67	44%	0.17	0.4	ND	220,000.00	2,340.66	11,695.00	11,695.00	97.5% KM (Chebyshev) UCL
Trichloroethene	ug/kg	152	71	47%	0.23	0.6	ND	1,700.00	40.32	126.50	126.50	97.5% KM (Chebyshev) UCL
Vinyl chloride	ug/kg	152	28	18%	0.33	0.7	ND	32.00	1.59	2.57	2.57	95% KM (t) UCL
Xylenes (Total)	ug/kg	152	50	33%	0.6	0.71	ND	300,000.00	2,288.89	14,797.00	14,797.00	97.5% KM (Chebyshev) UCL

Table H-3.7
Medium Specific Exposure Point Concentration Summary
Current Subsurface Soil,
Hot Spot 25

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	2	1	50%	0.5	0.5	ND	2.80	1.53	NA	2.80	Max Detect
Iron	mg/kg	2	2	100%	1.6	1.6	22,000.00	22,000.00	22,000.00	NA	22,000.00	Max Detect
Manganese	mg/kg	2	2	100%	0.5	0.5	340.00	340.00	340.00	NA	340.00	Max Detect
Thallium	mg/kg	2	2	100%	2.4	2.4	20.00	25.00	22.50	NA	25.00	Max Detect
Vanadium	mg/kg	2	2	100%	0.4	0.4	26.00	63.00	44.50	NA	63.00	Max Detect
Di-n-butylphthalate	ug/kg	2	1	50%	200	200	ND	310.00	205.00	--	--	---
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/kg	2	0	0%	0.8	0.8	ND	ND	0.40	--	--	---
1,2-Dichloroethane	ug/kg	2	2	100%	0.3	0.3	24,000.00	45,000.00	34,500.00	NA	45,000.00	Max Detect
1,4-Dichlorobenzene	ug/kg	2	0	0%	0.3	0.3	ND	ND	0.15	NA	ND	Max Detect
Benzene	ug/kg	2	0	0%	0.4	0.4	ND	ND	0.20	NA	ND	Max Detect
Chloroform	ug/kg	2	2	100%	0.2	0.2	460.00	690.00	575.00	NA	690.00	Max Detect
cis-1,2-Dichloroethene	ug/kg	2	2	100%	0.5	0.5	2,900.00	4,100.00	3,500.00	NA	4,100.00	Max Detect
Tetrachloroethene	ug/kg	2	2	100%	0.5	0.5	280.00	300.00	290.00	NA	300.00	Max Detect
Toluene	ug/kg	2	1	50%	0.4	0.4	ND	310.00	155.10	NA	310.00	Max Detect
Trichloroethene	ug/kg	2	2	100%	0.6	0.6	310.00	470.00	390.00	NA	470.00	Max Detect
Vinyl chloride	ug/kg	2	0	0%	0.7	0.7	ND	ND	0.35	NA	ND	Max Detect
Xylenes (Total)	ug/kg	2	1	50%	0.6	0.6	ND	170.00	85.15	NA	170.00	Max Detect

Table H-3.8
Medium Specific Exposure Point Concentration Summary
Current Subsurface Soil,
Hot Spot 64

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	ug/kg	3	0	0%	200	200	ND	ND	100.00	--	--	---
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/kg	3	0	0%	0.8	0.8	ND	ND	0.40	--	--	---
1,2-Dichloroethane	ug/kg	3	3	100%	0.18	0.18	930.00	11,000.00	7,076.67	NA	11,000.00	Max Detect
1,4-Dichlorobenzene	ug/kg	3	2	67%	0.21	0.21	ND	640.00	289.04	NA	640.00	Max Detect
Benzene	ug/kg	3	3	100%	0.18	0.18	155.00	2,100.00	845.33	NA	2,100.00	Max Detect
Chloroform	ug/kg	3	2	67%	0.13	0.13	ND	750.00	300.02	NA	750.00	Max Detect
cis-1,2-Dichloroethene	ug/kg	3	3	100%	0.16	0.16	5,200.00	58,000.00	24,733.33	NA	58,000.00	Max Detect
Tetrachloroethene	ug/kg	3	3	100%	0.14	0.14	1,200.00	72,000.00	25,033.33	NA	72,000.00	Max Detect
Toluene	ug/kg	3	3	100%	0.17	0.17	2,500.00	370,000.00	129,833.33	NA	370,000.00	Max Detect
Trichloroethene	ug/kg	3	3	100%	0.23	0.23	2,700.00	150,000.00	56,233.33	NA	150,000.00	Max Detect
Vinyl chloride	ug/kg	3	2	67%	0.33	0.33	ND	85.80	47.56	NA	85.80	Max Detect
Xylenes (Total)	ug/kg	3	3	100%	0.71	0.71	306.00	160,000.00	55,268.67	NA	160,000.00	Max Detect

Table H-3.9
Medium Specific Exposure Point Concentration Summary
Current Subsurface Soil,
Hot Spot 6

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	mg/kg	0	0	0%	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	ug/kg	0	0	0%	NA	NA	NA	NA	NA	--	--	---
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/kg	2	0	0%	0.8	0.8	ND	ND	0.40	--	--	---
1,2-Dichloroethane	ug/kg	2	1	50%	0.3	0.3	ND	0.37	0.26	NA	0.37	Max Detect
1,4-Dichlorobenzene	ug/kg	2	0	0%	0.3	0.3	ND	ND	0.15	NA	ND	Max Detect
Benzene	ug/kg	2	1	50%	0.4	0.4	ND	1.01	0.61	NA	1.01	Max Detect
Chloroform	ug/kg	2	0	0%	0.2	0.2	ND	ND	0.10	NA	ND	Max Detect
cis-1,2-Dichloroethene	ug/kg	2	2	100%	0.5	0.5	3,400.00	23,000.00	13,200.00	NA	23,000.00	Max Detect
Tetrachloroethene	ug/kg	2	2	100%	0.5	0.5	800.00	3,700.00	2,250.00	NA	3,700.00	Max Detect
Toluene	ug/kg	2	2	100%	0.4	0.4	7.44	91.00	49.22	NA	91.00	Max Detect
Trichloroethene	ug/kg	2	2	100%	0.6	0.6	31.00	3,200.00	1,615.50	NA	3,200.00	Max Detect
Vinyl chloride	ug/kg	2	2	100%	0.7	0.7	4.68	370.00	187.34	NA	370.00	Max Detect
Xylenes (Total)	ug/kg	2	2	100%	0.6	0.6	6.06	27.00	16.53	NA	27.00	Max Detect

Table H-3.10
Medium Specific Exposure Point Concentration Summary
Current Subsurface Soil,
Hot Spot 12

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	1	1	100%	0.5	0.5	1.50	1.50	1.50	NA	1.50	Max Detect
Iron	mg/kg	1	1	100%	1.6	1.6	49,000.00	49,000.00	49,000.00	NA	49,000.00	Max Detect
Manganese	mg/kg	1	1	100%	0.5	0.5	920.00	920.00	920.00	NA	920.00	Max Detect
Thallium	mg/kg	1	1	100%	2.4	2.4	52.00	52.00	52.00	NA	52.00	Max Detect
Vanadium	mg/kg	1	1	100%	0.4	0.4	210.00	210.00	210.00	NA	210.00	Max Detect
Di-n-butylphthalate	ug/kg	1	1	100%	200	200	920.00	920.00	920.00	--	--	---
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/kg	1	0	0%	0.8	0.8	ND	ND	0.40	--	--	---
1,2-Dichloroethane	ug/kg	1	0	0%	0.3	0.3	ND	ND	0.15	NA	ND	Max Detect
1,4-Dichlorobenzene	ug/kg	1	0	0%	0.3	0.3	ND	ND	0.15	NA	ND	Max Detect
Benzene	ug/kg	1	1	100%	0.4	0.4	5,600.00	5,600.00	5,600.00	NA	5,600.00	Max Detect
Chloroform	ug/kg	1	0	0%	0.2	0.2	ND	ND	0.10	NA	ND	Max Detect
cis-1,2-Dichloroethene	ug/kg	1	1	100%	0.5	0.5	390.00	390.00	390.00	NA	390.00	Max Detect
Tetrachloroethene	ug/kg	1	1	100%	0.5	0.5	300.00	300.00	300.00	NA	300.00	Max Detect
Toluene	ug/kg	1	1	100%	0.4	0.4	1,900,000.00	1,900,000.00	1,900,000.00	NA	1,900,000.00	Max Detect
Trichloroethene	ug/kg	1	1	100%	0.6	0.6	240.00	240.00	240.00	NA	240.00	Max Detect
Vinyl chloride	ug/kg	1	0	0%	0.7	0.7	ND	ND	0.35	NA	ND	Max Detect
Xylenes (Total)	ug/kg	1	1	100%	0.6	0.6	650,000.00	650,000.00	650,000.00	NA	650,000.00	Max Detect

Table H-3.11
Medium Specific Exposure Point Concentration Summary
Current Subsurface Soil,
Hot Spot 18

PSC Site
Rock Hill, South Carolina

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Arsenic	mg/kg	1	1	100%	0.5	0.5	0.92	0.92	0.92	NA	0.92	Max Detect
Iron	mg/kg	1	1	100%	1.6	1.6	21,000.00	21,000.00	21,000.00	NA	21,000.00	Max Detect
Manganese	mg/kg	1	1	100%	0.5	0.5	830.00	830.00	830.00	NA	830.00	Max Detect
Thallium	mg/kg	1	1	100%	2.4	2.4	22.00	22.00	22.00	NA	22.00	Max Detect
Vanadium	mg/kg	1	1	100%	0.4	0.4	42.00	42.00	42.00	NA	42.00	Max Detect
Di-n-butylphthalate	ug/kg	1	1	100%	200	200	260.00	260.00	260.00	--	--	---
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/kg	1	0	0%	0.8	0.8	ND	ND	0.40	--	--	---
1,2-Dichloroethane	ug/kg	1	1	100%	0.3	0.3	4,800.00	4,800.00	4,800.00	NA	4,800.00	Max Detect
1,4-Dichlorobenzene	ug/kg	1	1	100%	0.3	0.3	4,000.00	4,000.00	4,000.00	NA	4,000.00	Max Detect
Benzene	ug/kg	1	0	0%	0.4	0.4	ND	ND	0.20	NA	ND	Max Detect
Chloroform	ug/kg	1	0	0%	0.2	0.2	ND	ND	0.10	NA	ND	Max Detect
cis-1,2-Dichloroethene	ug/kg	1	1	100%	0.5	0.5	460.00	460.00	460.00	NA	460.00	Max Detect
Tetrachloroethene	ug/kg	1	1	100%	0.5	0.5	31.00	31.00	31.00	NA	31.00	Max Detect
Toluene	ug/kg	1	1	100%	0.4	0.4	44.00	44.00	44.00	NA	44.00	Max Detect
Trichloroethene	ug/kg	1	1	100%	0.6	0.6	452.00	452.00	452.00	NA	452.00	Max Detect
Vinyl chloride	ug/kg	1	0	0%	0.7	0.7	ND	ND	0.35	NA	ND	Max Detect
Xylenes (Total)	ug/kg	1	0	0%	0.6	0.6	ND	ND	0.30	NA	ND	Max Detect

Table H-3.12
Medium Specific Exposure Point Concentration Summary
Shallow Groundwater (Excludes Bedrock)

PSC Site
Rock Hill, SC

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Iron	mg/L	14	12	86%	0.02	0.02	ND	12.50	1.56	NA	1.56	Mean
Manganese	mg/L	14	14	100%	0.001	0.001	0.03	12.00	2.14	NA	2.14	Mean
2-Chlorophenol	ug/L	14	1	7%	5	5	ND	145.00	12.68	NA	12.68	Mean
Bis(2-ethylhexyl)phthalate	ug/L	14	2	14%	4	4	ND	14.50	3.19	NA	3.19	Mean
Naphthalene	ug/L	14	3	21%	3	3	ND	30.50	4.37	NA	4.37	Mean
1,1,1-Trichloroethane	ug/L	60	17	28%	0.19	0.3	ND	51,000.00	1,644.00	NA	1,644.00	Mean
1,1,2-Trichloroethane	ug/L	60	19	32%	0.3	0.34	ND	154.00	5.96	NA	5.96	Mean
1,1-Dichloroethane	ug/L	60	34	57%	0.2	0.31	ND	7,200.00	215.83	NA	215.83	Mean
1,1-Dichloroethene	ug/L	60	33	55%	0.16	0.4	ND	8,100.00	289.02	NA	289.02	Mean
1,2-Dichlorobenzene	ug/L	60	20	33%	0.16	0.43	ND	2,500.00	43.03	NA	43.03	Mean
1,2-Dichloroethane	ug/L	60	34	57%	0.14	0.4	ND	52,500.00	2,069.20	NA	2,069.20	Mean
1,4-Dichlorobenzene	ug/L	60	11	18%	0.3	0.31	ND	1,300.00	21.95	NA	21.95	Mean
4-Methyl-2-pentanone	ug/L	60	10	17%	0.56	1.15	ND	11,000.00	351.49	NA	351.49	Mean
Benzene	ug/L	60	37	62%	0.11	0.3	ND	1,050.00	45.03	NA	45.03	Mean
Chlorobenzene	ug/L	60	28	47%	0.11	0.5	ND	3,000.00	76.06	NA	76.06	Mean
Chloroethane	ug/L	60	19	32%	0.3	0.78	ND	2,850.00	96.15	NA	96.15	Mean
Chloroform	ug/L	60	21	35%	0.29	0.3	ND	882.00	19.22	NA	19.22	Mean
cis-1,2-Dichloroethene	ug/L	60	41	68%	0.3	0.4	ND	13,000.00	703.26	NA	703.26	Mean
Ethylbenzene	ug/L	60	26	43%	0.13	0.3	ND	46,000.00	972.05	NA	972.05	Mean
Isopropylbenzene	ug/L	60	30	50%	0.12	0.3	ND	36,000.00	680.54	NA	680.54	Mean
Methyl tert butyl ether	ug/L	60	15	25%	0.4	0.6	ND	444.00	21.56	NA	21.56	Mean
Methylcyclohexane	ug/L	60	25	42%	0.5	0.99	ND	19,000.00	403.25	NA	403.25	Mean
Methylene chloride	ug/L	60	22	37%	0.36	0.8	ND	7,900.00	201.55	NA	201.55	Mean
Tetrachloroethene	ug/L	60	34	57%	0.27	0.5	ND	13,000.00	475.08	NA	475.08	Mean
Toluene	ug/L	60	51	85%	0.11	0.3	ND	52,000.00	2,395.05	NA	2,395.05	Mean
Trichloroethene	ug/L	60	40	67%	0.12	0.32	ND	14,000.00	389.20	NA	389.20	Mean
Vinyl chloride	ug/L	60	29	48%	0.4	0.4	ND	1,200.00	63.09	NA	63.09	Mean
Xylenes (Total)	ug/L	60	31	52%	0.4	0.45	ND	150,000.00	3,337.07	NA	3,337.07	Mean

Table H-3.13
Medium Specific Exposure Point Concentration Summary
Shallow and Bedrock Groundwater

PSC Site
Rock Hill, SC

Chemical	Units	Number of Samples	Number Detects	Frequency of Detection	Min Detection Limit	Max Detection Limit	Min Concentration	Max Concentration	Mean	95%UCL	EPC	Statistic
Iron	mg/L	18	15	83%	0.02	0.02	ND	12.50	1.31	NA	1.31	Mean
Manganese	mg/L	18	18	100%	0.001	0.001	0.02	12.00	1.68	NA	1.68	Mean
2-Chlorophenol	ug/L	18	1	6%	5	5	ND	145.00	10.42	NA	10.42	Mean
Bis(2-ethylhexyl)phthalate	ug/L	18	3	17%	4	4	ND	14.50	3.20	NA	3.20	Mean
Naphthalene	ug/L	18	3	17%	3	3	ND	30.50	3.73	NA	3.73	Mean
1,1,1-Trichloroethane	ug/L	88	22	25%	0.19	0.3	ND	51,000.00	1,129.57	NA	1,129.57	Mean
1,1,2-Trichloroethane	ug/L	88	23	26%	0.3	0.34	ND	154.00	4.61	NA	4.61	Mean
1,1-Dichloroethane	ug/L	88	48	55%	0.2	0.31	ND	7,200.00	160.04	NA	160.04	Mean
1,1-Dichloroethene	ug/L	88	46	52%	0.16	0.4	ND	8,100.00	206.02	NA	206.02	Mean
1,2,4-Trichlorobenzene	ug/L	88	5	6%	0.16	0.43	ND	126.00	1.56	NA	1.56	Mean
1,2-Dichlorobenzene	ug/L	88	25	28%	0.16	0.43	ND	2,500.00	46.01	NA	46.01	Mean
1,2-Dichloroethane	ug/L	88	47	53%	0.14	0.4	ND	52,500.00	1,519.78	NA	1,519.78	Mean
1,4-Dichlorobenzene	ug/L	88	14	16%	0.3	0.31	ND	1,300.00	27.54	NA	27.54	Mean
4-Methyl-2-pentanone	ug/L	88	12	14%	0.56	1.15	ND	11,000.00	242.03	NA	242.03	Mean
Benzene	ug/L	88	44	50%	0.11	0.3	ND	1,050.00	31.46	NA	31.46	Mean
Bromodichloromethane	ug/L	88	6	7%	0.2	0.3	ND	6.27	0.37	NA	0.37	Mean
Chlorobenzene	ug/L	88	34	39%	0.11	0.5	ND	3,500.00	118.88	NA	118.88	Mean
Chloroethane	ug/L	88	24	27%	0.3	0.78	ND	2,850.00	98.27	NA	98.27	Mean
Chloroform	ug/L	88	33	38%	0.29	0.3	ND	882.00	15.04	NA	15.04	Mean
cis-1,2-Dichloroethene	ug/L	88	60	68%	0.3	0.4	ND	13,000.00	510.22	NA	510.22	Mean
Ethylbenzene	ug/L	88	31	35%	0.13	0.3	ND	46,000.00	675.84	NA	675.84	Mean
Isopropylbenzene	ug/L	88	34	39%	0.12	0.3	ND	36,000.00	464.64	NA	464.64	Mean
Methyl tert butyl ether	ug/L	88	17	19%	0.4	0.6	ND	444.00	14.77	NA	14.77	Mean
Methylcyclohexane	ug/L	88	29	33%	0.5	0.99	ND	19,000.00	275.45	NA	275.45	Mean
Methylene chloride	ug/L	88	29	33%	0.36	0.8	ND	7,900.00	151.97	NA	151.97	Mean
Tetrachloroethene	ug/L	88	51	58%	0.27	0.5	ND	13,000.00	329.73	NA	329.73	Mean
Toluene	ug/L	88	74	84%	0.11	0.3	ND	52,000.00	1,744.11	NA	1,744.11	Mean
Trichloroethene	ug/L	88	58	66%	0.12	0.32	ND	14,000.00	274.48	NA	274.48	Mean
Vinyl chloride	ug/L	88	36	41%	0.4	0.4	ND	1,200.00	53.44	NA	53.44	Mean
Xylenes (Total)	ug/L	88	35	40%	0.4	0.45	ND	150,000.00	2,314.63	NA	2,314.63	Mean

H-4 Pro-UCL Output

Pro-UCL
Current Surface Soil

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,2-Dichloroethane

General Statistics

Number of Valid Samples	41	Number of Detected Data	8
Number of Unique Samples	8	Number of Non-Detect Data	33
		Percent Non-Detects	80.49%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.36	Minimum Detected	-1.022
Maximum Detected	9.6	Maximum Detected	2.262
Mean of Detected	3.954	Mean of Detected	0.749
SD of Detected	3.936	SD of Detected	1.307
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	35.65	Maximum Non-Detect	3.574

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	41
Number treated as Detected	0
Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.816	Shapiro Wilk Test Statistic	0.904
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.319	Mean	-1.302
SD	3.466	SD	1.388
95% DL/2 (t) UCL	2.23	95% H-Stat (DL/2) UCL	0.853
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.74
		SD in Log Scale	3.075
		Mean in Original Scale	0.804
		SD in Original Scale	2.276
		95% Percentile Bootstrap UCL	1.404
		95% BCA Bootstrap UCL	1.625

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.665	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	5.949		
nu star	10.63		
A-D Test Statistic	0.447	**Nonparametric Statistics**	
5% A-D Critical Value	0.738	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.738	Mean	1.079
5% K-S Critical Value	0.302	SD	2.186
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.369
		95% KM (t) UCL	1.701
Assuming Gamma Distribution		95% KM (z) UCL	1.686
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.584
Minimum	0	95% KM (bootstrap t) UCL	1.924
Maximum	9.6	95% KM (BCA) UCL	2.873
Mean	2.619	95% KM (Percentile Bootstrap) UCL	2.011
Median	2.353	95% KM (Chebyshev) UCL	2.689

SD	2.475	97.5% KM (Chebyshev) UCL	3.386
k star	0.176	99% KM (Chebyshev) UCL	4.755
Theta star	14.87		
Nu star	14.44	Potential UCLs to Use	
AppChi2	6.873	95% KM (t) UCL	1.701
95% Gamma Approximate UCL	5.502		
95% Adjusted Gamma UCL	5.66		

Note: DL/2 is not a recommended method.

Arsenic

General Statistics

Number of Valid Samples	42	Number of Detected Data	40
Number of Unique Samples	26	Number of Non-Detect Data	2
		Percent Non-Detects	4.76%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.74	Minimum Detected	-0.301
Maximum Detected	8.9	Maximum Detected	2.186
Mean of Detected	2.02	Mean of Detected	0.562
SD of Detected	1.434	SD of Detected	0.491
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.629	Shapiro Wilk Test Statistic	0.93
5% Shapiro Wilk Critical Value	0.94	5% Shapiro Wilk Critical Value	0.94
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.935	Mean	0.47
SD	1.45	SD	0.637
95% DL/2 (t) UCL	2.312	95% H-Stat (DL/2) UCL	2.055
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.91	Mean in Log Scale	0.508
SD	1.474	SD in Log Scale	0.539
95% MLE (t) UCL	2.293	Mean in Original Scale	1.95
95% MLE (Tiku) UCL	2.276	SD in Original Scale	1.434
		95% Percentile Bootstrap UCL	2.332
		95% BCA Bootstrap UCL	2.423
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.455	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.585		
nu star	276.4		
A-D Test Statistic	1.426	**Nonparametric Statistics**	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	1.959
5% K-S Critical Value	0.14	SD	1.409
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.22
		95% KM (t) UCL	2.329
Assuming Gamma Distribution		95% KM (z) UCL	2.321
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.327
Minimum	0	95% KM (bootstrap t) UCL	2.705
Maximum	8.9	95% KM (BCA) UCL	2.372
Mean	1.924	95% KM (Percentile Bootstrap) UCL	2.353
Median	1.7	95% KM (Chebyshev) UCL	2.918
SD	1.465	97.5% KM (Chebyshev) UCL	3.334

k star	0.74	99% KM (Chebyshev) UCL	4.149
Theta star	2.599		
Nu star	62.16	Potential UCLs to Use	
AppChi2	45.03	95% KM (Chebyshev) UCL	2.918
95% Gamma Approximate UCL	2.656		
95% Adjusted Gamma UCL	2.687		

Note: DL/2 is not a recommended method.

Iron

General Statistics

Number of Valid Samples	42	Number of Unique Samples	30

Raw Statistics		Log-transformed Statistics	
Minimum	7400	Minimum of Log Data	8.909
Maximum	86000	Maximum of Log Data	11.36
Mean	32855	Mean of log Data	10.25
Median	28000	SD of log Data	0.575
SD	18593		
Coefficient of Variation	0.566		
Skewness	1.092		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.871	Shapiro Wilk Test Statistic	0.939
Shapiro Wilk Critical Value	0.942	Shapiro Wilk Critical Value	0.942
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	37683	95% H-UCL	39596
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	46664
95% Adjusted-CLT UCL	38090	97.5% Chebyshev (MVUE) UCL	52545
95% Modified-t UCL	37764	99% Chebyshev (MVUE) UCL	64097
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.176	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	10345		
nu star	266.8		
Approximate Chi Square Value (.05)	230	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0443	95% CLT UCL	37574
Adjusted Chi Square Value	228.7	95% Jackknife UCL	37683
		95% Standard Bootstrap UCL	37602
Anderson-Darling Test Statistic	0.268	95% Bootstrap-t UCL	38267
Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	38242
Kolmogorov-Smirnov Test Statistic	0.112	95% Percentile Bootstrap UCL	37533
Kolmogorov-Smirnov 5% Critical Value	0.137	95% BCA Bootstrap UCL	37976
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	45361
		97.5% Chebyshev(Mean, Sd) UCL	50772
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	61401
95% Approximate Gamma UCL	38116		
95% Adjusted Gamma UCL	38318		
Potential UCL to Use		Use 95% Approximate Gamma UCL	38116

Manganese

General Statistics

Number of Valid Samples	42	Number of Unique Samples	33

Raw Statistics		Log-transformed Statistics	
Minimum	80	Minimum of Log Data	4.382
Maximum	1500	Maximum of Log Data	7.313

Mean	549.6	Mean of log Data	6.126
Median	455	SD of log Data	0.645
SD	327.6		
Coefficient of Variation	0.596		
Skewness	1.009		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.881	Shapiro Wilk Test Statistic	0.933
Shapiro Wilk Critical Value	0.942	Shapiro Wilk Critical Value	0.942
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	634.7	95% H-UCL	689.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	821.9
95% Adjusted-CLT UCL	641.2	97.5% Chebyshev (MVUE) UCL	935.2
95% Modified-t UCL	636	99% Chebyshev (MVUE) UCL	1158

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.699	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	203.6		
nu star	226.7		
Approximate Chi Square Value (.05)	192.9	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0443	95% CLT UCL	632.8
Adjusted Chi Square Value	191.8	95% Jackknife UCL	634.7
		95% Standard Bootstrap UCL	631.4
Anderson-Darling Test Statistic	0.235	95% Bootstrap-t UCL	639.5
Anderson-Darling 5% Critical Value	0.756	95% Hall's Bootstrap UCL	642.8
Kolmogorov-Smirnov Test Statistic	0.0761	95% Percentile Bootstrap UCL	636.9
Kolmogorov-Smirnov 5% Critical Value	0.137	95% BCA Bootstrap UCL	638.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	770
		97.5% Chebyshev(Mean, Sd) UCL	865.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1053
95% Approximate Gamma UCL	646.1		
95% Adjusted Gamma UCL	649.9		
Potential UCL to Use		Use 95% Approximate Gamma UCL	646.1

Tetrachloroethene

General Statistics

Number of Valid Samples	41	Number of Detected Data	9
Number of Unique Samples	9	Number of Non-Detect Data	32
		Percent Non-Detects	78.05%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.4	Minimum Detected	0.336
Maximum Detected	35	Maximum Detected	3.555
Mean of Detected	9.346	Mean of Detected	1.69
SD of Detected	11.04	SD of Detected	1.099
Minimum Non-Detect	0.14	Minimum Non-Detect	-1.966
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	32
Number treated as Detected	9
Single DL Non-Detect Percentage	78.05%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.75	Shapiro Wilk Test Statistic	0.954
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Pro-UCL
Current Surface Soil

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.225	Mean	-0.866
SD	6.245	SD	1.515
95% DL/2 (t) UCL	3.867	95% H-Stat (DL/2) UCL	1.301
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.985
		SD in Log Scale	2.639
		Mean in Original Scale	2.181
		SD in Original Scale	6.263
		95% Percentile Bootstrap UCL	4.001
		95% BCA Bootstrap UCL	4.643

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.776	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	12.05		
nu star	13.96		
A-D Test Statistic	0.365	**Nonparametric Statistics**	
5% A-D Critical Value	0.743	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.743	Mean	3.144
5% K-S Critical Value	0.287	SD	5.883
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.974
		95% KM (t) UCL	4.785
Assuming Gamma Distribution		95% KM (z) UCL	4.747
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4.588
Minimum	0	95% KM (bootstrap t) UCL	8.25
Maximum	35	95% KM (BCA) UCL	5.842
Mean	7.247	95% KM (Percentile Bootstrap) UCL	5.26
Median	6.953	95% KM (Chebyshev) UCL	7.392
SD	6.362	97.5% KM (Chebyshev) UCL	9.23
k star	0.345	99% KM (Chebyshev) UCL	12.84
Theta star	21.03		
Nu star	28.26	Potential UCLs to Use	
AppChi2	17.13	95% KM (t) UCL	4.785
95% Gamma Approximate UCL	11.95		
95% Adjusted Gamma UCL	12.18		

Note: DL/2 is not a recommended method.

Thallium

General Statistics

Number of Valid Samples	42	Number of Unique Samples	32

Raw Statistics		Log-transformed Statistics	
Minimum	7.75	Minimum of Log Data	2.048
Maximum	91	Maximum of Log Data	4.511
Mean	36.81	Mean of log Data	3.44
Median	32	SD of log Data	0.607
SD	20.82		
Coefficient of Variation	0.566		
Skewness	0.857		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.886	Shapiro Wilk Test Statistic	0.927
Shapiro Wilk Critical Value	0.942	Shapiro Wilk Critical Value	0.942
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	42.21	95% H-UCL	45.24
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	53.6

95% Adjusted-CLT UCL	42.55	97.5% Chebyshev (MVUE) UCL	60.65
95% Modified-t UCL	42.29	99% Chebyshev (MVUE) UCL	74.5

Gamma Distribution Test

k star (bias corrected)	2.963
Theta Star	12.42
nu star	248.9
Approximate Chi Square Value (.05)	213.3
Adjusted Level of Significance	0.0443
Adjusted Chi Square Value	212.2
Anderson-Darling Test Statistic	0.199
Anderson-Darling 5% Critical Value	0.755
Kolmogorov-Smirnov Test Statistic	0.0825
Kolmogorov-Smirnov 5% Critical Value	0.137

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	42.94
95% Adjusted Gamma UCL	43.17

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	42.09
95% Jackknife UCL	42.21
95% Standard Bootstrap UCL	42.05
95% Bootstrap-t UCL	42.78
95% Hall's Bootstrap UCL	42.61
95% Percentile Bootstrap UCL	42.1
95% BCA Bootstrap UCL	42.37
95% Chebyshev(Mean, Sd) UCL	50.81
97.5% Chebyshev(Mean, Sd) UCL	56.87
99% Chebyshev(Mean, Sd) UCL	68.77

Potential UCL to Use — Use 95% Approximate Gamma UCL 42.94

Vanadium

General Statistics

Number of Valid Samples	42	Number of Unique Samples	37

Raw Statistics

Minimum	13
Maximum	400
Mean	114.8
Median	81
SD	97.38
Coefficient of Variation	0.848
Skewness	1.37

Log-transformed Statistics

Minimum of Log Data	2.565
Maximum of Log Data	5.991
Mean of log Data	4.386
SD of log Data	0.891

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.813
Shapiro Wilk Critical Value	0.942

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	140.1

95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL	142.9
95% Modified-t UCL	140.6

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.922
Shapiro Wilk Critical Value	0.942

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% H-UCL	163.3
95% Chebyshev (MVUE) UCL	198.5
97.5% Chebyshev (MVUE) UCL	233.3
99% Chebyshev (MVUE) UCL	301.7

Gamma Distribution Test

k star (bias corrected)	1.451
Theta Star	79.13
nu star	121.9
Approximate Chi Square Value (.05)	97.4
Adjusted Level of Significance	0.0443
Adjusted Chi Square Value	96.62
Anderson-Darling Test Statistic	0.35
Anderson-Darling 5% Critical Value	0.766
Kolmogorov-Smirnov Test Statistic	0.0909
Kolmogorov-Smirnov 5% Critical Value	0.139

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	139.5
95% Jackknife UCL	140.1
95% Standard Bootstrap UCL	140.2
95% Bootstrap-t UCL	145.7
95% Hall's Bootstrap UCL	145.8
95% Percentile Bootstrap UCL	139.6
95% BCA Bootstrap UCL	142.3
95% Chebyshev(Mean, Sd) UCL	180.3
97.5% Chebyshev(Mean, Sd) UCL	208.7

Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	264.3
95% Approximate Gamma UCL	143.7		
95% Adjusted Gamma UCL	144.9		
Potential UCL to Use		Use 95% Approximate Gamma UCL	143.7

Pro-UCL
Future Surface Soil

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Surface Soil wo HSs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,2-Dichloroethane

General Statistics

Number of Valid Samples	50	Number of Detected Data	9
Number of Unique Samples	9	Number of Non-Detect Data	41
		Percent Non-Detects	82.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.36	Minimum Detected	-1.022
Maximum Detected	1400	Maximum Detected	7.244
Mean of Detected	159.1	Mean of Detected	1.47
SD of Detected	465.4	SD of Detected	2.487
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	35.65	Maximum Non-Detect	3.574

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	49
Number treated as Detected	1
Single DL Non-Detect Percentage	98.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.397	Shapiro Wilk Test Statistic	0.834
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	29.1	Mean	-1.236
SD	197.9	SD	1.77
95% DL/2 (t) UCL	76.02	95% H-Stat (DL/2) UCL	3.469
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.633
		SD in Log Scale	5.385
		Mean in Original Scale	28.64
		SD in Original Scale	197.9
		95% Percentile Bootstrap UCL	84.62
		95% BCA Bootstrap UCL	113

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.21	Data appear Lognormal at 5% Significance Level	
Theta Star	757.5		
nu star	3.78		
A-D Test Statistic	1.664	**Nonparametric Statistics**	
5% A-D Critical Value	0.844	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.844	Mean	28.94
5% K-S Critical Value	0.307	SD	195.9
Data not Gamma Distributed at 5% Significance Level		SE of Mean	29.38
		95% KM (t) UCL	78.2
Assuming Gamma Distribution		95% KM (z) UCL	77.27
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	75.71
Minimum	0	95% KM (bootstrap t) UCL	3999
Maximum	1400	95% KM (BCA) UCL	92.34
Mean	130.1	95% KM (Percentile Bootstrap) UCL	84.95
Median	134.8	95% KM (Chebyshev) UCL	157
SD	201.5	97.5% KM (Chebyshev) UCL	212.4

Pro-UCL
Future Surface Soil

k star	0.154	99% KM (Chebyshev) UCL	321.3
Theta star	846.3		
Nu star	15.37	Potential UCLs to Use	
AppChi2	7.521	99% KM (Chebyshev) UCL	321.3
95% Gamma Approximate UCL	265.9		
95% Adjusted Gamma UCL	271.8		
Note: DL/2 is not a recommended method.			

Arsenic

General Statistics

Number of Valid Samples	50	Number of Detected Data	48
Number of Unique Samples	27	Number of Non-Detect Data	2
		Percent Non-Detects	4.00%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.74	Minimum Detected	-0.301
Maximum Detected	8.9	Maximum Detected	2.186
Mean of Detected	1.946	Mean of Detected	0.539
SD of Detected	1.33	SD of Detected	0.462
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.618	Shapiro Wilk Test Statistic	0.93
5% Shapiro Wilk Critical Value	0.947	5% Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.878	Mean	0.462
SD	1.345	SD	0.591
95% DL/2 (t) UCL	2.197	95% H-Stat (DL/2) UCL	2.227
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.859	Mean in Log Scale	0.495
SD	1.362	SD in Log Scale	0.502
95% MLE (t) UCL	2.182	Mean in Original Scale	1.891
95% MLE (Tiku) UCL	2.168	SD in Original Scale	1.33
		95% Percentile Bootstrap UCL	2.227
		95% BCA Bootstrap UCL	2.306
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.86	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.504		
nu star	370.5		
A-D Test Statistic	1.626	**Nonparametric Statistics**	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	1.897
5% K-S Critical Value	0.128	SD	1.311
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.187
		95% KM (t) UCL	2.211
Assuming Gamma Distribution		95% KM (z) UCL	2.206
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.21
Minimum	0	95% KM (bootstrap t) UCL	2.494
Maximum	8.9	95% KM (BCA) UCL	2.236
Mean	1.868	95% KM (Percentile Bootstrap) UCL	2.238
Median	1.675	95% KM (Chebyshev) UCL	2.714
SD	1.358	97.5% KM (Chebyshev) UCL	3.067
k star	0.915	99% KM (Chebyshev) UCL	3.761
Theta star	2.041		

Pro-UCL
Future Surface Soil

Nu star	91.52	Potential UCLs to Use	
AppChi2	70.46	95% KM (Chebyshev) UCL	2.714
95% Gamma Approximate UCL	2.426		
95% Adjusted Gamma UCL	2.446		

Note: DL/2 is not a recommended method.

Iron

General Statistics

Number of Valid Samples	50	Number of Unique Samples	34
Raw Statistics		**Log-transformed Statistics**	
Minimum	7400	Minimum of Log Data	8.909
Maximum	86000	Maximum of Log Data	11.36
Mean	34458	Mean of log Data	10.31
Median	30500	SD of log Data	0.551
SD	17624		
Coefficient of Variation	0.511		
Skewness	0.856		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.941	Shapiro Wilk Test Statistic	0.972
Shapiro Wilk Critical Value	0.947	Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	38637	95% H-UCL	40671
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	47418
95% Adjusted-CLT UCL	38880	97.5% Chebyshev (MVUE) UCL	52850
95% Modified-t UCL	38687	99% Chebyshev (MVUE) UCL	63519
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.606	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	9556		
nu star	360.6		
Approximate Chi Square Value (.05)	317.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0452	95% CLT UCL	38558
Adjusted Chi Square Value	316.4	95% Jackknife UCL	38637
		95% Standard Bootstrap UCL	38495
Anderson-Darling Test Statistic	0.179	95% Bootstrap-t UCL	39101
Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	39100
Kolmogorov-Smirnov Test Statistic	0.0816	95% Percentile Bootstrap UCL	38590
Kolmogorov-Smirnov 5% Critical Value	0.126	95% BCA Bootstrap UCL	38628
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	45322
		97.5% Chebyshev(Mean, Sd) UCL	50023
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	59257
95% Approximate Gamma UCL	39124		
95% Adjusted Gamma UCL	39272		
Potential UCL to Use		Use 95% Approximate Gamma UCL	39124

Manganese

General Statistics

Number of Valid Samples	50	Number of Unique Samples	40
Raw Statistics		**Log-transformed Statistics**	
Minimum	80	Minimum of Log Data	4.382
Maximum	7300	Maximum of Log Data	8.896
Mean	669.7	Mean of log Data	6.166
Median	455	SD of log Data	0.726
SD	1005		

Coefficient of Variation	1.501
Skewness	6.089

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.392	Shapiro Wilk Test Statistic	0.958
Shapiro Wilk Critical Value	0.947	Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	908.1	95% H-UCL	767.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	919.9
95% Adjusted-CLT UCL	1034	97.5% Chebyshev (MVUE) UCL	1051
95% Modified-t UCL	928.5	99% Chebyshev (MVUE) UCL	1309
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.531	Data appear Lognormal at 5% Significance Level	
Theta Star	437.4		
nu star	153.1		
Approximate Chi Square Value (.05)	125.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0452	95% CLT UCL	903.5
Adjusted Chi Square Value	124.8	95% Jackknife UCL	908.1
		95% Standard Bootstrap UCL	911
Anderson-Darling Test Statistic	2.017	95% Bootstrap-t UCL	1354
Anderson-Darling 5% Critical Value	0.766	95% Hall's Bootstrap UCL	1802
Kolmogorov-Smirnov Test Statistic	0.155	95% Percentile Bootstrap UCL	938.8
Kolmogorov-Smirnov 5% Critical Value	0.127	95% BCA Bootstrap UCL	1117
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1289
		97.5% Chebyshev(Mean, Sd) UCL	1558
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2084
95% Approximate Gamma UCL	817		
95% Adjusted Gamma UCL	821.8		
Potential UCL to Use		Use 95% H-UCL	767.3

Tetrachloroethene

General Statistics

Number of Valid Samples	50	Number of Detected Data	14
Number of Unique Samples	14	Number of Non-Detect Data	36
		Percent Non-Detects	72.00%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.69	Minimum Detected	-0.371
Maximum Detected	111	Maximum Detected	4.71
Mean of Detected	21.08	Mean of Detected	1.838
SD of Detected	35.67	SD of Detected	1.611
Minimum Non-Detect	0.14	Minimum Non-Detect	-1.966
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	36
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	72.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.616	Shapiro Wilk Test Statistic	0.944
5% Shapiro Wilk Critical Value	0.874	5% Shapiro Wilk Critical Value	0.874
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.065	Mean	-0.611
SD	20.66	SD	1.792

95% DL/2 (t) UCL	10.96	95% H-Stat (DL/2) UCL	6.24
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.451
		SD in Log Scale	3.469
		Mean in Original Scale	5.966
		SD in Original Scale	20.69
		95% Percentile Bootstrap UCL	11.29
		95% BCA Bootstrap UCL	14.02

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.457	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	46.09		
nu star	12.81		
A-D Test Statistic	0.855	**Nonparametric Statistics**	
5% A-D Critical Value	0.791	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.791	Mean	6.4
5% K-S Critical Value	0.241	SD	20.36
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	2.988
		95% KM (t) UCL	11.41
Assuming Gamma Distribution		95% KM (z) UCL	11.32
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	11.09
Minimum	0	95% KM (bootstrap t) UCL	24.91
Maximum	111	95% KM (BCA) UCL	11.83
Mean	16.54	95% KM (Percentile Bootstrap) UCL	11.87
Median	14.27	95% KM (Chebyshev) UCL	19.43
SD	20.17	97.5% KM (Chebyshev) UCL	25.06
k star	0.289	99% KM (Chebyshev) UCL	36.13
Theta star	57.16		
Nu star	28.94	Potential UCLs to Use	
AppChi2	17.66	95% KM (t) UCL	11.41
95% Gamma Approximate UCL	27.11		
95% Adjusted Gamma UCL	27.52		

Note: DL/2 is not a recommended method.

Thallium

General Statistics

Number of Valid Samples	50	Number of Unique Samples	37

Raw Statistics		**Log-transformed Statistics**	
Minimum	7.75	Minimum of Log Data	2.048
Maximum	91	Maximum of Log Data	4.511
Mean	38.28	Mean of log Data	3.5
Median	36.5	SD of log Data	0.576
SD	19.6		
Coefficient of Variation	0.512		
Skewness	0.675		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.953	Shapiro Wilk Test Statistic	0.959
Shapiro Wilk Critical Value	0.947	Shapiro Wilk Critical Value	0.947
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	42.93	95% H-UCL	45.84
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	53.69
95% Adjusted-CLT UCL	43.12	97.5% Chebyshev (MVUE) UCL	60.08
95% Modified-t UCL	42.97	99% Chebyshev (MVUE) UCL	72.61
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.402	Data appear Normal at 5% Significance Level	

Theta Star	11.25		
nu star	340.2		
Approximate Chi Square Value (.05)	298.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0452	95% CLT UCL	42.84
Adjusted Chi Square Value	297.3	95% Jackknife UCL	42.93
		95% Standard Bootstrap UCL	42.79
Anderson-Darling Test Statistic	0.183	95% Bootstrap-t UCL	43.12
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	43.07
Kolmogorov-Smirnov Test Statistic	0.0647	95% Percentile Bootstrap UCL	43.13
Kolmogorov-Smirnov 5% Critical Value	0.126	95% BCA Bootstrap UCL	43.27
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	50.36
		97.5% Chebyshev(Mean, Sd) UCL	55.59
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	65.86
95% Approximate Gamma UCL	43.63		
95% Adjusted Gamma UCL	43.8		
Potential UCL to Use		Use 95% Student's-t UCL	42.93

Vanadium

General Statistics

Number of Valid Samples	50	Number of Unique Samples	39
Raw Statistics		**Log-transformed Statistics**	
Minimum	13	Minimum of Log Data	2.565
Maximum	400	Maximum of Log Data	5.991
Mean	122.3	Mean of log Data	4.491
Median	100	SD of log Data	0.858
SD	92.82		
Coefficient of Variation	0.759		
Skewness	1.171		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.89	Shapiro Wilk Test Statistic	0.961
Shapiro Wilk Critical Value	0.947	Shapiro Wilk Critical Value	0.947
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	144.3	95% H-UCL	168.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	204.4
95% Adjusted-CLT UCL	146.2	97.5% Chebyshev (MVUE) UCL	237.6
95% Modified-t UCL	144.6	99% Chebyshev (MVUE) UCL	302.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.643	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	74.39		
nu star	164.3		
Approximate Chi Square Value (.05)	135.7	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0452	95% CLT UCL	143.8
Adjusted Chi Square Value	134.9	95% Jackknife UCL	144.3
		95% Standard Bootstrap UCL	143.2
Anderson-Darling Test Statistic	0.269	95% Bootstrap-t UCL	147.2
Anderson-Darling 5% Critical Value	0.765	95% Hall's Bootstrap UCL	146.2
Kolmogorov-Smirnov Test Statistic	0.0821	95% Percentile Bootstrap UCL	143.9
Kolmogorov-Smirnov 5% Critical Value	0.127	95% BCA Bootstrap UCL	147.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	179.5
		97.5% Chebyshev(Mean, Sd) UCL	204.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	252.9
95% Approximate Gamma UCL	148.1		
95% Adjusted Gamma UCL	148.9		
Potential UCL to Use		Use 95% Approximate Gamma UCL	148.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Subsurface Soil wo HSs.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,2-Dichloroethane

General Statistics

Number of Valid Samples	152	Number of Detected Data	53
Number of Unique Samples	51	Number of Non-Detect Data	99
		Percent Non-Detects	65.13%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.36	Minimum Detected	-1.022
Maximum Detected	2500	Maximum Detected	7.824
Mean of Detected	399.3	Mean of Detected	3.263
SD of Detected	637.6	SD of Detected	2.978
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	35.65	Maximum Non-Detect	3.574

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	131
Number treated as Detected	21
Single DL Non-Detect Percentage	86.18%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.323	Lilliefors Test Statistic	0.167
5% Lilliefors Critical Value	0.122	5% Lilliefors Critical Value	0.122
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	139.4	Mean	-0.134
SD	420	SD	3.075
95% DL/2 (t) UCL	195.8	95% H-Stat (DL/2) UCL	314.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.47
		SD in Log Scale	5.358
		Mean in Original Scale	139.3
		SD in Original Scale	420
		95% Percentile Bootstrap UCL	196
		95% BCA Bootstrap UCL	201.9

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.257	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1554		
nu star	27.24		
A-D Test Statistic	2.963	**Nonparametric Statistics**	
5% A-D Critical Value	0.881	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.881	Mean	139.5
5% K-S Critical Value	0.134	SD	418.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	34.28
		95% KM (t) UCL	196.2
Assuming Gamma Distribution		95% KM (z) UCL	195.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	195.8
Minimum	0	95% KM (bootstrap t) UCL	211.7
Maximum	2500	95% KM (BCA) UCL	201
Mean	348.2	95% KM (Percentile Bootstrap) UCL	199.4
Median	358.2	95% KM (Chebyshev) UCL	288.9
SD	398.5	97.5% KM (Chebyshev) UCL	353.5
k star	0.246	99% KM (Chebyshev) UCL	480.5
Theta star	1414		
Nu star	74.88	Potential UCLs to Use	
AppChi2	55.95	97.5% KM (Chebyshev) UCL	353.5
95% Gamma Approximate UCL	466		
95% Adjusted Gamma UCL	467.3		

Note: DL/2 is not a recommended method.

1,4-Dichlorobenzene

General Statistics

Number of Valid Samples	152	Number of Detected Data	18
Number of Unique Samples	18	Number of Non-Detect Data	134
		Percent Non-Detects	88.16%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.45	Minimum Detected	-0.799
Maximum Detected	2205	Maximum Detected	7.698
Mean of Detected	345.9	Mean of Detected	3.282
SD of Detected	663.4	SD of Detected	2.704
Minimum Non-Detect	0.21	Minimum Non-Detect	-1.561
Maximum Non-Detect	0.3	Maximum Non-Detect	-1.204

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	134
Number treated as Detected	18
Single DL Non-Detect Percentage	88.16%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.598	Lilliefors Test Statistic	0.945
5% Lilliefors Critical Value	0.897	5% Lilliefors Critical Value	0.897
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	41.09	Mean	-1.359
SD	249.2	SD	1.938
95% DL/2 (t) UCL	74.54	95% H-Stat (DL/2) UCL	2.754
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-8.561
		SD in Log Scale	6.985
		Mean in Original Scale	40.99
		SD in Original Scale	249.2
		95% Percentile Bootstrap UCL	77.79
		95% BCA Bootstrap UCL	89.46
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.265	Data appear Lognormal at 5% Significance Level	
Theta Star	1307		
nu star	9.526		
A-D Test Statistic	0.984	**Nonparametric Statistics**	
5% A-D Critical Value	0.853	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.853	Mean	41.36
5% K-S Critical Value	0.222	SD	248.4
Data not Gamma Distributed at 5% Significance Level		SE of Mean	20.73
		95% KM (t) UCL	75.67
Assuming Gamma Distribution		95% KM (z) UCL	75.46
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	74.58
Minimum	0	95% KM (bootstrap t) UCL	106.2
Maximum	19366	95% KM (BCA) UCL	82.31
Mean	3600	95% KM (Percentile Bootstrap) UCL	77.71
Median	894.4	95% KM (Chebyshev) UCL	131.7
SD	5144	97.5% KM (Chebyshev) UCL	170.8
k star	0.109	99% KM (Chebyshev) UCL	247.6
Theta star	33049		
Nu star	33.11	Potential UCLs to Use	
AppChi2	20.96	97.5% KM (Chebyshev) UCL	170.8
95% Gamma Approximate UCL	5688		
95% Adjusted Gamma UCL	5713		

Note: DL/2 is not a recommended method.

Arsenic

General Statistics

Number of Valid Samples	101	Number of Detected Data	78
Number of Unique Samples	40	Number of Non-Detect Data	23
		Percent Non-Detects	22.77%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.55	Minimum Detected	-0.598
Maximum Detected	8.9	Maximum Detected	2.186
Mean of Detected	1.671	Mean of Detected	0.377
SD of Detected	1.146	SD of Detected	0.495
Minimum Non-Detect	0.5	Minimum Non-Detect	-0.693
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.2	Lilliefors Test Statistic	0.078
5% Lilliefors Critical Value	0.1	5% Lilliefors Critical Value	0.1
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.348	Mean	-0.0248
SD	1.17	SD	0.861
95% DL/2 (t) UCL	1.541	95% H-Stat (DL/2) UCL	1.69
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.209	Mean in Log Scale	0.121
SD	1.356	SD in Log Scale	0.655
95% MLE (t) UCL	1.433	Mean in Original Scale	1.403
95% MLE (Tiku) UCL	1.436	SD in Original Scale	1.123
		95% Percentile Bootstrap UCL	1.597
		95% BCA Bootstrap UCL	1.65
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.67	Data appear Lognormal at 5% Significance Level	
Theta Star	0.455		
nu star	572.5		
A-D Test Statistic	1.21	**Nonparametric Statistics**	
5% A-D Critical Value	0.757	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.757	Mean	1.416
5% K-S Critical Value	0.102	SD	1.105
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.111
		95% KM (t) UCL	1.6
Assuming Gamma Distribution		95% KM (z) UCL	1.598

Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.592
Minimum	0	95% KM (bootstrap t) UCL	1.658
Maximum	8.9	95% KM (BCA) UCL	1.623
Mean	1.458	95% KM (Percentile Bootstrap) UCL	1.608
Median	1.3	95% KM (Chebyshev) UCL	1.899
SD	1.098	97.5% KM (Chebyshev) UCL	2.107
k star	0.969	99% KM (Chebyshev) UCL	2.518
Theta star	1.505		
Nu star	195.6	Potential UCLs to Use	
AppChi2	164.3	95% KM (BCA) UCL	1.623
95% Gamma Approximate UCL	1.736		
95% Adjusted Gamma UCL	1.741		

Note: DL/2 is not a recommended method.

Benzene

General Statistics

Number of Valid Samples	152	Number of Detected Data	40
Number of Unique Samples	38	Number of Non-Detect Data	112
		Percent Non-Detects	73.68%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.335	Minimum Detected	-1.094
Maximum Detected	490	Maximum Detected	6.194
Mean of Detected	49.74	Mean of Detected	1.867
SD of Detected	106.2	SD of Detected	2.067
Minimum Non-Detect	0.18	Minimum Non-Detect	-1.715
Maximum Non-Detect	0.4	Maximum Non-Detect	-0.916

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	113
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	39
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	74.34%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.54	Lilliefors Test Statistic	0.917
5% Lilliefors Critical Value	0.94	5% Lilliefors Critical Value	0.94
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	13.22	Mean	-0.816
SD	58.25	SD	1.941
95% DL/2 (t) UCL	21.04	95% H-Stat (DL/2) UCL	4.776
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.517
		SD in Log Scale	4.285
		Mean in Original Scale	13.13
		SD in Original Scale	58.27
		95% Percentile Bootstrap UCL	21.37
		95% BCA Bootstrap UCL	24.81
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.324	Data do not follow a Discernable Distribution (0.05)	
Theta Star	153.5		
nu star	25.93		
A-D Test Statistic	3.088	**Nonparametric Statistics**	
5% A-D Critical Value	0.85	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.85	Mean	13.34
5% K-S Critical Value	0.151	SD	58.03
Data not Gamma Distributed at 5% Significance Level		SE of Mean	4.767
		95% KM (t) UCL	21.23
Assuming Gamma Distribution		95% KM (z) UCL	21.18
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	21.08
Minimum	0	95% KM (bootstrap t) UCL	26.47
Maximum	490	95% KM (BCA) UCL	22.17
Mean	44.21	95% KM (Percentile Bootstrap) UCL	21.77
Median	42.57	95% KM (Chebyshev) UCL	34.12
SD	58.02	97.5% KM (Chebyshev) UCL	43.11
k star	0.23	99% KM (Chebyshev) UCL	60.77
Theta star	191.8		
Nu star	70.06	Potential UCLs to Use	
AppChi2	51.79	97.5% KM (Chebyshev) UCL	43.11
95% Gamma Approximate UCL	59.81		
95% Adjusted Gamma UCL	59.98		

Note: DL/2 is not a recommended method.

Chloroform

General Statistics

Number of Valid Samples	152	Number of Detected Data	27
Number of Unique Samples	27	Number of Non-Detect Data	125
		Percent Non-Detects	82.24%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.23	Minimum Detected	-1.47
Maximum Detected	63	Maximum Detected	4.143
Mean of Detected	6.749	Mean of Detected	0.947
SD of Detected	12.15	SD of Detected	1.474
Minimum Non-Detect	0.13	Minimum Non-Detect	-2.04

Maximum Non-Detect	0.2	Maximum Non-Detect	-1.609

Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	125
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	27
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	82.24%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.512	Lilliefors Test Statistic	0.959
5% Lilliefors Critical Value	0.923	5% Lilliefors Critical Value	0.923
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.275	Mean	-1.805
SD	5.65	SD	1.431
95% DL/2 (t) UCL	2.033	95% H-Stat (DL/2) UCL	0.618
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.976
		SD in Log Scale	3.318
		Mean in Original Scale	1.237
		SD in Original Scale	5.658
		95% Percentile Bootstrap UCL	2.076
		95% BCA Bootstrap UCL	2.582
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.591	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	11.42		
nu star	31.9		
A-D Test Statistic	0.633	**Nonparametric Statistics**	
5% A-D Critical Value	0.795	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.795	Mean	1.388
5% K-S Critical Value	0.176	SD	5.607
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.463
		95% KM (t) UCL	2.155
Assuming Gamma Distribution		95% KM (z) UCL	2.15
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.135
Minimum	0	95% KM (bootstrap t) UCL	3.171
Maximum	63	95% KM (BCA) UCL	2.302
Mean	7.903	95% KM (Percentile Bootstrap) UCL	2.25
Median	5.046	95% KM (Chebyshev) UCL	3.408
SD	9.092	97.5% KM (Chebyshev) UCL	4.282
k star	0.14	99% KM (Chebyshev) UCL	5.999
Theta star	56.38		
Nu star	42.61	Potential UCLs to Use	
AppChi2	28.64	95% KM (t) UCL	2.155
95% Gamma Approximate UCL	11.76		
95% Adjusted Gamma UCL	11.8		
Note: DL/2 is not a recommended method.			

cis-1,2-Dichloroethene

General Statistics

Number of Valid Samples	152	Number of Detected Data	72
Number of Unique Samples	69	Number of Non-Detect Data	80
		Percent Non-Detects	52.63%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.55	Minimum Detected	-0.598
Maximum Detected	3200	Maximum Detected	8.071
Mean of Detected	201.4	Mean of Detected	3.23
SD of Detected	477.8	SD of Detected	2.401
Minimum Non-Detect	0.16	Minimum Non-Detect	-1.833
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	72
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	52.63%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.337	Lilliefors Test Statistic	0.0935
5% Lilliefors Critical Value	0.104	5% Lilliefors Critical Value	0.104
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	95.52	Mean	0.71
SD	342.8	SD	2.924
95% DL/2 (t) UCL	141.5	95% H-Stat (DL/2) UCL	409.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.14
		SD in Log Scale	3.985
		Mean in Original Scale	95.51
		SD in Original Scale	342.8
		95% Percentile Bootstrap UCL	145.3
		95% BCA Bootstrap UCL	164
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.323	Data appear Lognormal at 5% Significance Level	

Theta Star	623.4		
nu star	46.53		
A-D Test Statistic	1.771	**Nonparametric Statistics**	
5% A-D Critical Value	0.859	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.859	Mean	95.7
5% K-S Critical Value	0.114	SD	341.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	27.9
		95% KM (t) UCL	141.9
Assuming Gamma Distribution		95% KM (z) UCL	141.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	141.7
Minimum	0	95% KM (bootstrap t) UCL	182
Maximum	3200	95% KM (BCA) UCL	155
Mean	259.8	95% KM (Percentile Bootstrap) UCL	142.9
Median	59	95% KM (Chebyshev) UCL	217.3
SD	438.8	97.5% KM (Chebyshev) UCL	269.9
k star	0.134	99% KM (Chebyshev) UCL	373.3
Theta star	1941		
Nu star	40.69	**Potential UCLs to Use**	
AppChi2	27.07	97.5% KM (Chebyshev) UCL	269.9
95% Gamma Approximate UCL	390.5		
95% Adjusted Gamma UCL	392		

Note: DL/2 is not a recommended method.

Iron

General Statistics

Number of Valid Samples	101	Number of Unique Samples	55
Raw Statistics		**Log-transformed Statistics**	
Minimum	7400	Minimum of Log Data	8.909
Maximum	99000	Maximum of Log Data	11.5
Mean	33417	Mean of log Data	10.27
Median	31000	SD of log Data	0.558
SD	17412		
Coefficient of Variation	0.521		
Skewness	0.987		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0717	Lilliefors Test Statistic	0.0847
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	36293	95% H-UCL	37605
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	42580
95% Adjusted-CLT UCL	36449	97.5% Chebyshev (MVUE) UCL	46368
95% Modified-t UCL	36322	99% Chebyshev (MVUE) UCL	53808
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.577	Data appear Normal at 5% Significance Level	
Theta Star	9342		
nu star	722.6		
Approximate Chi Square Value (.05)	661.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	36267
Adjusted Chi Square Value	660.4	95% Jackknife UCL	36293
		95% Standard Bootstrap UCL	36314
Anderson-Darling Test Statistic	0.306	95% Bootstrap-t UCL	36350
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	36407
Kolmogorov-Smirnov Test Statistic	0.0609	95% Percentile Bootstrap UCL	36135
Kolmogorov-Smirnov 5% Critical Value	0.0896	95% BCA Bootstrap UCL	36416
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	40969
		97.5% Chebyshev(Mean, Sd) UCL	44237
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	50656
95% Approximate Gamma UCL	36518		
95% Adjusted Gamma UCL	36565		
Potential UCL to Use		Use 95% Student's-t UCL	36293

Manganese

General Statistics

Number of Valid Samples	101	Number of Unique Samples	64
Raw Statistics		**Log-transformed Statistics**	
Minimum	60	Minimum of Log Data	4.094
Maximum	7300	Maximum of Log Data	8.896
Mean	619	Mean of log Data	6.091
Median	450	SD of log Data	0.772
SD	808.3		
Coefficient of Variation	1.306		
Skewness	6.214		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.245	Lilliefors Test Statistic	0.062
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	752.5	95% H-UCL	695.5

95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	816.7
95% Adjusted-CLT UCL	804.4	97.5% Chebyshev (MVUE) UCL	913.4
95% Modified-t UCL	760.8	99% Chebyshev (MVUE) UCL	1103
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.588	Data appear Lognormal at 5% Significance Level	
Theta Star	389.7		
nu star	320.8		
Approximate Chi Square Value (.05)	280.3	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	751.3
Adjusted Chi Square Value	279.8	95% Jackknife UCL	752.5
		95% Standard Bootstrap UCL	749.4
Anderson-Darling Test Statistic	2.018	95% Bootstrap-t UCL	884.4
Anderson-Darling 5% Critical Value	0.769	95% Hall's Bootstrap UCL	1348
Kolmogorov-Smirnov Test Statistic	0.119	95% Percentile Bootstrap UCL	753.9
Kolmogorov-Smirnov 5% Critical Value	0.0907	95% BCA Bootstrap UCL	833.9
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	969.6
		97.5% Chebyshev(Mean, Sd) UCL	1121
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1419
95% Approximate Gamma UCL	708.4		
95% Adjusted Gamma UCL	709.8		
Potential UCL to Use		Use 95% H-UCL	695.5

Tetrachloroethene

General Statistics

Number of Valid Samples	152	Number of Detected Data	70
Number of Unique Samples	64	Number of Non-Detect Data	82
		Percent Non-Detects	53.95%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.54	Minimum Detected	-0.616
Maximum Detected	2800	Maximum Detected	7.937
Mean of Detected	179	Mean of Detected	2.527
SD of Detected	545.3	SD of Detected	2.241
Minimum Non-Detect	0.14	Minimum Non-Detect	-1.966
Maximum Non-Detect	0.5	Maximum Non-Detect	-0.693
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	82
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	70
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	53.95%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.414	Lilliefors Test Statistic	0.103
5% Lilliefors Critical Value	0.106	5% Lilliefors Critical Value	0.106
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	82.53	Mean	0.257
SD	379.3	SD	2.623
95% DL/2 (t) UCL	133.4	95% H-Stat (DL/2) UCL	93.75
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.854
		SD in Log Scale	3.872
		Mean in Original Scale	82.48
		SD in Original Scale	379.3
		95% Percentile Bootstrap UCL	135.9
		95% BCA Bootstrap UCL	152.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.263	Data appear Lognormal at 5% Significance Level	
Theta Star	681		
nu star	36.79		
A-D Test Statistic	6.352	**Nonparametric Statistics**	
5% A-D Critical Value	0.881	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.881	Mean	82.71
5% K-S Critical Value	0.116	SD	378
Data not Gamma Distributed at 5% Significance Level		SE of Mean	30.88
		95% KM (t) UCL	133.8
Assuming Gamma Distribution		95% KM (z) UCL	133.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	133.6
Minimum	0.54	95% KM (bootstrap t) UCL	172.9
Maximum	2800	95% KM (BCA) UCL	137.9
Mean	239.2	95% KM (Percentile Bootstrap) UCL	134.7
Median	40.02	95% KM (Chebyshev) UCL	217.3
SD	454.6	97.5% KM (Chebyshev) UCL	275.6
k star	0.374	99% KM (Chebyshev) UCL	390
Theta star	640.2		
Nu star	113.6	Potential UCLs to Use	
AppChi2	89.99	97.5% KM (Chebyshev) UCL	275.6
95% Gamma Approximate UCL	302		
95% Adjusted Gamma UCL	302.6		
Note: DL/2 is not a recommended method.			

Thallium

General Statistics

Number of Valid Samples	101	Number of Unique Samples	56

Raw Statistics		Log-transformed Statistics	
Minimum	7.75	Minimum of Log Data	2.048
Maximum	99	Maximum of Log Data	4.595
Mean	36.52	Mean of log Data	3.458
Median	33	SD of log Data	0.558
SD	18.7		
Coefficient of Variation	0.512		
Skewness	0.839		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.0796	Lilliefors Test Statistic	0.09
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	39.61	95% H-UCL	41.14
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	46.57
95% Adjusted-CLT UCL	39.75	97.5% Chebyshev (MVUE) UCL	50.71
95% Modified-t UCL	39.64	99% Chebyshev (MVUE) UCL	58.84
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.617	Data appear Normal at 5% Significance Level	
Theta Star	10.1		
nu star	730.7		
Approximate Chi Square Value (.05)	669	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	39.58
Adjusted Chi Square Value	668.1	95% Jackknife UCL	39.61
		95% Standard Bootstrap UCL	39.55
Anderson-Darling Test Statistic	0.204	95% Bootstrap-t UCL	39.68
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	39.7
Kolmogorov-Smirnov Test Statistic	0.0547	95% Percentile Bootstrap UCL	39.53
Kolmogorov-Smirnov 5% Critical Value	0.0896	95% BCA Bootstrap UCL	39.84
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	44.63
		97.5% Chebyshev(Mean, Sd) UCL	48.14
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	55.04
95% Approximate Gamma UCL	39.89		
95% Adjusted Gamma UCL	39.94		
Potential UCL to Use		Use 95% Student's-t UCL	39.61

Toluene

General Statistics

Number of Valid Samples	152	Number of Detected Data	67
Number of Unique Samples	61	Number of Non-Detect Data	85
		Percent Non-Detects	55.92%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.45	Minimum Detected	-0.799
Maximum Detected	220000	Maximum Detected	12.3
Mean of Detected	5450	Mean of Detected	3.32
SD of Detected	27325	SD of Detected	3.769
Minimum Non-Detect	0.17	Minimum Non-Detect	-1.772
Maximum Non-Detect	0.4	Maximum Non-Detect	-0.916

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	85
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	67
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	55.92%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.421	Lilliefors Test Statistic	0.159
5% Lilliefors Critical Value	0.108	5% Lilliefors Critical Value	0.108
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2402	Mean	0.473
SD	18268	SD	3.564
95% DL/2 (t) UCL	4855	95% H-Stat (DL/2) UCL	4088
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.579
		SD in Log Scale	6.523
		Mean in Original Scale	2402
		SD in Original Scale	18268
		95% Percentile Bootstrap UCL	5302
		95% BCA Bootstrap UCL	6998
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.149	Data do not follow a Discernable Distribution (0.05)	
Theta Star	36463		
nu star	20.03		
A-D Test Statistic	6.645	**Nonparametric Statistics**	
5% A-D Critical Value	0.953	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.953	Mean	2402
5% K-S Critical Value	0.123	SD	18208
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1488
		95% KM (t) UCL	4865

Assuming Gamma Distribution		95% KM (z) UCL	4850
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4855
Minimum	0.45	95% KM (bootstrap t) UCL	17694
Maximum	220000	95% KM (BCA) UCL	5265
Mean	6915	95% KM (Percentile Bootstrap) UCL	5138
Median	4226	95% KM (Chebyshev) UCL	8888
SD	18805	97.5% KM (Chebyshev) UCL	11695
k star	0.281	99% KM (Chebyshev) UCL	17208
Theta star	24642		
Nu star	85.3	Potential UCLs to Use	
AppChi2	65.01	97.5% KM (Chebyshev) UCL	11695
95% Gamma Approximate UCL	9073		
95% Adjusted Gamma UCL	9096		

Note: DL/2 is not a recommended method.

Trichloroethene

General Statistics

Number of Valid Samples	152	Number of Detected Data	71
Number of Unique Samples	64	Number of Non-Detect Data	81
		Percent Non-Detects	53.29%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.4	Minimum Detected	-0.916
Maximum Detected	1700	Maximum Detected	7.438
Mean of Detected	88.25	Mean of Detected	2.498
SD of Detected	237	SD of Detected	2.085
Minimum Non-Detect	0.23	Minimum Non-Detect	-1.47
Maximum Non-Detect	0.6	Maximum Non-Detect	-0.511

Note: Data have multiple DLs - Use of KM Method is recommended
For all methods (except KM, DL/2, and ROS Methods),
Observations < Largest ND are treated as NDs

Number treated as Non-Detect	83
Number treated as Detected	69
Single DL Non-Detect Percentage	54.61%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.355	Lilliefors Test Statistic	0.0898
5% Lilliefors Critical Value	0.105	5% Lilliefors Critical Value	0.105
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	41.37	Mean	0.45
SD	167.3	SD	2.404
95% DL/2 (t) UCL	63.82	95% H-Stat (DL/2) UCL	58.15
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.532
		SD in Log Scale	3.533
		Mean in Original Scale	41.31
		SD in Original Scale	167.3
		95% Percentile Bootstrap UCL	66.68
		95% BCA Bootstrap UCL	71.79
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.336	Data appear Lognormal at 5% Significance Level	
Theta Star	262.9		
nu star	47.67		
A-D Test Statistic	3.448	**Nonparametric Statistics**	
5% A-D Critical Value	0.856	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.856	Mean	41.44
5% K-S Critical Value	0.114	SD	166.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	13.62
		95% KM (t) UCL	63.98
Assuming Gamma Distribution		95% KM (z) UCL	63.84
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	63.81
Minimum	0	95% KM (bootstrap t) UCL	89
Maximum	1700	95% KM (BCA) UCL	69.74
Mean	113	95% KM (Percentile Bootstrap) UCL	66.08
Median	26.13	95% KM (Chebyshev) UCL	100.8
SD	201.8	97.5% KM (Chebyshev) UCL	126.5
k star	0.165	99% KM (Chebyshev) UCL	176.9
Theta star	686.2		
Nu star	50.08	Potential UCLs to Use	
AppChi2	34.83	97.5% KM (Chebyshev) UCL	126.5
95% Gamma Approximate UCL	162.5		
95% Adjusted Gamma UCL	163.1		

Note: DL/2 is not a recommended method.

Vanadium

General Statistics

Number of Valid Samples	405	Number of Detected Data	179
Number of Unique Samples	127	Number of Non-Detect Data	226
		Percent Non-Detects	55.80%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.73	Minimum Detected	-0.315
Maximum Detected	300000	Maximum Detected	12.61
Mean of Detected	2064	Mean of Detected	3.844
SD of Detected	22490	SD of Detected	2.132

Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	0.71	Maximum Non-Detect	-0.342
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	226
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	179
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	55.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.484	Lilliefors Test Statistic	0.0969
5% Lilliefors Critical Value	0.0662	5% Lilliefors Critical Value	0.0662
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	912.4	Mean	1.025
SD	14964	SD	2.89
95% DL/2 (t) UCL	2138	95% H-Stat (DL/2) UCL	138.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.729
		SD in Log Scale	3.488
		Mean in Original Scale	912.6
		SD in Original Scale	14964
		95% Percentile Bootstrap UCL	2387
		95% BCA Bootstrap UCL	3784
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.195	Data do not follow a Discernable Distribution (0.05)	
Theta Star	10559		
nu star	69.98		
A-D Test Statistic	29.74	**Nonparametric Statistics**	
5% A-D Critical Value	0.922	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.922	Mean	912.7
5% K-S Critical Value	0.0767	SD	14945
Data not Gamma Distributed at 5% Significance Level		SE of Mean	744.7
		95% KM (t) UCL	2140
Assuming Gamma Distribution		95% KM (z) UCL	2138
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2139
Minimum	0.73	95% KM (bootstrap t) UCL	16179
Maximum	300000	95% KM (BCA) UCL	2425
Mean	2174	95% KM (Percentile Bootstrap) UCL	2374
Median	1600	95% KM (Chebyshev) UCL	4159
SD	14948	97.5% KM (Chebyshev) UCL	5563
k star	0.384	99% KM (Chebyshev) UCL	8322
Theta star	5655		
Nu star	311.4	Potential UCLs to Use	
AppChi2	271.5	97.5% KM (Chebyshev) UCL	5563
95% Gamma Approximate UCL	2493		
95% Adjusted Gamma UCL	2494		

Note: DL/2 is not a recommended method.

Vinyl chloride

General Statistics

Number of Valid Samples	152	Number of Detected Data	28
Number of Unique Samples	27	Number of Non-Detect Data	124
		Percent Non-Detects	81.58%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.73	Minimum Detected	-0.315
Maximum Detected	32	Maximum Detected	3.466
Mean of Detected	7.456	Mean of Detected	1.405
SD of Detected	8.41	SD of Detected	1.162
Minimum Non-Detect	0.33	Minimum Non-Detect	-1.109
Maximum Non-Detect	0.7	Maximum Non-Detect	-0.357
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	124
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	28
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	81.58%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.77	Lilliefors Test Statistic	0.939
5% Lilliefors Critical Value	0.924	5% Lilliefors Critical Value	0.924
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.62	Mean	-0.756
SD	4.516	SD	1.18
95% DL/2 (t) UCL	2.226	95% H-Stat (DL/2) UCL	1.177
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.439
		SD in Log Scale	2.625
		Mean in Original Scale	1.488
		SD in Original Scale	4.558
		95% Percentile Bootstrap UCL	2.14
		95% BCA Bootstrap UCL	2.284
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	

k star (bias corrected)	0.881	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	8.466		
nu star	49.32		
A-D Test Statistic	0.623	**Nonparametric Statistics**	
5% A-D Critical Value	0.776	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.776	Mean	1.969
5% K-S Critical Value	0.17	SD	4.4
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.363
		95% KM (t) UCL	2.571
Assuming Gamma Distribution		95% KM (z) UCL	2.567
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.494
Minimum	0	95% KM (bootstrap t) UCL	2.733
Maximum	32	95% KM (BCA) UCL	2.746
Mean	9.333	95% KM (Percentile Bootstrap) UCL	2.616
Median	7.719	95% KM (Chebyshev) UCL	3.553
SD	8.088	97.5% KM (Chebyshev) UCL	4.239
k star	0.201	99% KM (Chebyshev) UCL	5.585
Theta star	46.44		
Nu star	61.09	Potential UCLs to Use	
AppChi2	44.11	95% KM (t) UCL	2.571
95% Gamma Approximate UCL	12.92		
95% Adjusted Gamma UCL	12.96		

Note: DL/2 is not a recommended method.

Xylenes (Total)

General Statistics

Number of Valid Samples	152	Number of Detected Data	50
Number of Unique Samples	50	Number of Non-Detect Data	102
		Percent Non-Detects	67.11%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.73	Minimum Detected	-0.315
Maximum Detected	300000	Maximum Detected	12.61
Mean of Detected	7141	Mean of Detected	3.916
SD of Detected	42437	SD of Detected	3.169
Minimum Non-Detect	0.6	Minimum Non-Detect	-0.511
Maximum Non-Detect	0.71	Maximum Non-Detect	-0.342
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	102
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	50
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	67.11%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.176	Lilliefors Test Statistic	0.925
5% Lilliefors Critical Value	0.947	5% Lilliefors Critical Value	0.947
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2349	Mean	0.506
SD	24408	SD	3
95% DL/2 (t) UCL	5626	95% H-Stat (DL/2) UCL	439.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.875
		SD in Log Scale	6.097
		Mean in Original Scale	2349
		SD in Original Scale	24408
		95% Percentile Bootstrap UCL	6266
		95% BCA Bootstrap UCL	10020
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.158	Data do not follow a Discernable Distribution (0.05)	
Theta Star	45068		
nu star	15.84		
A-D Test Statistic	5.954	**Nonparametric Statistics**	
5% A-D Critical Value	0.938	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.938	Mean	2349
5% K-S Critical Value	0.141	SD	24327
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1993
		95% KM (t) UCL	5648
Assuming Gamma Distribution		95% KM (z) UCL	5628
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5626
Minimum	0	95% KM (bootstrap t) UCL	42654
Maximum	1654576	95% KM (BCA) UCL	6378
Mean	156322	95% KM (Percentile Bootstrap) UCL	6295
Median	267.3	95% KM (Chebyshev) UCL	11038
SD	342456	97.5% KM (Chebyshev) UCL	14797
k star	0.0758	99% KM (Chebyshev) UCL	22182
Theta star	2062297		
Nu star	23.04	Potential UCLs to Use	
AppChi2	13.12	97.5% KM (Chebyshev) UCL	14797
95% Gamma Approximate UCL	274484		
95% Adjusted Gamma UCL	275992		

Note: DL/2 is not a recommended method.

H-5 Risk Calculations

Appendix H-5.1
Surface Soil
Excluding Hot Spots
Current O&M Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current
Receptor Population:	O&M Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Excluding Hot Spots and Beneath Structures	Arsenic	5.E-07	2.E-07	6.E-10			6.E-07	3.E-03	1.E-03	NA			4.E-03
			Iron	NA	NA	NA			0.E+00	2.E-02	1.E-02	NA			3.E-02
			Manganese	NA	NA	NA			0.E+00	9.E-03	6.E-03	3.E-03			2.E-02
			Thallium	NA	NA	NA			0.E+00	2.E-01	1.E-01	NA			3.E-01
			Vanadium	NA	NA	NA			0.E+00	4.E-02	3.E-02	NA			7.E-02
			1,2-Dichloroethane	2.E-11	8.E-12	2.E-15			2.E-11	NA	NA	3.E-08			3.E-08
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	3.E-10	1.E-10	1.E-15			4.E-10	1.E-07	7.E-08	9.E-06			9.E-06
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	5.E-07	2.E-07	6.E-10	0.E+00	0.E+00	6.E-07	3.E-01	2.E-01	3.E-03	0.E+00	0.E+00	4.E-01
		Exposure Point Total							6.E-07						4.E-01
	Exposure Medium Total								6.E-07						4.E-01
Soil Total									6.E-07						4.E-01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1,2-Trichloroethane					1.E-08	1.E-08					2.E-04	2.E-04
			1,1-Dichloroethane					NA	0.E+00					1.E-03	1.E-03
			1,1-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			1,2-Dichlorobenzene					NA	0.E+00					2.E-04	2.E-04
			1,2-Dichloroethane					1.E-05	1.E-05					4.E-04	4.E-04
			1,4-Dichlorobenzene					5.E-08	5.E-08					3.E-05	3.E-05
			2-Chlorophenol					NA	0.E+00					1.E-04	1.E-04
			4-Methyl-2-pentanone					NA	0.E+00					8.795E-06	9.E-06
			Benzene					3.E-07	3.E-07					4.E-03	4.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					2.E-03	2.E-03
			Chloroethane					2.E-07	2.E-07					6.E-04	6.E-04
			Chloroform					3.E-07	3.E-07					8.E-04	8.E-04
			cis-1,2-Dichloroethene					NA	0.E+00					7.E-03	7.E-03
			Ethylbenzene					NA	0.E+00					3.E-03	3.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					9.E-03	9.E-03
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					3.E-06	3.E-06
			Methylcyclohexane					NA	0.E+00					6.E-03	6.E-03
			Methylene chloride					4.E-08	4.E-08					2.E-04	2.E-04
			Naphthalene					NA	0.E+00					3.E-04	3.E-04
			Tetrachloroethene					8.E-06	8.E-06					1.E-01	1.E-01
			Toluene					NA	0.E+00					1.E-03	1.E-03
			Trichloroethene					7.E-05	7.E-05					5.E-02	5.E-02
			Vinyl chloride					2.E-06	2.E-06					1.E-02	1.E-02
			Xylenes (Total)					NA	0.E+00					1.E-01	1.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	9.E-05	9.E-05	0.E+00	0.E+00	0.E+00	0.E+00	3.E-01	3.E-01
		Exposure Point Total							9.E-05						3.E-01
	Exposure Medium Total								9.E-05						3.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current
Receptor Population:	O&M Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									9.E-05						3.E-01

Total Risk Across All Media = 9.E-05

Total Hazard Across All Media = 0.8

Current O&M Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.9	50	1	150	25	1.0E-06	70	9125	8.5E-07	3.0E-04	2.8E-03	1%
Iron	38116	50	1	150	25	1.0E-06	70	9125	1.1E-02	7.0E-01	1.6E-02	6%
Manganese	646	50	1	150	25	1.0E-06	70	9125	1.9E-04	2.0E-02	9.5E-03	4%
Thallium	43	50	1	150	25	1.0E-06	70	9125	1.3E-05	7.0E-05	1.8E-01	**72%**
Vanadium	144	50	1	150	25	1.0E-06	70	9125	4.2E-05	1.0E-03	4.2E-02	**17%**
1,2-Dichloroethane	0.0017	50	1	150	25	1.0E-06	70	9125	5.0E-10	NA	NA	0%
Tetrachloroethene	0.0048	50	1	150	25	1.0E-06	70	9125	1.4E-09	1.0E-02	1.4E-07	0%

Hazard Index = 2.5E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Current O&M Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.9	3,300	0.2	0.03	150	25	1	1.0E-06	70	9125	3.4E-07	9.5E-01	2.9E-04	1.2E-03	1%
Iron	38116	3,300	0.2	0.01	150	25	1	1.0E-06	70	9125	1.5E-03	2.0E-01	1.4E-01	1.1E-02	6%
Manganese	646	3,300	0.2	0.01	150	25	1	1.0E-06	70	9125	2.5E-05	2.0E-01	4.0E-03	6.3E-03	4%
Thallium	43	3,300	0.2	0.01	150	25	1	1.0E-06	70	9125	1.7E-06	2.0E-01	1.4E-05	1.2E-01	**72%**
Vanadium	144	3,300	0.2	0.01	150	25	1	1.0E-06	70	9125	5.6E-06	2.0E-01	2.0E-04	2.8E-02	**17%**
1,2-Dichloroethane	0.0017	3,300	0.2	0.03	150	25	1	1.0E-06	70	9125	2.0E-10	8.0E-01	NA	NA	0%
Tetrachloroethene	0.0048	3,300	0.2	0.03	150	25	1	1.0E-06	70	9125	5.6E-10	8.0E-01	8.0E-03	7.0E-08	0%

Hazard Index = 1.6E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Current O&M Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.9	6.80E+08	NA	1	150	25	8	70	9125	2.0E-10	NA	NA	0%
Iron	38116	6.80E+08	NA	1	150	25	8	70	9125	2.6E-06	NA	NA	0%
Manganese	646	6.80E+08	NA	1	150	25	8	70	9125	4.5E-08	1.43E-05	3.1E-03	**100%**
Thallium	43	6.80E+08	NA	1	150	25	8	70	9125	3.0E-09	NA	NA	0%
Vanadium	144	6.80E+08	NA	1	150	25	8	70	9125	9.9E-09	NA	NA	0%
1,2-Dichloroethane	0.0017	NA	3.91E+03	1	150	25	8	70	9125	2.0E-08	7.00E-01	2.9E-08	0%
Tetrachloroethene	0.0048	NA	2.55E+03	1	150	25	8	70	9125	8.8E-08	1.00E-02	8.8E-06	0%

Hazard Index = 3.1E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Current O&M Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.9	50	1	150	25	1.0E-06	70	25,550	3.0E-07	1.5E+00	4.6E-07	**100%**
Iron	38116	50	1	150	25	1.0E-06	70	25,550	4.0E-03	NA	NA	0%
Manganese	646	50	1	150	25	1.0E-06	70	25,550	6.8E-05	NA	NA	0%
Thallium	43	50	1	150	25	1.0E-06	70	25,550	4.5E-06	NA	NA	0%
Vanadium	144	50	1	150	25	1.0E-06	70	25,550	1.5E-05	NA	NA	0%
1,2-Dichloroethane	0.0017	50	1	150	25	1.0E-06	70	25,550	1.8E-10	9.1E-02	1.6E-11	0%
Tetrachloroethene	0.0048	50	1	150	25	1.0E-06	70	25,550	5.0E-10	5.4E-01	2.7E-10	0%

Excess Lifetime Cancer Risk = 4.6E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Current O&M Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$

where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil (1) (mg/kg)	SA Skin Surface Area Exposed (cm^2)	AF Skin-soil Adherence Factor (mg/cm^2-event)	AE_d Dermal Absorption Efficiency (2) (unitless)	EF Exposure Frequency (days/year)	ED Exposure Duration (years)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency (3) (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.9	3,300	0.2	0.03	150	25	1	1.0E-06	70	25,550	1.2E-07	9.5E-01	1.6E+00	1.9E-07	**100%**
Iron	38116	3,300	0.2	0.01	150	25	1	1.0E-06	70	25,550	5.3E-04	2.0E-01	NA	NA	0%
Manganese	646	3,300	0.2	0.01	150	25	1	1.0E-06	70	25,550	8.9E-06	2.0E-01	NA	NA	0%
Thallium	43	3,300	0.2	0.01	150	25	1	1.0E-06	70	25,550	6.0E-07	2.0E-01	NA	NA	0%
Vanadium	144	3,300	0.2	0.01	150	25	1	1.0E-06	70	25,550	2.0E-06	2.0E-01	NA	NA	0%
1,2-Dichloroethane	0.0017	3,300	0.2	0.03	150	25	1	1.0E-06	70	25,550	7.1E-11	8.0E-01	1.1E-01	8.0E-12	0%
Tetrachloroethene	0.0048	3,300	0.2	0.03	150	25	1	1.0E-06	70	25,550	2.0E-10	8.0E-01	6.8E-01	1.3E-10	0%

Excess Lifetime Cancer Risk = 1.9E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Current O&M Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s /\ PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} /\ BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} /\ BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposur (1): Soil EPCs (see Appendix H-3)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.9	1.32E+09	NA	1	150	25	8	70	25,550	3.7E-11	1.51E+01	5.6E-10	**100%**
Iron	38116	1.32E+09	NA	1	150	25	8	70	25,550	4.9E-07	NA	NA	0%
Manganese	646	1.32E+09	NA	1	150	25	8	70	25,550	8.2E-09	NA	NA	0%
Thallium	43	1.32E+09	NA	1	150	25	8	70	25,550	5.5E-10	NA	NA	0%
Vanadium	144	1.32E+09	NA	1	150	25	8	70	25,550	1.8E-09	NA	NA	0%
1,2-Dichloroethane	0.0017	1.32E+09	3.91E+03	1	150	25	8	70	25,550	2.2E-14	9.10E-02	2.0E-15	0%
Tetrachloroethene	0.0048	1.32E+09	2.55E+03	1	150	25	8	70	25,550	6.1E-14	2.10E-02	1.3E-15	0%

Excess Lifetime Cancer Risk = 5.6E-10

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.2
Surface Soil
Excluding Hot Spots
Current Trespasser/Recreational

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface	Excluding	Arsenic	7.E-07	3.E-07	2.E-10			1.E-06	9.E-03	4.E-03	NA			1.E-02
	Soil	Hot Spots	Iron	NA	NA	NA			0.E+00	5.E-02	4.E-02	NA			9.E-02
		and Beneath	Manganese	NA	NA	NA			0.E+00	3.E-02	2.E-02	1.E-03			5.E-02
		Structures	Thallium	NA	NA	NA			0.E+00	6.E-01	4.E-01	NA			1.E+00
			Vanadium	NA	NA	NA			0.E+00	1.E-01	1.E-01	NA			2.E-01
			1,2-Dichloroethane	6.E-11	2.E-10	3.E-10			6.E-10	NA	NA	1.E-08			1.E-08
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	4.E-10	2.E-10	1.E-10			8.E-10	5.E-07	3.E-07	4.E-06			4.E-06
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-07	3.E-07	7.E-10	0.E+00	0.E+00	1.E-06	8.E-01	6.E-01	1.E-03	0.E+00	0.E+00	1.E+00
		Exposure Point Total							1.E-06						1.E+00
	Exposure Medium Total								1.E-06						1.E+00
Soil Total									1.E-06						1.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater	Shallow	Potable	1,1,1-Trichloroethane						0.E+00						0.E+00
Continued	and	Use	1,1,2-Trichloroethane						0.E+00						0.E+00
	Bedrock		1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									0.E+00						0.E+00

Total Risk Across All Media = 1.E-06

Total Hazard Across All Media = 1

Current Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.9	100	1	144	12	1.0E-06	42	4380	2.7E-06	3.0E-04	9.1E-03	1%
Iron	38116	100	1	144	12	1.0E-06	42	4380	3.6E-02	7.0E-01	5.1E-02	6%
Manganese	646	100	1	144	12	1.0E-06	42	4380	6.1E-04	2.0E-02	3.0E-02	4%
Thallium	43	100	1	144	12	1.0E-06	42	4380	4.0E-05	7.0E-05	5.8E-01	**72%**
Vanadium	144	100	1	144	12	1.0E-06	42	4380	1.4E-04	1.0E-03	1.4E-01	**17%**
1,2-Dichloroethane	0.0017	100	1	144	12	1.0E-06	42	4380	1.6E-09	NA	NA	0%
Tetrachloroethene	0.0048	100	1	144	12	1.0E-06	42	4380	4.5E-09	1.0E-02	4.5E-07	0%

Hazard Index = 8.0E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Current Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.9	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	1.2E-06	9.5E-01	2.9E-04	4.4E-03	1%
Iron	38116	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	5.4E-03	2.0E-01	1.4E-01	3.9E-02	6%
Manganese	646	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	9.2E-05	2.0E-01	4.0E-03	2.3E-02	4%
Thallium	43	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	6.1E-06	2.0E-01	1.4E-05	4.4E-01	**72%**
Vanadium	144	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	2.1E-05	2.0E-01	2.0E-04	1.0E-01	**17%**
1,2-Dichloroethane	0.0017	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	7.3E-10	8.0E-01	NA	NA	0%
Tetrachloroethene	0.0048	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	2.1E-09	8.0E-01	8.0E-03	2.6E-07	0%

Hazard Index = 6.1E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Current Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.9	6.80E+08	NA	0.52	144	12	4	42	4380	8.3E-11	NA	NA	0%
Iron	38116	6.80E+08	NA	0.52	144	12	4	42	4380	1.1E-06	NA	NA	0%
Manganese	646	6.80E+08	NA	0.52	144	12	4	42	4380	1.9E-08	1.43E-05	1.3E-03	**100%**
Thallium	43	6.80E+08	NA	0.52	144	12	4	42	4380	1.2E-09	NA	NA	0%
Vanadium	144	6.80E+08	NA	0.52	144	12	4	42	4380	4.1E-09	NA	NA	0%
1,2-Dichloroethane	0.0017	NA	3.91E+03	0.52	144	12	4	42	4380	8.5E-09	7.00E-01	1.2E-08	0%
Tetrachloroethene	0.0048	NA	2.55E+03	0.52	144	12	4	42	4380	3.7E-08	1.00E-02	3.7E-06	0%

Hazard Index = 1.3E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Current Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.9	100	1	144	12	1.0E-06	42	25,550	4.7E-07	1.5E+00	7.0E-07	**100%**
Iron	38116	100	1	144	12	1.0E-06	42	25,550	6.1E-03	NA	NA	0%
Manganese	646	100	1	144	12	1.0E-06	42	25,550	1.0E-04	NA	NA	0%
Thallium	43	100	1	144	12	1.0E-06	42	25,550	6.9E-06	NA	NA	0%
Vanadium	144	100	1	144	12	1.0E-06	42	25,550	2.3E-05	NA	NA	0%
1,2-Dichloroethane	0.0017			**chemical is considered mutagenic, see Table xx for risk calculation**							6.0E-11	0%
Tetrachloroethene	0.0048	100	1	144	12	1.0E-06	42	25,550	7.7E-10	5.4E-01	4.2E-10	0%

Excess Lifetime Cancer Risk = 7.0E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Current Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.9	7,605	0.2	0.03	144	12	1	1.0E-06	42	25,550	2.1E-07	9.5E-01	1.6E+00	3.4E-07	**100%**
Iron	38116	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	9.3E-04	2.0E-01	NA	NA	0%
Manganese	646	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	1.6E-05	2.0E-01	NA	NA	0%
Thallium	43	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	1.1E-06	2.0E-01	NA	NA	0%
Vanadium	144	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	3.5E-06	2.0E-01	NA	NA	0%
1,2-Dichloroethane	0.0017				**chemical is considered mutagenic, see Table xx for risk calculation**									1.7E-10	0%
Tetrachloroethene	0.0048	7,605	0.2	0.03	144	12	1	1.0E-06	42	25,550	3.5E-10	8.0E-01	6.8E-01	2.4E-10	0%

Excess Lifetime Cancer Risk =	**3.4E-07**

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Current Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.9	6.80E+08	NA	0.52	144	12	4	42	25,550	1.4E-11	1.51E+01	2.2E-10	**32%**
Iron	38116	6.80E+08	NA	0.52	144	12	4	42	25,550	1.9E-07	NA	NA	0%
Manganese	646	6.80E+08	NA	0.52	144	12	4	42	25,550	3.2E-09	NA	NA	0%
Thallium	43	6.80E+08	NA	0.52	144	12	4	42	25,550	2.1E-10	NA	NA	0%
Vanadium	144	6.80E+08	NA	0.52	144	12	4	42	25,550	7.1E-10	NA	NA	0%
1,2-Dichloroethane	0.0017			**chemical is considered mutagenic, see Table xx for risk calculation**								3.2E-10	**48%**
Tetrachloroethene	0.0048	NA	2.55E+03	0.52	144	12	4	42	25,550	6.3E-09	2.10E-02	1.3E-10	**20%**

Excess Lifetime Cancer Risk = 6.7E-10

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.0017			2.90E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	1.73E-10	NA	1.73E-10	**Dermal Risk**
1,2-Dichloroethane	0.0017			1.01E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	6.04E-11	NA	6.04E-11	**Ingestion risk**
1,2-Dichloroethane	0.0017			5.40E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	3.22E-10	NA	3.22E-10	**inhalation risk**

Appendix H-5.4
Surface Soil
Excluding Hot Spots
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Excluding Hot Spots	Arsenic	7.E-07	3.E-07	9.E-10			1.E-06	4.E-03	2.E-03	NA			6.E-03
			Iron	NA	NA	NA			0.E+00	3.E-02	2.E-02	NA			5.E-02
			Manganese	NA	NA	NA			0.E+00	2.E-02	1.E-02	6.E-03			4.E-02
			Thallium	NA	NA	NA			0.E+00	3.E-01	2.E-01	NA			5.E-01
			Vanadium	NA	NA	NA			0.E+00	7.E-02	5.E-02	NA			1.E-01
			1,2-Dichloroethane	NA	NA	2.E-07			2.E-07	NA	NA	9.E-06			9.E-06
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	1.E-09	5.E-10	3.E-09			4.E-09	5.E-07	3.E-07	3.E-05			3.E-05
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-07	3.E-07	2.E-07	0.E+00	0.E+00	1.E-06	4.E-01	3.E-01	6.E-03	0.E+00	0.E+00	7.E-01
		Exposure Point Total							1.E-06						7.E-01
	Exposure Medium Total								1.E-06						7.E-01
Soil Total									1.E-06						7.E-01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.431E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene		0.E+00				0.E+00		0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane		0.E+00				0.E+00		0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 9.E-03

Total Hazard Across All Media = 62

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.7	50	1	250	25	1.0E-06	70	9125	1.3E-06	3.0E-04	4.4E-03	1%
Iron	39124	50	1	250	25	1.0E-06	70	9125	1.9E-02	7.0E-01	2.7E-02	6%
Manganese	767	50	1	250	25	1.0E-06	70	9125	3.8E-04	2.0E-02	1.9E-02	4%
Thallium	43	50	1	250	25	1.0E-06	70	9125	2.1E-05	7.0E-05	3.0E-01	**71%**
Vanadium	148	50	1	250	25	1.0E-06	70	9125	7.2E-05	1.0E-03	7.2E-02	**17%**
1,2-Dichloroethane	0.32	50	1	250	25	1.0E-06	70	9125	1.6E-07	NA	NA	0%
Tetrachloroethene	0.011	50	1	250	25	1.0E-06	70	9125	5.4E-09	1.0E-02	5.4E-07	0%

Hazard Index = 4.2E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.7	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	5.2E-07	9.5E-01	2.9E-04	1.8E-03	1%
Iron	39124	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	2.5E-03	2.0E-01	1.4E-01	1.8E-02	6%
Manganese	767	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	5.0E-05	2.0E-01	4.0E-03	1.2E-02	4%
Thallium	43	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	2.8E-06	2.0E-01	1.4E-05	2.0E-01	**71%**
Vanadium	148	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	9.6E-06	2.0E-01	2.0E-04	4.8E-02	**17%**
1,2-Dichloroethane	0.32	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	6.2E-08	8.0E-01	NA	NA	0%
Tetrachloroethene	0.011	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	2.1E-09	8.0E-01	8.0E-03	2.7E-07	0%

Hazard Index = 2.8E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	C_s Conc. in Soil [(1)] (mg/kg)	PEF Particulate Emission Factor[(2)] (m^3/kg)	VF Volatilization Factor[(3)] (m^3/kg)	$IR_{air\text{-}hourly}$ Hourly Inhalation Rate (m^3/hr)	EF Exposure Frequency (day/year)	ED Duration of Exposure (years)	ET_{inh} Exposure Time (hr/day)	BW Body Weight (kg)	AT_n Averaging Time Noncancer (days)	ADD_{inhal} Average Daily Dose (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient	Percent Distribution of Risk (%)
Arsenic	2.7	6.80E+08	NA	1	250	25	8	70	9125	3.1E-10	NA	NA	0%
Iron	39124	6.80E+08	NA	1	250	25	8	70	9125	4.5E-06	NA	NA	0%
Manganese	767	6.80E+08	NA	1	250	25	8	70	9125	8.8E-08	1.43E-05	6.2E-03	**99%**
Thallium	43	6.80E+08	NA	1	250	25	8	70	9125	4.9E-09	NA	NA	0%
Vanadium	148	6.80E+08	NA	1	250	25	8	70	9125	1.7E-08	NA	NA	0%
1,2-Dichloroethane	0.32	NA	3.91E+03	1	250	25	8	70	9125	6.4E-06	7.00E-01	9.2E-06	0%
Tetrachloroethene	0.011	NA	2.55E+03	1	250	25	8	70	9125	3.4E-07	1.00E-02	3.4E-05	1%

Hazard Index = 6.2E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.7	50	1	250	25	1.0E-06	70	25,550	4.7E-07	1.5E+00	7.1E-07	**100%**
Iron	39124	50	1	250	25	1.0E-06	70	25,550	6.8E-03	NA	NA	0%
Manganese	767	50	1	250	25	1.0E-06	70	25,550	1.3E-04	NA	NA	0%
Thallium	43	50	1	250	25	1.0E-06	70	25,550	7.5E-06	NA	NA	0%
Vanadium	148	50	1	250	25	1.0E-06	70	25,550	2.6E-05	NA	NA	0%
1,2-Dichloroethane	0.32	50	1	250	25	1.0E-06	70	25,550	5.6E-08	9.1E-02	NA	0%
Tetrachloroethene	0.011	50	1	250	25	1.0E-06	70	25,550	1.9E-09	5.4E-01	1.0E-09	0%

Excess Lifetime Cancer Risk = 7.1E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency (2) (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency (3) (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.7	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.9E-07	9.5E-01	1.6E+00	2.9E-07	**100%**
Iron	39124	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	9.0E-04	2.0E-01	NA	NA	0%
Manganese	767	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.8E-05	2.0E-01	NA	NA	0%
Thallium	43	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	9.9E-07	2.0E-01	NA	NA	0%
Vanadium	148	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	3.4E-06	2.0E-01	NA	NA	0%
1,2-Dichloroethane	0.32	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.2E-08	8.0E-01	NA	NA	0%
Tetrachloroethene	0.011	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	7.6E-10	8.0E-01	6.8E-01	5.1E-10	0%

Excess Lifetime Cancer Risk = 3.0E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.7	1.32E+09	NA	1	250	25	8	70	25,550	5.7E-11	1.51E+01	8.7E-10	0%
Iron	39124	1.32E+09	NA	1	250	25	8	70	25,550	8.3E-07	NA	NA	0%
Manganese	767	1.32E+09	NA	1	250	25	8	70	25,550	1.6E-08	NA	NA	0%
Thallium	43	1.32E+09	NA	1	250	25	8	70	25,550	9.1E-10	NA	NA	0%
Vanadium	148	1.32E+09	NA	1	250	25	8	70	25,550	3.1E-09	NA	NA	0%
1,2-Dichloroethane	0.32	NA	3.91E+03	1	250	25	8	70	25,550	2.3E-06	9.10E-02	2.1E-07	**98%**
Tetrachloroethene	0.011	NA	2.55E+03	1	250	25	8	70	25,550	1.2E-07	2.10E-02	2.5E-09	1%

Excess Lifetime Cancer Risk = 2.1E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.3
Surface Soil
Excluding Hot Spots
Future Trespasser/Recreational

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Excluding Hot Spots	Arsenic	7.E-07	3.E-07	2.E-10			1.E-06	8.E-03	4.E-03	NA			1.E-02
			Iron	NA	NA	NA			0.E+00	5.E-02	4.E-02	NA			9.E-02
			Manganese	NA	NA	NA			0.E+00	4.E-02	3.E-02	2.E-03			6.E-02
			Thallium	NA	NA	NA			0.E+00	6.E-01	4.E-01	NA			1.E+00
			Vanadium	NA	NA	NA			0.E+00	1.E-01	1.E-01	NA			2.E-01
			1,2-Dichloroethane	1.E-08	3.E-08	6.E-08			1.E-07	NA	NA	2.E-06			2.E-06
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	1.E-09	5.E-10	3.E-10			2.E-09	1.E-06	6.E-07	8.E-06			1.E-05
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-07	3.E-07	6.E-08	0.E+00	0.E+00	1.E-06	8.E-01	6.E-01	2.E-03	0.E+00	0.E+00	1.E+00
		Exposure Point Total							1.E-06						1.E+00
	Exposure Medium Total								1.E-06						1.E+00
Soil Total									1.E-06						1.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									0.E+00						0.E+00

Total Risk Across All Media = 1.E-06

Total Hazard Across All Media = 1

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.7	100	1	144	12	1.0E-06	42	4380	2.5E-06	3.0E-04	8.5E-03	1%
Iron	39124	100	1	144	12	1.0E-06	42	4380	3.7E-02	7.0E-01	5.3E-02	6%
Manganese	767	100	1	144	12	1.0E-06	42	4380	7.2E-04	2.0E-02	3.6E-02	4%
Thallium	43	100	1	144	12	1.0E-06	42	4380	4.0E-05	7.0E-05	5.8E-01	**71%**
Vanadium	148	100	1	144	12	1.0E-06	42	4380	1.4E-04	1.0E-03	1.4E-01	**17%**
1,2-Dichloroethane	0.32	100	1	144	12	1.0E-06	42	4380	3.0E-07	NA	NA	0%
Tetrachloroethene	0.011	100	1	144	12	1.0E-06	42	4380	1.0E-08	1.0E-02	1.0E-06	0%

Hazard Index = 8.1E-01

Notes:
(1): Soil EPCs (see Appedix H-3)

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.7	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	1.2E-06	9.5E-01	2.9E-04	4.1E-03	1%
Iron	39124	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	5.6E-03	2.0E-01	1.4E-01	4.0E-02	6%
Manganese	767	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	1.1E-04	2.0E-01	4.0E-03	2.7E-02	4%
Thallium	43	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	6.1E-06	2.0E-01	1.4E-05	4.4E-01	**71%**
Vanadium	148	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	2.1E-05	2.0E-01	2.0E-04	1.1E-01	**17%**
1,2-Dichloroethane	0.32	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	1.4E-07	8.0E-01	NA	NA	0%
Tetrachloroethene	0.011	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	4.7E-09	8.0E-01	8.0E-03	5.9E-07	0%

Hazard Index = 6.2E-01

Notes:
(1): Soil EPCs (see Appedix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.7	6.80E+08	NA	0.52	144	12	4	42	4380	7.8E-11	NA	NA	0%
Iron	39124	6.80E+08	NA	0.52	144	12	4	42	4380	1.1E-06	NA	NA	0%
Manganese	767	6.80E+08	NA	0.52	144	12	4	42	4380	2.2E-08	1.43E-05	1.5E-03	**99%**
Thallium	43	6.80E+08	NA	0.52	144	12	4	42	4380	1.2E-09	NA	NA	0%
Vanadium	148	6.80E+08	NA	0.52	144	12	4	42	4380	4.3E-09	NA	NA	0%
1,2-Dichloroethane	0.32	NA	3.91E+03	0.52	144	12	4	42	4380	1.6E-06	7.00E-01	2.3E-06	0%
Tetrachloroethene	0.011	NA	2.55E+03	0.52	144	12	4	42	4380	8.4E-08	1.00E-02	8.4E-06	1%

Hazard Index = 1.6E-03

Notes:
(1): Soil EPCs (see Appedix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.7	100	1	144	12	1.0E-06	42	25,550	4.3E-07	1.5E+00	6.5E-07	**98%**
Iron	39124	100	1	144	12	1.0E-06	42	25,550	6.3E-03	NA	NA	0%
Manganese	767	100	1	144	12	1.0E-06	42	25,550	1.2E-04	NA	NA	0%
Thallium	43	100	1	144	12	1.0E-06	42	25,550	6.9E-06	NA	NA	0%
Vanadium	148	100	1	144	12	1.0E-06	42	25,550	2.4E-05	NA	NA	0%
1,2-Dichloroethane	0.32			**chemical is considered mutagenic, see Table xx for risk calculation**							1.1E-08	2%
Tetrachloroethene	0.011	100	1	144	12	1.0E-06	42	25,550	1.8E-09	5.4E-01	9.6E-10	0%

Excess Lifetime Cancer Risk = 6.6E-07

Notes:
(1): Soil EPCs (see Appedix H-3)
"NA" = Not applicable

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$

where:

C_s = representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA = skin surface area in contact with soil on days exposed (cm^2)
AF = mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d = absorption efficiency (unitless)
EF = exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED = exposure duration: the typical duration of each exposure event (years)
EV = event frequency (events/day)
BW = body weight (kg)
AT_c = averaging time (days)
C_1 = conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$** **Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.7	7,605	0.2	0.03	144	12	1	1.0E-06	42	25,550	2.0E-07	9.5E-01	1.6E+00	3.1E-07	**90%**
Iron	39124	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	9.6E-04	2.0E-01	NA	NA	0%
Manganese	767	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	1.9E-05	2.0E-01	NA	NA	0%
Thallium	43	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	1.1E-06	2.0E-01	NA	NA	0%
Vanadium	148	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	3.6E-06	2.0E-01	NA	NA	0%
1,2-Dichloroethane	0.32				**chemical is considered mutagenic, see Table xx for risk calculation**									3.3E-08	9%
Tetrachloroethene	0.011	7,605	0.2	0.03	144	12	1	1.0E-06	42	25,550	8.1E-10	8.0E-01	6.8E-01	5.5E-10	0%

Excess Lifetime Cancer Risk = 3.5E-07

Notes:
(1): Soil EPCs (see Appedix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.7	6.80E+08	NA	0.52	144	12	4	42	25,550	1.3E-11	1.51E+01	2.0E-10	0%
Iron	39124	6.80E+08	NA	0.52	144	12	4	42	25,550	1.9E-07	NA	NA	0%
Manganese	767	6.80E+08	NA	0.52	144	12	4	42	25,550	3.8E-09	NA	NA	0%
Thallium	43	6.80E+08	NA	0.52	144	12	4	42	25,550	2.1E-10	NA	NA	0%
Vanadium	148	6.80E+08	NA	0.52	144	12	4	42	25,550	7.3E-10	NA	NA	0%
1,2-Dichloroethane	0.32			**chemical is considered mutagenic, see Table xx for risk calculation**								6.1E-08	**99%**
Tetrachloroethene	0.011	NA	2.55E+03	0.52	144	12	4	42	25,550	1.4E-08	2.10E-02	3.0E-10	0%

Excess Lifetime Cancer Risk = 6.1E-08

Notes:
(1): Soil EPCs (see Appedix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.32			2.90E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	3.27E-08	NA	3.27E-08	**Dermal Risk**
1,2-Dichloroethane	0.32			1.01E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	1.14E-08	NA	1.14E-08	**Ingestion risk**
1,2-Dichloroethane	0.32			5.40E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	6.08E-08	NA	6.08E-08	**inhalation risk**

4	8			
4	8			
4.5	9			
4.5	9			
5.5	11			
5.5	11			
7	13			
7	13			
8	16			
8	16			
		8.6	0.52	6-15
			0.15	0-2
			0.26	2-6

Appendix H-5.5
Surface Soil
Excluding Hot Spots
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

				Cancer						Non-Carcinogenic Hazard Quotient					
Medium	Exposure Medium	Exposure Point	COPC	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Excluding Hot Spots	Arsenic	6.E-06	6.E-07	6.E-09			7.E-06	1.E-01	1.E-02	NA			1.E-01
			Iron	NA	NA	NA			0.E+00	7.E-01	1.E-01	NA			8.E-01
			Manganese	NA	NA	NA			0.E+00	5.E-01	7.E-02	2.E-02			6.E-01
			Thallium	NA	NA	NA			0.E+00	8.E+00	1.E+00	NA			9.E+00
			Vanadium	NA	NA	NA			0.E+00	2.E+00	3.E-01	NA			2.E+00
			1,2-Dichloroethane	2.E-07	5.E-07	2.E-06			2.E-06	NA	NA	3.E-05			3.E-05
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	9.E-09	1.E-09	9.E-09			2.E-08	1.E-05	1.E-05	1.E-04			1.E-04
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-06	1.E-06	2.E-06	0.E+00	0.E+00	9.E-06	1.E+01	2.E+00	2.E-02	0.E+00	0.E+00	1.E+01
		Exposure Point Total							9.E-06						1.E+01
	Exposure Medium Total								9.E-06						1.E+01
Soil Total									9.E-06						1.E+01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene		0.E+00				0.E+00		0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane		0.E+00				0.E+00		0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 3.E-02

Total Hazard Across All Media = 408

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.7	200	1	350	6	1.0E-06	15	2190	3.5E-05	3.0E-04	1.2E-01	1%
Iron	39124	200	1	350	6	1.0E-06	15	2190	5.0E-01	7.0E-01	7.1E-01	6%
Manganese	767	200	1	350	6	1.0E-06	15	2190	9.8E-03	2.0E-02	4.9E-01	4%
Thallium	43	200	1	350	6	1.0E-06	15	2190	5.5E-04	7.0E-05	7.9E+00	**71%**
Vanadium	148	200	1	350	6	1.0E-06	15	2190	1.9E-03	1.0E-03	1.9E+00	**17%**
1,2-Dichloroethane	0.32	200	1	350	6	1.0E-06	15	2190	4.1E-06	NA	NA	0%
Tetrachloroethene	0.011	200	1	350	6	1.0E-06	15	2190	1.4E-07	1.0E-02	1.4E-05	0%

Hazard Index = 1.1E+01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (years)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.7	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	2.9E-06	9.5E-01	2.9E-04	1.0E-02	1%
Iron	39124	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.4E-02	2.0E-01	1.4E-01	1.0E-01	6%
Manganese	767	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	2.7E-04	2.0E-01	4.0E-03	6.9E-02	4%
Thallium	43	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.5E-05	2.0E-01	1.4E-05	1.1E+00	**71%**
Vanadium	148	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	5.3E-05	2.0E-01	2.0E-04	2.6E-01	**17%**
1,2-Dichloroethane	0.32	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.4E-07	8.0E-01	NA	NA	0%
Tetrachloroethene	0.011	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.2E-08	8.0E-01	8.0E-03	1.5E-06	0%

Hazard Index = 1.5E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly} * EF * ED * ET_{inh} / BW * AT_n$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	C_s Conc. in Soil (1) (mg/kg)	PEF Particulate Emission Factor(2) (m^3/kg)	VF Volatilization Factor(3) (m^3/kg)	$IR_{air\text{-}hourly}$ Hourly Inhalation Rate (m^3/hr)	EF Exposure Frequency (day/year)	ED Duration of Exposure (years)	ET_{inh} Exposure Time (hr/day)	BW Body Weight (kg)	AT_n Averaging Time Noncancer (days)	ADD_{inhal} Average Daily Dose (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient	Percent Distribution of Risk (%)
Arsenic	2.7	6.80E+08	NA	0.26	350	6	16	15	2190	1.1E-09	NA	NA	0%
Iron	39124	6.80E+08	NA	0.26	350	6	16	15	2190	1.5E-05	NA	NA	0%
Manganese	767	6.80E+08	NA	0.26	350	6	16	15	2190	3.0E-07	1.43E-05	2.1E-02	**99%**
Thallium	43	6.80E+08	NA	0.26	350	6	16	15	2190	1.7E-08	NA	NA	0%
Vanadium	148	6.80E+08	NA	0.26	350	6	16	15	2190	5.8E-08	NA	NA	0%
1,2-Dichloroethane	0.32	NA	3.91E+03	0.26	350	6	16	15	2190	2.2E-05	7.00E-01	3.1E-05	0%
Tetrachloroethene	0.011	NA	2.55E+03	0.26	350	6	16	15	2190	1.1E-06	1.00E-02	1.1E-04	1%

Hazard Index = 2.1E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IF_{soil}** Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.7	114	1	350	1.0E-06	25,550	4.2E-06	1.5E+00	6.3E-06	**96%**
Iron	39124	114	1	350	1.0E-06	25,550	6.1E-02	NA	NA	0%
Manganese	767	114	1	350	1.0E-06	25,550	1.2E-03	NA	NA	0%
Thallium	43	114	1	350	1.0E-06	25,550	6.7E-05	NA	NA	0%
Vanadium	148	114	1	350	1.0E-06	25,550	2.3E-04	NA	NA	0%
1,2-Dichloroethane	0.32		**chemical is considered mutagenic, see Table xx for risk calculation**						2.30E-07	4%
cis-1,2-Dichloroethene	0.00	114	1	350	1.0E-06	25,550	0.0E+00	NA	NA	0%
Tetrachloroethene	0.011	114	1	350	1.0E-06	25,550	1.7E-08	5.4E-01	9.3E-09	0%

Excess Lifetime Cancer Risk = 6.6E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SFS** Age-Adjusted Dermal Factor (mg-year/kg-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.7	360	0.03	350	1	1.0E-06	25,550	4.0E-07	9.5E-01	1.6E+00	6.3E-07	**55%**
Iron	39124	360	0.01	350	1	1.0E-06	25,550	1.9E-03	2.0E-01	NA	NA	0%
Manganese	767	360	0.01	350	1	1.0E-06	25,550	3.8E-05	2.0E-01	NA	NA	0%
Thallium	43	360	0.01	350	1	1.0E-06	25,550	2.1E-06	2.0E-01	NA	NA	0%
Vanadium	148	360	0.01	350	1	1.0E-06	25,550	7.3E-06	8.0E-01	NA	NA	0%
1,2-Dichloroethane	0.32			**chemical is considered mutagenic, see Table xx for risk calculation**							5.1E-07	**45%**
Tetrachloroethene	0.011	360	0.03	350	1	1.0E-06	25,550	1.6E-09	8.0E-01	6.8E-01	1.1E-09	0%

Excess Lifetime Cancer Risk = 1.1E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	C_s Conc. in Soil (1) (mg/kg)	PEF Particulate Emission Factor(2) (m^3/kg)	VF Volatilization Factor(3) (m^3/kg)	$IR_{air\text{-}hourly}$ Hourly Inhalation Rate (m^3/hr)	EF Exposure Frequency (day/year)	ED Duration of Exposure Period (years)	ET_{inh} Exposure Time (hr/day)	BW Body Weight (kg)	AT_c Averaging Time Cancer (days)	ADD_{inhal} Average Daily Dose (mg/kg-day)	CSF_{inh} Cancer Slope Factor $(mg/(kg/day))^{-1}$	Chemical Specific Cancer Risk	Percent Distribution of Risk (%)
Arsenic	2.7	6.80E+08	NA	1	350	30	16	70	25,550	3.7E-10	1.51E+01	5.6E-09	0%
Iron	39124	6.80E+08	NA	1	350	30	16	70	25,550	5.4E-06	NA	NA	0%
Manganese	767	6.80E+08	NA	1	350	30	16	70	25,550	1.1E-07	NA	NA	0%
Thallium	43	6.80E+08	NA	1	350	30	16	70	25,550	5.9E-09	NA	NA	0%
Vanadium	148	6.80E+08	NA	1	350	30	16	70	25,550	2.0E-08	NA	NA	0%
1,2-Dichloroethane	0.32			**chemical is considered mutagenic, see Table xx for risk calculation**								1.7E-06	**99%**
Tetrachloroethene	0.011	NA	2.55E+03	1	350	30	16	70	25,550	4.1E-07	2.10E-02	8.5E-09	1%

Excess Lifetime Cancer Risk = 1.7E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.32	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	2.76E-07	1.15E-07	7.95E-08	3.71E-08	5.08E-07	**Dermal Risk**
1,2-Dichloroethane	0.32	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	1.46E-07	4.80E-08	2.77E-08	8.83E-09	2.30E-07	**Ingestion risk**
1,2-Dichloroethane	0.32	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	4.48E-07	2.56E-07	5.91E-07	3.62E-07	1.66E-06	**Inhalation risk**

Appendix H-5.6
Surface Soil
Hot Spot 1
Current O&M Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current
Receptor Population:	O&M Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #1	Arsenic	3.E-07	1.E-07	4.E-10			4.E-07	2.E-03	8.E-04	NA			3.E-03
			Iron	NA	NA	NA			0.E+00	2.E-02	2.E-02	NA			4.E-02
			Manganese	NA	NA	NA			0.E+00	2.E-02	2.E-02	8.E-03			5.E-02
			Thallium	NA	NA	NA			0.E+00	2.E-01	1.E-01	NA			3.E-01
			Vanadium	NA	NA	NA			0.E+00	3.E-02	2.E-02	NA			5.E-02
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	2.E-07	8.E-08	7.E-13			2.E-07	8.E-05	4.E-05	5.E-03			5.E-03
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	5.E-07	2.E-07	4.E-10	0.E+00	0.E+00	7.E-07	3.E-01	2.E-01	1.E-02	0.E+00	0.E+00	5.E-01
		Exposure Point Total							7.E-07						5.E-01
	Exposure Medium Total								7.E-07						5.E-01
Soil Total									7.E-07						5.E-01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1,2-Trichloroethane					1.E-08	1.E-08					2.E-04	2.E-04
			1,1-Dichloroethane					NA	0.E+00					1.E-03	1.E-03
			1,1-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			1,2-Dichlorobenzene					NA	0.E+00					2.E-04	2.E-04
			1,2-Dichloroethane					1.E-05	1.E-05					4.E-04	4.E-04
			1,4-Dichlorobenzene					5.E-08	5.E-08					3.E-05	3.E-05
			2-Chlorophenol					NA	0.E+00					1.E-04	1.E-04
			4-Methyl-2-pentanone					NA	0.E+00					9.E-06	9.E-06
			Benzene					3.E-07	3.E-07					4.E-03	4.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					2.E-03	2.E-03
			Chloroethane					2.E-07	2.E-07					6.E-04	6.E-04
			Chloroform					3.E-07	3.E-07					8.E-04	8.E-04
			cis-1,2-Dichloroethene					NA	0.E+00					7.E-03	7.E-03
			Ethylbenzene					NA	0.E+00					3.E-03	3.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					9.E-03	9.E-03
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					3.E-06	3.E-06
			Methylcyclohexane					NA	0.E+00					6.E-03	6.E-03
			Methylene chloride					4.E-08	4.E-08					2.E-04	2.E-04
			Naphthalene					NA	0.E+00					3.E-04	3.E-04
			Tetrachloroethene					8.E-06	8.E-06					1.E-01	1.E-01
			Toluene					NA	0.E+00					1.E-03	1.E-03
			Trichloroethene					7.E-05	7.E-05					5.E-02	5.E-02
			Vinyl chloride					2.E-06	2.E-06					1.E-02	1.E-02
			Xylenes (Total)					NA	0.E+00					1.E-01	1.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	9.E-05	9.E-05	0.E+00	0.E+00	0.E+00	0.E+00	3.E-01	3.E-01
		Exposure Point Total							9.E-05						3.E-01
	Exposure Medium Total								9.E-05						3.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current
Receptor Population:	O&M Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									9.E-05						3.E-01

Total Risk Across All Media = 9.E-05

Total Hazard Across All Media = 0.8

Current O&M Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	50	1	150	25	1.0E-06	70	9125	5.6E-07	3.0E-04	1.9E-03	1%
Iron	54500	50	1	150	25	1.0E-06	70	9125	1.6E-02	7.0E-01	2.3E-02	8%
Manganese	1700	50	1	150	25	1.0E-06	70	9125	5.0E-04	2.0E-02	2.5E-02	9%
Thallium	50	50	1	150	25	1.0E-06	70	9125	1.5E-05	7.0E-05	2.1E-01	**73%**
Vanadium	97	50	1	150	25	1.0E-06	70	9125	2.8E-05	1.0E-03	2.8E-02	**10%**
Tetrachloroethene	2.7	50	1	150	25	1.0E-06	70	9125	7.9E-07	1.0E-02	7.9E-05	0%

Hazard Index = 2.9E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Current O&M Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	3,300	0.2	0.03	150	25	1	1.0E-06	70	9125	2.2E-07	9.5E-01	2.9E-04	7.7E-04	0%
Iron	54500	3,300	0.2	0.01	150	25	1	1.0E-06	70	9125	2.1E-03	2.0E-01	1.4E-01	1.5E-02	8%
Manganese	1700	3,300	0.2	0.01	150	25	1	1.0E-06	70	9125	6.6E-05	2.0E-01	4.0E-03	1.6E-02	9%
Thallium	50	3,300	0.2	0.01	150	25	1	1.0E-06	70	9125	1.9E-06	2.0E-01	1.4E-05	1.4E-01	**73%**
Vanadium	97	3,300	0.2	0.01	150	25	1	1.0E-06	70	9125	3.7E-06	2.0E-01	2.0E-04	1.9E-02	**10%**
Tetrachloroethene	2.7	3,300	0.2	0.03	150	25	1	1.0E-06	70	9125	3.1E-07	8.0E-01	8.0E-03	3.9E-05	0%

Hazard Index = 1.9E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Current O&M Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	6.80E+08	NA	1	150	25	8	70	9125	1.3E-10	NA	NA	0%
Iron	54500	6.80E+08	NA	1	150	25	8	70	9125	3.8E-06	NA	NA	0%
Manganese	1700	6.80E+08	NA	1	150	25	8	70	9125	1.2E-07	1.43E-05	8.2E-03	**62%**
Thallium	50	6.80E+08	NA	1	150	25	8	70	9125	3.5E-09	NA	NA	0%
Vanadium	97	6.80E+08	NA	1	150	25	8	70	9125	6.7E-09	NA	NA	0%
Tetrachloroethene	2.7	NA	2.55E+03	1	150	25	8	70	9125	5.0E-05	1.00E-02	5.0E-03	**38%**

Hazard Index = 1.3E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Current O&M Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	50	1	150	25	1.0E-06	70	25,550	2.0E-07	1.5E+00	3.0E-07	**66%**
Iron	54500	50	1	150	25	1.0E-06	70	25,550	5.7E-03	NA	NA	0%
Manganese	1700	50	1	150	25	1.0E-06	70	25,550	1.8E-04	NA	NA	0%
Thallium	50	50	1	150	25	1.0E-06	70	25,550	5.2E-06	NA	NA	0%
Vanadium	97	50	1	150	25	1.0E-06	70	25,550	1.0E-05	NA	NA	0%
Tetrachloroethene	2.7	50	1	150	25	1.0E-06	70	25,550	2.8E-07	5.4E-01	1.5E-07	**34%**

Excess Lifetime Cancer Risk = 4.5E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Current O&M Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil (1) (mg/kg)	SA Skin Surface Area Exposed (cm^2)	AF Skin-soil Adherence Factor (mg/cm^2-event)	AE_d Dermal Absorption Efficiency (2) (unitless)	EF Exposure Frequency (days/year)	ED Exposure Duration (years)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency (3) (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	3,300	0.2	0.03	150	25	1	1.0E-06	70	25,550	7.9E-08	9.5E-01	1.6E+00	1.2E-07	**62%**
Iron	54500	3,300	0.2	0.01	150	25	1	1.0E-06	70	25,550	7.5E-04	2.0E-01	NA	NA	0%
Manganese	1700	3,300	0.2	0.01	150	25	1	1.0E-06	70	25,550	2.4E-05	2.0E-01	NA	NA	0%
Thallium	50	3,300	0.2	0.01	150	25	1	1.0E-06	70	25,550	6.9E-07	2.0E-01	NA	NA	0%
Vanadium	97	3,300	0.2	0.01	150	25	1	1.0E-06	70	25,550	1.3E-06	2.0E-01	NA	NA	0%
Tetrachloroethene	2.7	3,300	0.2	0.03	150	25	1	1.0E-06	70	25,550	1.1E-07	8.0E-01	6.8E-01	7.6E-08	**38%**

Excess Lifetime Cancer Risk = 2.0E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Current O&M Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	1.32E+09	NA	1	150	25	8	70	25,550	2.4E-11	1.51E+01	3.7E-10	**100%**
Iron	54500	1.32E+09	NA	1	150	25	8	70	25,550	6.9E-07	NA	NA	0%
Manganese	1700	1.32E+09	NA	1	150	25	8	70	25,550	2.2E-08	NA	NA	0%
Thallium	50	1.32E+09	NA	1	150	25	8	70	25,550	6.4E-10	NA	NA	0%
Vanadium	97	1.32E+09	NA	1	150	25	8	70	25,550	1.2E-09	NA	NA	0%
Tetrachloroethene	2.7	1.32E+09	2.55E+03	1	150	25	8	70	25,550	3.4E-11	2.10E-02	7.2E-13	0%

Excess Lifetime Cancer Risk = 3.7E-10

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.7
Surface Soil
Hot Spot 1
Current/Future
Trespasser/Recreational

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
Soil	Surface Soil	Hot Spot #1	Arsenic	5.E-07	2.E-07	1.E-10			7.E-07	6.E-03	3.E-03	NA			9.E-03
			Iron	NA	NA	NA			0.E+00	7.E-02	6.E-02	NA			1.E-01
			Manganese	NA	NA	NA			0.E+00	8.E-02	6.E-02	3.E-03			1.E-01
			Thallium	NA	NA	NA			0.E+00	7.E-01	5.E-01	NA			1.E+00
			Vanadium	NA	NA	NA			0.E+00	9.E-02	7.E-02	NA			2.E-01
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	2.E-07	1.E-07	7.E-08			4.E-07	3.E-04	1.E-04	2.E-03			2.E-03
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-07	4.E-07	7.E-08	0.E+00	0.E+00	1.E-06	9.E-01	7.E-01	5.E-03	0.E+00	0.E+00	2.E+00
		Exposure Point Total							1.E-06						2.E+00
	Exposure Medium Total								1.E-06						2.E+00
Soil Total									1.E-06						2.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									0.E+00						0.E+00

Total Risk Across All Media = 1.E-06

Total Hazard Across All Media = 2

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	100	1	144	12	1.0E-06	42	4380	1.8E-06	3.0E-04	5.9E-03	1%
Iron	54500	100	1	144	12	1.0E-06	42	4380	5.1E-02	7.0E-01	7.3E-02	8%
Manganese	1700	100	1	144	12	1.0E-06	42	4380	1.6E-03	2.0E-02	8.0E-02	9%
Thallium	50	100	1	144	12	1.0E-06	42	4380	4.7E-05	7.0E-05	6.7E-01	**73%**
Vanadium	97	100	1	144	12	1.0E-06	42	4380	9.1E-05	1.0E-03	9.1E-02	**10%**
Tetrachloroethene	2.7	100	1	144	12	1.0E-06	42	4380	2.5E-06	1.0E-02	2.5E-04	0%

Hazard Index = 9.2E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	8.1E-07	9.5E-01	2.9E-04	2.9E-03	0%
Iron	54500	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	7.8E-03	2.0E-01	1.4E-01	5.6E-02	8%
Manganese	1700	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	2.4E-04	2.0E-01	4.0E-03	6.1E-02	9%
Thallium	50	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	7.1E-06	2.0E-01	1.4E-05	5.1E-01	**73%**
Vanadium	97	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	1.4E-05	2.0E-01	2.0E-04	6.9E-02	**10%**
Tetrachloroethene	2.7	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	1.2E-06	8.0E-01	8.0E-03	1.4E-04	0%

Hazard Index = 7.0E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s /\ PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} /\ BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} /\ BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	6.80E+08	NA	0.52	144	12	4	42	4380	5.5E-11	NA	NA	0%
Iron	54500	6.80E+08	NA	0.52	144	12	4	42	4380	1.6E-06	NA	NA	0%
Manganese	1700	6.80E+08	NA	0.52	144	12	4	42	4380	4.9E-08	1.43E-05	3.4E-03	**62%**
Thallium	50	6.80E+08	NA	0.52	144	12	4	42	4380	1.4E-09	NA	NA	0%
Vanadium	97	6.80E+08	NA	0.52	144	12	4	42	4380	2.8E-09	NA	NA	0%
Tetrachloroethene	2.7	NA	2.55E+03	0.52	144	12	4	42	4380	2.1E-05	1.00E-02	2.1E-03	**38%**

Hazard Index = 5.5E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	100	1	144	12	1.0E-06	42	25,550	3.1E-07	1.5E+00	4.6E-07	**66%**
Iron	54500	100	1	144	12	1.0E-06	42	25,550	8.8E-03	NA	NA	0%
Manganese	1700	100	1	144	12	1.0E-06	42	25,550	2.7E-04	NA	NA	0%
Thallium	50	100	1	144	12	1.0E-06	42	25,550	8.1E-06	NA	NA	0%
Vanadium	97	100	1	144	12	1.0E-06	42	25,550	1.6E-05	NA	NA	0%
Tetrachloroethene	2.7	100	1	144	12	1.0E-06	42	25,550	4.3E-07	5.4E-01	2.3E-07	**34%**

Excess Lifetime Cancer Risk = 6.9E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg-day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	7,605	0.2	0.03	144	12	1	1.0E-06	42	25,550	1.4E-07	9.5E-01	1.6E+00	2.2E-07	**62%**
Iron	54500	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	1.3E-03	2.0E-01	NA	NA	0%
Manganese	1700	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	4.2E-05	2.0E-01	NA	NA	0%
Thallium	50	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	1.2E-06	2.0E-01	NA	NA	0%
Vanadium	97	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	2.4E-06	2.0E-01	NA	NA	0%
Tetrachloroethene	2.7	7,605	0.2	0.03	144	12	1	1.0E-06	42	25,550	2.0E-07	8.0E-01	6.8E-01	1.3E-07	**38%**

Excess Lifetime Cancer Risk = 3.5E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	6.80E+08	NA	0.52	144	12	4	42	25,550	9.4E-12	1.51E+01	1.4E-10	0%
Iron	54500	6.80E+08	NA	0.52	144	12	4	42	25,550	2.7E-07	NA	NA	0%
Manganese	1700	6.80E+08	NA	0.52	144	12	4	42	25,550	8.4E-09	NA	NA	0%
Thallium	50	6.80E+08	NA	0.52	144	12	4	42	25,550	2.5E-10	NA	NA	0%
Vanadium	97	6.80E+08	NA	0.52	144	12	4	42	25,550	4.8E-10	NA	NA	0%
Tetrachloroethene	2.7	NA	2.55E+03	0.52	144	12	4	42	25,550	3.5E-06	2.10E-02	7.4E-08	**100%**

Excess Lifetime Cancer Risk = 7.5E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.00			2.90E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	0.00E+00	NA	0.00E+00	**Dermal Risk**
1,2-Dichloroethane	0.00			1.01E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	0.00E+00	NA	0.00E+00	**Ingestion risk**
1,2-Dichloroethane	0.00			5.40E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	0.00E+00	NA	0.00E+00	**inhalation risk**

Appendix H-5.8
Surface Soil
Hot Spot 1
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

				Cancer						Non-Carcinogenic Hazard Quotient					
Medium	**Exposure Medium**	**Exposure Point**	**COPC**	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #1	Arsenic	5.E-07	2.E-07	6.E-10			7.E-07	3.E-03	1.E-03	NA			4.E-03
			Iron	NA	NA	NA			0.E+00	4.E-02	3.E-02	NA			6.E-02
			Manganese	NA	NA	NA			0.E+00	4.E-02	3.E-02	1.E-02			8.E-02
			Thallium	NA	NA	NA			0.E+00	3.E-01	2.E-01	NA			6.E-01
			Vanadium	NA	NA	NA			0.E+00	5.E-02	3.E-02	NA			8.E-02
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	3.E-07	1.E-07	6.E-07			1.E-06	1.E-04	7.E-05	8.E-03			8.E-03
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	8.E-07	3.E-07	6.E-07	0.E+00	0.E+00	2.E-06	5.E-01	3.E-01	2.E-02	0.E+00	0.E+00	8.E-01
		Exposure Point Total							2.E-06						8.E-01
	Exposure Medium Total								2.E-06						8.E-01
Soil Total									2.E-06						8.E-01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer Ingestion	Cancer Dermal	Cancer Inhalation of Dust and Vapors	Cancer Inhalation Ambient Air	Cancer Inhalation Indoor Air	Cancer Exposure Route Total	Non-Carcinogenic Hazard Quotient Ingestion	Non-Carcinogenic Hazard Quotient Dermal	Non-Carcinogenic Hazard Quotient Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient Exposure Route Total
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 9.E-03

Total Hazard Across All Media = 63

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	50	1	250	25	1.0E-06	70	9125	9.3E-07	3.0E-04	3.1E-03	1%
Iron	54500	50	1	250	25	1.0E-06	70	9125	2.7E-02	7.0E-01	3.8E-02	8%
Manganese	1700	50	1	250	25	1.0E-06	70	9125	8.3E-04	2.0E-02	4.2E-02	9%
Thallium	50	50	1	250	25	1.0E-06	70	9125	2.4E-05	7.0E-05	3.5E-01	**73%**
Vanadium	97	50	1	250	25	1.0E-06	70	9125	4.7E-05	1.0E-03	4.7E-02	**10%**
Tetrachloroethene	2.7	50	1	250	25	1.0E-06	70	9125	1.3E-06	1.0E-02	1.3E-04	0%

Hazard Index = 4.8E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency (2) (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency (3) (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	3.7E-07	9.5E-01	2.9E-04	1.3E-03	0%
Iron	54500	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	3.5E-03	2.0E-01	1.4E-01	2.5E-02	8%
Manganese	1700	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	1.1E-04	2.0E-01	4.0E-03	2.7E-02	9%
Thallium	50	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	3.2E-06	2.0E-01	1.4E-05	2.3E-01	**73%**
Vanadium	97	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	6.2E-06	2.0E-01	2.0E-04	3.1E-02	**10%**
Tetrachloroethene	2.7	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	5.2E-07	8.0E-01	8.0E-03	6.5E-05	0%

Hazard Index = 3.2E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	6.80E+08	NA	1	250	25	8	70	9125	2.2E-10	NA	NA	0%
Iron	54500	6.80E+08	NA	1	250	25	8	70	9125	6.3E-06	NA	NA	0%
Manganese	1700	6.80E+08	NA	1	250	25	8	70	9125	2.0E-07	1.43E-05	1.4E-02	**62%**
Thallium	50	6.80E+08	NA	1	250	25	8	70	9125	5.8E-09	NA	NA	0%
Vanadium	97	6.80E+08	NA	1	250	25	8	70	9125	1.1E-08	NA	NA	0%
Tetrachloroethene	2.7	NA	2.55E+03	1	250	25	8	70	9125	8.3E-05	1.00E-02	8.3E-03	**38%**

Hazard Index = 2.2E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	50	1	250	25	1.0E-06	70	25,550	3.3E-07	1.5E+00	5.0E-07	**66%**
Iron	54500	50	1	250	25	1.0E-06	70	25,550	9.5E-03	NA	NA	0%
Manganese	1700	50	1	250	25	1.0E-06	70	25,550	3.0E-04	NA	NA	0%
Thallium	50	50	1	250	25	1.0E-06	70	25,550	8.7E-06	NA	NA	0%
Vanadium	97	50	1	250	25	1.0E-06	70	25,550	1.7E-05	NA	NA	0%
Tetrachloroethene	2.7	50	1	250	25	1.0E-06	70	25,550	4.7E-07	5.4E-01	2.5E-07	**34%**

Excess Lifetime Cancer Risk = 7.5E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.3E-07	9.5E-01	1.6E+00	2.1E-07	**62%**
Iron	54500	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.3E-03	2.0E-01	NA	NA	0%
Manganese	1700	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	3.9E-05	2.0E-01	NA	NA	0%
Thallium	50	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.2E-06	2.0E-01	NA	NA	0%
Vanadium	97	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	2.2E-06	2.0E-01	NA	NA	0%
Tetrachloroethene	2.7	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.9E-07	8.0E-01	6.8E-01	1.3E-07	**38%**

Excess Lifetime Cancer Risk = 3.3E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	1.32E+09	NA	1	250	25	8	70	25,550	4.0E-11	1.51E+01	6.1E-10	0%
Iron	54500	1.32E+09	NA	1	250	25	8	70	25,550	1.2E-06	NA	NA	0%
Manganese	1700	1.32E+09	NA	1	250	25	8	70	25,550	3.6E-08	NA	NA	0%
Thallium	50	1.32E+09	NA	1	250	25	8	70	25,550	1.1E-09	NA	NA	0%
Vanadium	97	1.32E+09	NA	1	250	25	8	70	25,550	2.0E-09	NA	NA	0%
Tetrachloroethene	2.7	NA	2.55E+03	1	250	25	8	70	25,550	3.0E-05	2.10E-02	6.2E-07	**100%**

Excess Lifetime Cancer Risk = 6.2E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.9
Surface Soil
Hot Spot 1
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #1	Arsenic	4.E-06	4.E-07	4.E-09			5.E-06	8.E-02	7.E-03	NA			9.E-02
			Iron	NA	NA	NA			0.E+00	1.E+00	1.E-01	NA			1.E+00
			Manganese	NA	NA	NA			0.E+00	1.E+00	2.E-01	5.E-02			1.E+00
			Thallium	NA	NA	NA			0.E+00	9.E+00	1.E+00	NA			1.E+01
			Vanadium	NA	NA	NA			0.E+00	1.E+00	2.E-01	NA			1.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	2.E-06	3.E-07	2.E-06			5.E-06	3.E-03	4.E-04	3.E-02			3.E-02
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-06	7.E-07	2.E-06	0.E+00	0.E+00	1.E-05	1.E+01	2.E+00	7.E-02	0.E+00	0.E+00	1.E+01
		Exposure Point Total							1.E-05						1.E+01
	Exposure Medium Total								1.E-05						1.E+01
Soil Total									1.E-05						1.E+01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 3.E-02

Total Hazard Across All Media = 409

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	200	1	350	6	1.0E-06	15	2190	2.4E-05	3.0E-04	8.1E-02	1%
Iron	54500	200	1	350	6	1.0E-06	15	2190	7.0E-01	7.0E-01	1.0E+00	8%
Manganese	1700	200	1	350	6	1.0E-06	15	2190	2.2E-02	2.0E-02	1.1E+00	9%
Thallium	50	200	1	350	6	1.0E-06	15	2190	6.4E-04	7.0E-05	9.1E+00	**73%**
Vanadium	97	200	1	350	6	1.0E-06	15	2190	1.2E-03	1.0E-03	1.2E+00	**10%**
Tetrachloroethene	2.7	200	1	350	6	1.0E-06	15	2190	3.5E-05	1.0E-02	3.5E-03	0%

Hazard Index = 1.3E+01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (years)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	2.0E-06	9.5E-01	2.9E-04	7.2E-03	0%
Iron	54500	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	2.0E-02	2.0E-01	1.4E-01	1.4E-01	8%
Manganese	1700	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	6.1E-04	2.0E-01	4.0E-03	1.5E-01	9%
Thallium	50	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.8E-05	2.0E-01	1.4E-05	1.3E+00	**73%**
Vanadium	97	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	3.5E-05	2.0E-01	2.0E-04	1.7E-01	**10%**
Tetrachloroethene	2.7	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	2.9E-06	8.0E-01	8.0E-03	3.6E-04	0%

Hazard Index = 1.8E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of <u>Noncancer</u> Hazard from Inhalation Exposure
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly} * EF * ED * ET_{inh} / BW * AT_n$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.9	6.80E+08	NA	0.26	350	6	16	15	2190	7.4E-10	NA	NA	0%
Iron	54500	6.80E+08	NA	0.26	350	6	16	15	2190	2.1E-05	NA	NA	0%
Manganese	1700	6.80E+08	NA	0.26	350	6	16	15	2190	6.6E-07	1.43E-05	4.6E-02	**62%**
Thallium	50	6.80E+08	NA	0.26	350	6	16	15	2190	2.0E-08	NA	NA	0%
Vanadium	97	6.80E+08	NA	0.26	350	6	16	15	2190	3.8E-08	NA	NA	0%
Tetrachloroethene	2.7	NA	2.55E+03	0.26	350	6	16	15	2190	2.8E-04	1.00E-02	2.8E-02	**38%**

Hazard Index = 7.5E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$

where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IF_{soil}** Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	114	1	350	1.0E-06	25,550	3.0E-06	1.5E+00	4.5E-06	**66%**
Iron	54500	114	1	350	1.0E-06	25,550	8.5E-02	NA	NA	0%
Manganese	9089	114	1	350	1.0E-06	25,550	1.4E-02	NA	NA	0%
Thallium	44	114	1	350	1.0E-06	25,550	6.8E-05	NA	NA	0%
Vanadium	152	114	1	350	1.0E-06	25,550	2.4E-04	NA	NA	0%
Tetrachloroethene	2.7	114	1	350	1.0E-06	25,550	4.2E-06	5.4E-01	2.3E-06	**34%**

Excess Lifetime Cancer Risk = 6.7E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SFS** Age-Adjusted Dermal Factor (mg-year/kg-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	360	0.03	350	1	1.0E-06	25,550	2.8E-07	9.5E-01	1.6E+00	4.4E-07	**62%**
Iron	54500	360	0.01	350	1	1.0E-06	25,550	2.7E-03	2.0E-01	NA	NA	0%
Manganese	1700	360	0.01	350	1	1.0E-06	25,550	8.4E-05	2.0E-01	NA	NA	0%
Thallium	50	360	0.01	350	1	1.0E-06	25,550	2.5E-06	2.0E-01	NA	NA	0%
Vanadium	97	360	0.01	350	1	1.0E-06	25,550	4.8E-06	8.0E-01	NA	NA	0%
Tetrachloroethene	2.7	360	0.03	350	1	1.0E-06	25,550	4.0E-07	8.0E-01	6.8E-01	2.7E-07	**38%**

Excess Lifetime Cancer Risk = 7.1E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 1

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$

where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.9	6.80E+08	NA	1	350	30	16	70	25,550	2.6E-10	1.51E+01	4.0E-09	0%
Iron	54500	6.80E+08	NA	1	350	30	16	70	25,550	7.5E-06	NA	NA	0%
Manganese	1700	6.80E+08	NA	1	350	30	16	70	25,550	2.3E-07	NA	NA	0%
Thallium	50	6.80E+08	NA	1	350	30	16	70	25,550	6.9E-09	NA	NA	0%
Vanadium	97	6.80E+08	NA	1	350	30	16	70	25,550	1.3E-08	NA	NA	0%
Tetrachloroethene	2.7	NA	2.55E+03	1	350	30	16	70	25,550	9.9E-05	2.10E-02	2.1E-06	**100%**

Excess Lifetime Cancer Risk = 2.1E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.00	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Dermal Risk**
1,2-Dichloroethane	0.00	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Ingestion risk**

	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30	
1,2-Dichloroethane	0.00	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

4	8			
4	8			
4.5	9			
4.5	9			
5.5	11			
5.5	11			
7	13			
7	13			
8	16			
8	16			
		8.6	0.52	6-15
			0.15	0-2
			0.26	2-6

Appendix H-5.10
Surface Soil
Hot Spot 2
Current O&M Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current
Receptor Population:	O&M Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #2	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	5.E-08	2.E-08	2.E-13			7.E-08	2.E-05	1.E-05	1.E-03			2.E-03
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	5.E-08	2.E-08	2.E-13	0.E+00	0.E+00	7.E-08	2.E-05	1.E-05	1.E-03	0.E+00	0.E+00	2.E-03
		Exposure Point Total							7.E-08						2.E-03
	Exposure Medium Total								7.E-08						2.E-03
Soil Total									7.E-08						2.E-03
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1,2-Trichloroethane					1.E-08	1.E-08					2.E-04	2.E-04
			1,1-Dichloroethane					NA	0.E+00					1.E-03	1.E-03
			1,1-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			1,2-Dichlorobenzene					NA	0.E+00					2.E-04	2.E-04
			1,2-Dichloroethane					1.E-05	1.E-05					4.E-04	4.E-04
			1,4-Dichlorobenzene					5.E-08	5.E-08					3.E-05	3.E-05
			2-Chlorophenol					NA	0.E+00					1.E-04	1.E-04
			4-Methyl-2-pentanone					NA	0.E+00					9.E-06	9.E-06
			Benzene					3.E-07	3.E-07					4.E-03	4.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					2.E-03	2.E-03
			Chloroethane					2.E-07	2.E-07					6.E-04	6.E-04
			Chloroform					3.E-07	3.E-07					8.E-04	8.E-04
			cis-1,2-Dichloroethene					NA	0.E+00					7.E-03	7.E-03
			Ethylbenzene					NA	0.E+00					3.E-03	3.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					9.E-03	9.E-03
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					3.E-06	3.E-06
			Methylcyclohexane					NA	0.E+00					6.E-03	6.E-03
			Methylene chloride					4.E-08	4.E-08					2.E-04	2.E-04
			Naphthalene					NA	0.E+00					3.E-04	3.E-04
			Tetrachloroethene					8.E-06	8.E-06					1.E-01	1.E-01
			Toluene					NA	0.E+00					1.E-03	1.E-03
			Trichloroethene					7.E-05	7.E-05					5.E-02	5.E-02
			Vinyl chloride					2.E-06	2.E-06					1.E-02	1.E-02
			Xylenes (Total)					NA	0.E+00					1.E-01	1.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	9.E-05	9.E-05	0.E+00	0.E+00	0.E+00	0.E+00	3.E-01	3.E-01
		Exposure Point Total							9.E-05						3.E-01
	Exposure Medium Total								9.E-05						3.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current
Receptor Population:	O&M Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer Ingestion	Cancer Dermal	Cancer Inhalation of Dust and Vapors	Cancer Inhalation Ambient Air	Cancer Inhalation Indoor Air	Cancer Exposure Route Total	Non-Carcinogenic Hazard Quotient Ingestion	Non-Carcinogenic Hazard Quotient Dermal	Non-Carcinogenic Hazard Quotient Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient Exposure Route Total
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									9.E-05						3.E-01

Total Risk Across All Media = 9.E-05

Total Hazard Across All Media = 0.3

Current O&M Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	50	1	150	25	1.0E-06	70	9125	2.3E-07	1.0E-02	2.3E-05	**100%**

Hazard Index = 2.3E-05

Notes:
(1): Soil EPCs (see Appendix H-3)

Current O&M Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	3,300	0.2	0.03	150	25	1	1.0E-06	70	9125	9.3E-08	8.0E-01	8.0E-03	1.2E-05	**100%**

Hazard Index = 1.2E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Current O&M Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	NA	2.55E+03	1	150	25	8	70	9125	1.5E-05	1.00E-02	1.5E-03	**100%**

Hazard Index = 1.5E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Current O&M Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	50	1	150	25	1.0E-06	70	25,550	8.4E-08	5.4E-01	4.5E-08	**100%**

Excess Lifetime Cancer Risk = 4.5E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Current O&M Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$** **Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	3,300	0.2	0.03	150	25	1	1.0E-06	70	25,550	3.3E-08	8.0E-01	6.8E-01	2.2E-08	**100%**

Excess Lifetime Cancer Risk = 2.2E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Current O&M Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:
C_s = concentration of contaminant in the airborne particulates (mg/kg)
PEF = particulate emission factor (m^3/kg)
VF = volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$ = inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF = exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED = exposure duration: the typical duration of each exposure event (year)
ET_{inh} = exposure time (hr/day)
BW = body weight (kg)
AT_c = averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	1.32E+09	2.55E+03	1	150	25	8	70	25,550	1.0E-11	2.10E-02	2.1E-13	**100%**

Excess Lifetime Cancer Risk = 2.1E-13

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.11
Surface Soil
Hot Spot 2
Current/Future
Trespasser/Recreational

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #2	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	7.E-08	6.E-08	2.E-08			2.E-07	8.E-05	4.E-05	6.E-04			7.E-04
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-08	6.E-08	2.E-08	0.E+00	0.E+00	2.E-07	8.E-05	4.E-05	6.E-04	0.E+00	0.E+00	7.E-04
		Exposure Point Total							2.E-07						7.E-04
	Exposure Medium Total								2.E-07						7.E-04
Soil Total									2.E-07						7.E-04
Groundwater	Shallow	Air	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Current/Future
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									0.E+00						0.E+00

Total Risk Across All Media = 2.E-07

Total Hazard Across All Media = 0.000731

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	100	1	144	12	1.0E-06	42	4380	7.5E-07	1.0E-02	7.5E-05	**100%**

Hazard Index = 7.5E-05

Notes:
(1): Soil EPCs (see Appendix H-3)

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	3.4E-07	8.0E-01	8.0E-03	4.3E-05	**100%**

Hazard Index = 4.3E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	NA	2.55E+03	0.52	144	12	4	42	4380	6.1E-06	1.00E-02	6.1E-04	**100%**
											Hazard Index =	**6.1E-04**	

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	100	1	144	12	1.0E-06	42	25,550	1.3E-07	5.4E-01	7.0E-08	**100%**

Excess Lifetime Cancer Risk = 7.0E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [(1)] (mg/kg)	SA Skin Surface Area Exposed (cm^2)	AF Skin-soil Adherence Factor (mg/cm^2-event)	AE_d Dermal Absorption Efficiency [(2)] (unitless)	EF Exposure Frequency (days/year)	ED Exposure Duration (years)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency [(3)] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	7,605	0.2	0.03	144	12	1	1.0E-06	42	25,550	5.9E-08	8.0E-01	6.8E-01	4.0E-08	**100%**

Excess Lifetime Cancer Risk = 4.0E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Current/Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	NA	2.55E+03	0.52	144	12	4	42	25,550	1.1E-06	2.10E-02	2.2E-08	**100%**

Excess Lifetime Cancer Risk = 2.2E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.00			2.90E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	0.00E+00	NA	0.00E+00	**Dermal Risk**
1,2-Dichloroethane	0.00			1.01E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	0.00E+00	NA	0.00E+00	**Ingestion risk**
1,2-Dichloroethane	0.00			5.40E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	0.00E+00	NA	0.00E+00	**inhalation risk**

4	8			
4	8			
4.5	9			
4.5	9			
5.5	11			
5.5	11			
7	13			
7	13			
8	16			
8	16			
		8.6	0.52	6-15
			0.15	0-2
			0.26	2-6

Appendix H-5.12
Surface Soil
Hot Spot 2
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #2	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	8.E-08	4.E-08	2.E-07			3.E-07	4.E-05	2.E-05	2.E-03			3.E-03
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	8.E-08	4.E-08	2.E-07	0.E+00	0.E+00	3.E-07	4.E-05	2.E-05	2.E-03	0.E+00	0.E+00	3.E-03
		Exposure Point Total							3.E-07						3.E-03
	Exposure Medium Total								3.E-07						3.E-03
Soil Total									3.E-07						3.E-03
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 9.E-03

Total Hazard Across All Media = 62

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.800	50	1	250	25	1.0E-06	70	9125	3.9E-07	1.0E-02	3.9E-05	**100%**

Hazard Index = 3.9E-05

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil (1) (mg/kg)	SA Skin Surface Area Exposed (cm^2)	AF Skin-soil Adherence Factor (mg/cm^2-event)	AE_d Dermal Absorption Efficiency (2) (unitless)	EF Exposure Frequency (days/year)	ED Exposure Duration (years)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_n Averaging Time Noncancer (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency (3) (unitless)	$RfD_{dermal-adj}$ **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.800	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	1.5E-07	8.0E-01	8.0E-03	1.9E-05	**100%**

Hazard Index = 1.9E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air-hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air-hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air-hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air-hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.800	NA	2.55E+03	1	250	25	8	70	9125	2.5E-05	1.00E-02	2.5E-03	**100%**

Hazard Index = 2.5E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.800	50	1	250	25	1.0E-06	70	25,550	1.4E-07	5.4E-01	7.5E-08	**100%**

Excess Lifetime Cancer Risk = 7.5E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$SF_{dermal-adj}$** **Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.800	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	5.5E-08	8.0E-01	6.8E-01	3.7E-08	**100%**

Excess Lifetime Cancer Risk = 3.7E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.800	NA	2.55E+03	1	250	25	8	70	25,550	8.8E-06	2.10E-02	1.8E-07	**100%**

Excess Lifetime Cancer Risk = 1.8E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.13
Surface Soil
Hot Spot 2
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #2	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	7.E-07	8.E-08	6.E-07			1.E-06	1.E-03	1.E-04	8.E-03			9.E-03
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-07	8.E-08	6.E-07	0.E+00	0.E+00	1.E-06	1.E-03	1.E-04	8.E-03	0.E+00	0.E+00	9.E-03
		Exposure Point Total							1.E-06						9.E-03
	Exposure Medium Total								1.E-06						9.E-03
Soil Total									1.E-06						9.E-03
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 3.E-02

Total Hazard Across All Media = 395

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	200	1	350	6	1.0E-06	15	2190	1.0E-05	1.0E-02	1.0E-03	**100%**

Hazard Index = 1.0E-03

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s = representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA = skin surface area in contact with soil on days exposed (cm^2)
AF = mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d = absorption efficiency (unitless)
EF = exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED = exposure duration: the typical duration of each exposure event (year)
EV = event frequency (events/day)
BW = body weight (kg)
AT_n = averaging time (days)
C_1 = conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (years)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	8.6E-07	8.0E-01	8.0E-03	1.1E-04	**100%**

Hazard Index = 1.1E-04

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly} * EF * ED * ET_{inh} / BW * AT_n$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	NA	2.55E+03	0.26	350	6	16	15	2190	8.3E-05	1.00E-02	8.3E-03	**100%**

Hazard Index = 8.3E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IF_{soil}** Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	114	1	350	1.0E-06	25,550	1.2E-06	5.4E-01	6.7E-07	**100%**

Excess Lifetime Cancer Risk = 6.7E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [1] (mg/kg)	SFS Age-Adjusted Dermal Factor (mg-year/kg-event)	AE_d Dermal Absorption Efficiency [2] (unitless)	EF Exposure Frequency (days/year)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency [3] (unitless)	$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor $(mg/kg-day)^{-1}$	Chemical Specific Cancer Risk	Percent Distribution of Risk (%)
Tetrachloroethene	0.80	360	0.03	350	1	1.0E-06	25,550	1.2E-07	8.0E-01	6.8E-01	8.0E-08	**100%**

Excess Lifetime Cancer Risk = 8.0E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 2

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Tetrachloroethene	0.80	NA	2.55E+03	1	350	30	16	70	25,550	2.9E-05	2.10E-02	6.2E-07	**100%**

Excess Lifetime Cancer Risk = 6.2E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.00	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Dermal Risk**
1,2-Dichloroethane	0.00	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Ingestion risk**

	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30	
1,2-Dichloroethane	0.00	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

4	8			
4	8			
4.5	9			
4.5	9			
5.5	11			
5.5	11			
7	13			
7	13			
8	16			
8	16			
		8.6	0.52	6-15
			0.15	0-2
			0.26	2-6

Appendix H-5.14
Surface Soil
Hot Spot 3
Current/Future
Trespasser/Recreational

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #3	Arsenic	4.E-07	2.E-07	1.E-10			6.E-07	6.E-03	3.E-03	NA			8.E-03
			Iron	NA	NA	NA			0.E+00	1.E-01	1.E-01	NA			2.E-01
			Manganese	NA	NA	NA			0.E+00	1.E-01	8.E-02	4.E-03			2.E-01
			Thallium	NA	NA	NA			0.E+00	1.E+00	1.E+00	NA			2.E+00
			Vanadium	NA	NA	NA			0.E+00	5.E-01	4.E-01	NA			8.E-01
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	2.E-07	1.E-07	8.E-08			5.E-07	3.E-04	2.E-04	2.E-03			3.E-03
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-07	3.E-07	8.E-08	0.E+00	0.E+00	1.E-06	2.E+00	2.E+00	7.E-03	0.E+00	0.E+00	4.E+00
		Exposure Point Total							1.E-06						4.E+00
	Exposure Medium Total								1.E-06						4.E+00
Soil Total									1.E-06						4.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Trespasser/Recreational
Receptor:	Teen/Adolescent

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									0.E+00						0.E+00

Total Risk Across All Media = 1.E-06

Total Hazard Across All Media = 4

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.8	100	1	144	12	1.0E-06	42	4380	1.7E-06	3.0E-04	5.6E-03	0%
Iron	99000	100	1	144	12	1.0E-06	42	4380	9.3E-02	7.0E-01	1.3E-01	6%
Manganese	2200	100	1	144	12	1.0E-06	42	4380	2.1E-03	2.0E-02	1.0E-01	5%
Thallium	99	100	1	144	12	1.0E-06	42	4380	9.3E-05	7.0E-05	1.3E+00	**65%**
Vanadium	510	100	1	144	12	1.0E-06	42	4380	4.8E-04	1.0E-03	4.8E-01	**23%**
Tetrachloroethene	2.8	100	1	144	12	1.0E-06	42	4380	2.6E-06	1.0E-02	2.6E-04	0%

Hazard Index = 2.0E+00

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency (2) (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency (3) (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.8	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	7.7E-07	9.5E-01	2.9E-04	2.7E-03	0%
Iron	99000	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	1.4E-02	2.0E-01	1.4E-01	1.0E-01	6%
Manganese	2200	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	3.1E-04	2.0E-01	4.0E-03	7.9E-02	5%
Thallium	99	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	1.4E-05	2.0E-01	1.4E-05	1.0E+00	**65%**
Vanadium	510	7,605	0.2	0.01	144	12	1	1.0E-06	42	4380	7.3E-05	2.0E-01	2.0E-04	3.6E-01	**23%**
Tetrachloroethene	2.8	7,605	0.2	0.03	144	12	1	1.0E-06	42	4380	1.2E-06	8.0E-01	8.0E-03	1.5E-04	0%

Hazard Index = 1.6E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s /\ PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} /\ BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} /\ BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.8	6.80E+08	NA	0.52	144	12	4	42	4380	5.2E-11	NA	NA	0%
Iron	99000	6.80E+08	NA	0.52	144	12	4	42	4380	2.8E-06	NA	NA	0%
Manganese	2200	6.80E+08	NA	0.52	144	12	4	42	4380	6.3E-08	1.43E-05	4.4E-03	**67%**
Thallium	99	6.80E+08	NA	0.52	144	12	4	42	4380	2.8E-09	NA	NA	0%
Vanadium	510	6.80E+08	NA	0.52	144	12	4	42	4380	1.5E-08	NA	NA	0%
Tetrachloroethene	2.8	NA	2.55E+03	0.52	144	12	4	42	4380	2.1E-05	1.00E-02	2.1E-03	**33%**

Hazard Index = 6.6E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$

where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.8	100	1	144	12	1.0E-06	42	25,550	2.9E-07	1.5E+00	4.3E-07	**64%**
Iron	99000	100	1	144	12	1.0E-06	42	25,550	1.6E-02	NA	NA	0%
Manganese	2200	100	1	144	12	1.0E-06	42	25,550	3.5E-04	NA	NA	0%
Thallium	99	100	1	144	12	1.0E-06	42	25,550	1.6E-05	NA	NA	0%
Vanadium	510	100	1	144	12	1.0E-06	42	25,550	8.2E-05	NA	NA	0%
Tetrachloroethene	2.8	100	1	144	12	1.0E-06	42	25,550	4.5E-07	5.4E-01	2.4E-07	**36%**

Excess Lifetime Cancer Risk = 6.8E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil (1) (mg/kg)	SA Skin Surface Area Exposed (cm^2)	AF Skin-soil Adherence Factor (mg/cm^2-event)	AE_d Dermal Absorption Efficiency (2) (unitless)	EF Exposure Frequency (days/year)	ED Exposure Duration (years)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency (3) (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.8	7,605	0.2	0.03	144	12	1	1.0E-06	42	25,550	1.3E-07	9.5E-01	1.6E+00	2.1E-07	**60%**
Iron	99000	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	2.4E-03	2.0E-01	NA	NA	0%
Manganese	2200	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	5.4E-05	2.0E-01	NA	NA	0%
Thallium	99	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	2.4E-06	2.0E-01	NA	NA	0%
Vanadium	510	7,605	0.2	0.01	144	12	1	1.0E-06	42	25,550	1.2E-05	2.0E-01	NA	NA	0%
Tetrachloroethene	2.8	7,605	0.2	0.03	144	12	1	1.0E-06	42	25,550	2.1E-07	8.0E-01	6.8E-01	1.4E-07	**40%**

Excess Lifetime Cancer Risk = 3.5E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Teen/Adolescent Trespasser-Recreational Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.8	6.80E+08	NA	0.52	144	12	4	42	25,550	8.9E-12	1.51E+01	1.3E-10	0%
Iron	99000	6.80E+08	NA	0.52	144	12	4	42	25,550	4.9E-07	NA	NA	0%
Manganese	2200	6.80E+08	NA	0.52	144	12	4	42	25,550	1.1E-08	NA	NA	0%
Thallium	99	6.80E+08	NA	0.52	144	12	4	42	25,550	4.9E-10	NA	NA	0%
Vanadium	510	6.80E+08	NA	0.52	144	12	4	42	25,550	2.5E-09	NA	NA	0%
Tetrachloroethene	2.8	NA	2.55E+03	0.52	144	12	4	42	25,550	3.7E-06	2.10E-02	7.7E-08	**100%**

Excess Lifetime Cancer Risk = 7.7E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.00			2.90E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	0.00E+00	NA	0.00E+00	**Dermal Risk**
1,2-Dichloroethane	0.00			1.01E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	0.00E+00	NA	0.00E+00	**Ingestion risk**
1,2-Dichloroethane	0.00			5.40E-06		9.1E-02	10	3	3	1	2	4	9	15	70	NA	NA	0.00E+00	NA	0.00E+00	**inhalation risk**

4	8			
4	8			
4.5	9			
4.5	9			
5.5	11			
5.5	11			
7	13			
7	13			
8	16			
8	16			
		8.6	0.52	6-15
			0.15	0-2
			0.26	2-6

Appendix H-5.15
Surface Soil
Hot Spot 3
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #3	Arsenic	5.E-07	2.E-07	6.E-10			7.E-07	3.E-03	1.E-03	NA			4.E-03
			Iron	NA	NA	NA			0.E+00	7.E-02	5.E-02	NA			1.E-01
			Manganese	NA	NA	NA			0.E+00	5.E-02	4.E-02	2.E-02			1.E-01
			Thallium	NA	NA	NA			0.E+00	7.E-01	5.E-01	NA			1.E+00
			Vanadium	NA	NA	NA			0.E+00	2.E-01	2.E-01	NA			4.E-01
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	3.E-07	1.E-07	6.E-07			1.E-06	1.E-04	7.E-05	9.E-03			9.E-03
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-07	3.E-07	6.E-07	0.E+00	0.E+00	2.E-06	1.E+00	7.E-01	3.E-02	0.E+00	0.E+00	2.E+00
		Exposure Point Total							2.E-06						2.E+00
	Exposure Medium Total								2.E-06						2.E+00
Soil Total									2.E-06						2.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 9.E-03

Total Hazard Across All Media = 63

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.8	50	1	250	25	1.0E-06	70	9125	8.8E-07	3.0E-04	2.9E-03	0%
Iron	99000	50	1	250	25	1.0E-06	70	9125	4.8E-02	7.0E-01	6.9E-02	6%
Manganese	2200	50	1	250	25	1.0E-06	70	9125	1.1E-03	2.0E-02	5.4E-02	5%
Thallium	99	50	1	250	25	1.0E-06	70	9125	4.8E-05	7.0E-05	6.9E-01	**65%**
Vanadium	510	50	1	250	25	1.0E-06	70	9125	2.5E-04	1.0E-03	2.5E-01	**23%**
Tetrachloroethene	2.8	50	1	250	25	1.0E-06	70	9125	1.4E-06	1.0E-02	1.4E-04	0%

Hazard Index = 1.1E+00

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.8	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	3.5E-07	9.5E-01	2.9E-04	1.2E-03	0%
Iron	99000	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	6.4E-03	2.0E-01	1.4E-01	4.6E-02	6%
Manganese	2200	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	1.4E-04	2.0E-01	4.0E-03	3.6E-02	5%
Thallium	99	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	6.4E-06	2.0E-01	1.4E-05	4.6E-01	**65%**
Vanadium	510	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	3.3E-05	2.0E-01	2.0E-04	1.6E-01	**23%**
Tetrachloroethene	2.8	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	5.4E-07	8.0E-01	8.0E-03	6.8E-05	0%

Hazard Index = 7.0E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.8	6.80E+08	NA	1	250	25	8	70	9125	2.1E-10	NA	NA	0%
Iron	99000	6.80E+08	NA	1	250	25	8	70	9125	1.1E-05	NA	NA	0%
Manganese	2200	6.80E+08	NA	1	250	25	8	70	9125	2.5E-07	1.43E-05	1.8E-02	**67%**
Thallium	99	6.80E+08	NA	1	250	25	8	70	9125	1.1E-08	NA	NA	0%
Vanadium	510	6.80E+08	NA	1	250	25	8	70	9125	5.9E-08	NA	NA	0%
Tetrachloroethene	2.8	NA	2.55E+03	1	250	25	8	70	9125	8.6E-05	1.00E-02	8.6E-03	**33%**

Hazard Index = 2.6E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.8	50	1	250	25	1.0E-06	70	25,550	3.1E-07	1.5E+00	4.7E-07	**64%**
Iron	99000	50	1	250	25	1.0E-06	70	25,550	1.7E-02	NA	NA	0%
Manganese	2200	50	1	250	25	1.0E-06	70	25,550	3.8E-04	NA	NA	0%
Thallium	99	50	1	250	25	1.0E-06	70	25,550	1.7E-05	NA	NA	0%
Vanadium	510	50	1	250	25	1.0E-06	70	25,550	8.9E-05	NA	NA	0%
Tetrachloroethene	2.8	50	1	250	25	1.0E-06	70	25,550	4.9E-07	5.4E-01	2.6E-07	**36%**

Excess Lifetime Cancer Risk = 7.4E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$SF_{dermal-adj}$** **Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.8	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.2E-07	9.5E-01	1.6E+00	2.0E-07	**60%**
Iron	99000	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	2.3E-03	2.0E-01	NA	NA	0%
Manganese	2200	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	5.1E-05	2.0E-01	NA	NA	0%
Thallium	99	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	2.3E-06	2.0E-01	NA	NA	0%
Vanadium	510	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.2E-05	2.0E-01	NA	NA	0%
Tetrachloroethene	2.8	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.9E-07	8.0E-01	6.8E-01	1.3E-07	**40%**

Excess Lifetime Cancer Risk = 3.3E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.8	1.32E+09	NA	1	250	25	8	70	25,550	3.8E-11	1.51E+01	5.8E-10	0%
Iron	99000	1.32E+09	NA	1	250	25	8	70	25,550	2.1E-06	NA	NA	0%
Manganese	2200	1.32E+09	NA	1	250	25	8	70	25,550	4.7E-08	NA	NA	0%
Thallium	99	1.32E+09	NA	1	250	25	8	70	25,550	2.1E-09	NA	NA	0%
Vanadium	510	1.32E+09	NA	1	250	25	8	70	25,550	1.1E-08	NA	NA	0%
Tetrachloroethene	2.8	NA	2.55E+03	1	250	25	8	70	25,550	3.1E-05	2.10E-02	6.4E-07	**100%**

Excess Lifetime Cancer Risk = 6.5E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.16
Surface Soil
Hot Spot 3
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Surface Soil	Hot Spot #3	Arsenic	4.E-06	4.E-07	4.E-09			5.E-06	8.E-02	7.E-03	NA			8.E-02
			Iron	NA	NA	NA			0.E+00	2.E+00	3.E-01	NA			2.E+00
			Manganese	NA	NA	NA			0.E+00	1.E+00	2.E-01	6.E-02			2.E+00
			Thallium	NA	NA	NA			0.E+00	2.E+01	3.E+00	NA			2.E+01
			Vanadium	NA	NA	NA			0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Tetrachloroethene	2.E-06	3.E-07	2.E-06			5.E-06	4.E-03	4.E-04	3.E-02			3.E-02
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	7.E-06	7.E-07	2.E-06	0.E+00	0.E+00	9.E-06	2.E+01	3.E+00	9.E-02	0.E+00	0.E+00	2.E+01
		Exposure Point Total							9.E-06						2.E+01
	Exposure Medium Total								9.E-06						2.E+01
Soil Total									9.E-06						2.E+01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 3.E-02

Total Hazard Across All Media = 419

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.8	200	1	350	6	1.0E-06	15	2190	2.3E-05	3.0E-04	7.7E-02	0%
Iron	99000	200	1	350	6	1.0E-06	15	2190	1.3E+00	7.0E-01	1.8E+00	6%
Manganese	2200	200	1	350	6	1.0E-06	15	2190	2.8E-02	2.0E-02	1.4E+00	5%
Thallium	99	200	1	350	6	1.0E-06	15	2190	1.3E-03	7.0E-05	1.8E+01	**65%**
Vanadium	510	200	1	350	6	1.0E-06	15	2190	6.5E-03	1.0E-03	6.5E+00	**23%**
Tetrachloroethene	2.8	200	1	350	6	1.0E-06	15	2190	3.6E-05	1.0E-02	3.6E-03	0%

Hazard Index = 2.8E+01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Dermal Contact
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (years)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.8	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.9E-06	9.5E-01	2.9E-04	6.8E-03	0%
Iron	99000	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	3.5E-02	2.0E-01	1.4E-01	2.5E-01	6%
Manganese	2200	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	7.9E-04	2.0E-01	4.0E-03	2.0E-01	5%
Thallium	99	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	3.5E-05	2.0E-01	1.4E-05	2.5E+00	**65%**
Vanadium	510	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.8E-04	2.0E-01	2.0E-04	9.1E-01	**23%**
Tetrachloroethene	2.8	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.0E-06	8.0E-01	8.0E-03	3.8E-04	0%

Hazard Index = 3.9E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly} * EF * ED * ET_{inh} / BW * AT_n$

where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.8	6.80E+08	NA	0.26	350	6	16	15	2190	7.0E-10	NA	NA	0%
Iron	99000	6.80E+08	NA	0.26	350	6	16	15	2190	3.9E-05	NA	NA	0%
Manganese	2200	6.80E+08	NA	0.26	350	6	16	15	2190	8.6E-07	1.43E-05	6.0E-02	**67%**
Thallium	99	6.80E+08	NA	0.26	350	6	16	15	2190	3.9E-08	NA	NA	0%
Vanadium	510	6.80E+08	NA	0.26	350	6	16	15	2190	2.0E-07	NA	NA	0%
Tetrachloroethene	2.8	NA	2.55E+03	0.26	350	6	16	15	2190	2.9E-04	1.00E-02	2.9E-02	**33%**

Hazard Index = 8.9E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**IF_{soil}** Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.8	114	1	350	1.0E-06	25,550	2.8E-06	1.5E+00	4.2E-06	**64%**
Iron	99000	114	1	350	1.0E-06	25,550	1.5E-01	NA	NA	0%
Manganese	2200	114	1	350	1.0E-06	25,550	3.4E-03	NA	NA	0%
Thallium	99	114	1	350	1.0E-06	25,550	1.5E-04	NA	NA	0%
Vanadium	510	114	1	350	1.0E-06	25,550	8.0E-04	NA	NA	0%
Tetrachloroethene	2.8	114	1	350	1.0E-06	25,550	4.4E-06	5.4E-01	2.4E-06	**36%**

Excess Lifetime Cancer Risk = 6.6E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SFS** Age-Adjusted Dermal Factor (mg-year/kg-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg-day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.8	360	0.03	350	1	1.0E-06	25,550	2.7E-07	9.5E-01	1.6E+00	4.2E-07	**60%**
Iron	99000	360	0.01	350	1	1.0E-06	25,550	4.9E-03	2.0E-01	NA	NA	0%
Manganese	2200	360	0.01	350	1	1.0E-06	25,550	1.1E-04	2.0E-01	NA	NA	0%
Thallium	99	360	0.01	350	1	1.0E-06	25,550	4.9E-06	2.0E-01	NA	NA	0%
Vanadium	510	360	0.01	350	1	1.0E-06	25,550	2.5E-05	8.0E-01	NA	NA	0%
Tetrachloroethene	2.8	360	0.03	350	1	1.0E-06	25,550	4.1E-07	8.0E-01	6.8E-01	2.8E-07	**40%**

Excess Lifetime Cancer Risk = 7.0E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Surface Soil - Hot Spot 3

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	C_s Conc. in Soil [1] (mg/kg)	PEF Particulate Emission Factor[2] (m^3/kg)	VF Volatilization Factor[3] (m^3/kg)	$IR_{air\text{-}hourly}$ Hourly Inhalation Rate (m^3/hr)	EF Exposure Frequency (day/year)	ED Duration of Exposure Period (years)	ET_{inh} Exposure Time (hr/day)	BW Body Weight (kg)	AT_c Averaging Time Cancer (days)	ADD_{inhal} Average Daily Dose (mg/kg-day)	CSF_{inh} Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.8	6.80E+08	NA	1	350	30	16	70	25,550	2.5E-10	1.51E+01	3.8E-09	0%
Iron	99000	6.80E+08	NA	1	350	30	16	70	25,550	1.4E-05	NA	NA	0%
Manganese	2200	6.80E+08	NA	1	350	30	16	70	25,550	3.0E-07	NA	NA	0%
Thallium	99	6.80E+08	NA	1	350	30	16	70	25,550	1.4E-08	NA	NA	0%
Vanadium	510	6.80E+08	NA	1	350	30	16	70	25,550	7.0E-08	NA	NA	0%
Tetrachloroethene	2.8	NA	2.55E+03	1	350	30	16	70	25,550	1.0E-04	2.10E-02	2.2E-06	**100%**

Excess Lifetime Cancer Risk = 2.2E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.00	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Dermal Risk**
1,2-Dichloroethane	0.00	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Ingestion risk**

	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30	
1,2-Dichloroethane	0.00	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

4	8			
4	8			
4.5	9			
4.5	9			
5.5	11			
5.5	11			
7	13			
7	13			
8	16			
8	16			
		8.6	0.52	6-15
			0.15	0-2
			0.26	2-6

Appendix H-5.17
Subsurface Soil
Excluding Hot Spots
Future Excavation Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Excluding Hot Spots	Arsenic	1.E-07	7.E-09	4.E-11			1.E-07	2.E-02	1.E-03	NA			2.E-02
			Iron	NA	NA	NA			0.E+00	2.E-01	2.E-02	NA			2.E-01
			Manganese	NA	NA	NA			0.E+00	2.E-02	2.E-03	6.E-03			2.E-02
			Thallium	NA	NA	NA			0.E+00	2.E+00	2.E-01	NA			2.E+00
			Vanadium	NA	NA	NA			0.E+00	3.E+00	3.E-01	NA			3.E+00
			1,2-Dichloroethane	1.E-09	NA	9.E-09			1.E-08	NA	NA	1.E-05			1.E-05
			1,4-Dichlorobenzene	2.E-10	1.E-11	3.E-10			5.E-10	6.E-07	5.E-08	1.E-06			2.E-06
			Benzene	1.E-10	1.E-13	5.E-10			6.E-10	3.E-05	4.E-08	1.E-04			2.E-04
			Chloroform	1.E-12	1.E-15	7.E-11			8.E-11	7.E-07	9.E-10	5.E-06			5.E-06
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	9.E-06	1.E-08	1.E-04			1.E-04
			Tetrachloroethene	7.E-09	5.E-10	3.E-09			1.E-08	9.E-06	7.E-07	8.E-04			9.E-04
			Toluene	NA	NA	NA			0.E+00	2.E-05	1.E-06	2.E-04			2.E-04
			Trichloroethene	2.E-09	2.E-10	2.E-08			2.E-08	1.E-03	1.E-04	3.E-04			2.E-03
			Vinyl chloride	9.E-11	1.E-13	4.E-11			1.E-10	3.E-06	3.E-09	7.E-06			1.E-05
			Xylenes	NA	NA	NA			0.E+00	2.E-04	2.E-05	7.E-03			7.E-03
			Chemical Total	1.E-07	8.E-09	3.E-08	0.E+00	0.E+00	2.E-07	5.E+00	5.E-01	1.E-02	0.E+00	0.E+00	5.E+00
		Exposure Point Total							2.E-07						5.E+00
	Exposure Medium Total								2.E-07						5.E+00
Soil Total									2.E-07						5.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane				NA		0.E+00				9.E-05		9.E-05
			1,1,2-Trichloroethane				2.E-11		2.E-11				6.E-06		6.E-06
			1,1-Dichloroethane				NA		0.E+00				1.E-06		1.E-06
			1,1-Dichloroethene				NA		0.E+00				7.E-04		7.E-04
			1,2-Dichlorobenzene				NA		0.E+00				8.E-06		8.E-06
			1,2-Dichloroethane				NA		0.E+00				2.E-05		2.E-05
			1,4-Dichlorobenzene				7.E-11		7.E-11				3.E-07		3.E-07
			2-Chlorophenol				NA		0.E+00				NA		0.E+00
			4-Methyl-2-pentanone				NA		0.E+00				3.E-07		3.E-07
			Benzene				5.E-10		5.E-10				2.E-04		2.E-04
			Bis(2-ethylhexyl)phthalate				NA		0.E+00				NA		0.E+00
			Chlorobenzene				NA		0.E+00				9.E-05		9.E-05
			Chloroethane				NA		0.E+00				5.E-06		5.E-06
			Chloroform				5.E-10		5.E-10				3.E-05		3.E-05
			cis-1,2-Dichloroethene				NA		0.E+00				2.E-04		2.E-04
			Ethylbenzene				NA		0.E+00				1.E-04		1.E-04
			Iron				NA		0.E+00				NA		0.E+00
			Isopropylbenzene				NA		0.E+00				3.E-02		3.E-02
			Manganese				NA		0.E+00				NA		0.E+00
			Methyl tert butyl ether				NA		0.E+00				NA		0.E+00
			Methylcyclohexane				NA		0.E+00				NA		0.E+00
			Methylene chloride				NA		0.E+00				3.E-06		3.E-06
			Naphthalene				NA		0.E+00				8.E-06		8.E-06
			Tetrachloroethene				1.E-08		1.E-08				4.E-03		4.E-03
			Toluene				NA		0.E+00				6.E-05		6.E-05
			Trichloroethene				1.E-07		1.E-07				2.E-03		2.E-03
			Vinyl chloride				NA		0.E+00				4.E-04		4.E-04
			Xylenes (Total)				NA		0.E+00				4.E-03		4.E-03
			Chemical Total	0.E+00	0.E+00	0.E+00	1.E-07	0.E+00	1.E-07	0.E+00	0.E+00	0.E+00	4.E-02	0.E+00	4.E-02
		Exposure Point Total							1.E-07						4.E-02
	Exposure Medium Total								1.E-07						4.E-02
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									1.E-07						4.E-02

Total Risk Across All Media = 3.E-07

Total Hazard Across All Media = 5

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Subchronic Oral RfD [2]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.6	330	1	250	1	1.0E-06	70	365	5.2E-06	3.0E-04	1.7E-02	0%
Iron	36293	330	1	250	1	1.0E-06	70	365	1.2E-01	7.0E-01	1.7E-01	4%
Manganese	696	330	1	250	1	1.0E-06	70	365	2.2E-03	1.4E-01	1.6E-02	0%
Thallium	40	330	1	250	1	1.0E-06	70	365	1.3E-04	7.0E-05	1.8E+00	**40%**
Vanadium	5563	330	1	250	1	1.0E-06	70	365	1.8E-02	7.0E-03	2.6E+00	**56%**
1,2-Dichloroethane	0.35	330	1	250	1	1.0E-06	70	365	1.1E-06	NA	NA	0%
1,4-Dichlorobenzene	0.17	330	1	250	1	1.0E-06	70	365	5.5E-07	9.0E-01	6.1E-07	0%
Benzene	0.043	330	1	250	1	1.0E-06	70	365	1.4E-07	4.0E-03	3.5E-05	0%
Chloroform	0.0022	330	1	250	1	1.0E-06	70	365	7.1E-09	1.0E-02	7.1E-07	0%
cis-1,2-Dichloroethene	0.27	330	1	250	1	1.0E-06	70	365	8.7E-07	1.0E-01	8.7E-06	0%
Tetrachloroethene	0.28	330	1	250	1	1.0E-06	70	365	8.9E-07	1.0E-01	8.9E-06	0%
Toluene	12	330	1	250	1	1.0E-06	70	365	3.8E-05	2.0E+00	1.9E-05	0%
Trichloroethene	0.13	330	1	250	1	1.0E-06	70	365	4.1E-07	3.0E-04	1.4E-03	0%
Vinyl Chloride	0.0026	330	1	250	1	1.0E-06	70	365	8.4E-09	3.0E-03	2.8E-06	0%
Xylenes (total)	15	330	1	250	1	1.0E-06	70	365	4.8E-05	2.0E-01	2.4E-04	0%

Hazard Index = 4.6E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$RfD_{dermal-adj}$ Subchronic Dermal Adj. RfD [(4)]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.6	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	3.1E-07	9.5E-01	2.9E-04	1.1E-03	0%
Iron	36293	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	2.3E-03	2.0E-01	1.4E-01	1.7E-02	4%
Manganese	696	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	4.5E-05	2.0E-01	2.8E-02	1.6E-03	0%
Thallium	40	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	2.6E-06	2.0E-01	1.4E-05	1.8E-01	**40%**
Vanadium	5563	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	3.6E-04	2.0E-01	1.4E-03	2.6E-01	**56%**
1,2-Dichloroethane	0.35	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	6.9E-08	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.17	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	3.3E-08	8.0E-01	7.2E-01	4.6E-08	0%
Benzene	0.043	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	1.4E-10	8.0E-01	3.2E-03	4.3E-08	0%
Chloroform	0.0022	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	7.1E-12	8.0E-01	8.0E-03	8.9E-10	0%
cis-1,2-Dichloroethene	0.27	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	8.7E-10	8.0E-01	8.0E-02	1.1E-08	0%
Tetrachloroethene	0.28	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	5.3E-08	8.0E-01	8.0E-02	6.7E-07	0%
Toluene	12	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	2.3E-06	8.0E-01	1.6E+00	1.4E-06	0%
Trichloroethene	0.13	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	2.5E-08	8.0E-01	2.4E-04	1.0E-04	0%
Vinyl Chloride	0.0026	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	8.4E-12	8.0E-01	2.4E-03	3.5E-09	0%
Xylenes (total)	15	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	2.9E-06	8.0E-01	1.6E-01	1.8E-05	0%

Hazard Index = 4.6E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
(4): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	C_s Conc. in Soil [(1)] (mg/kg)	PEF Particulate Emission Factor[(2)] (m^3/kg)	VF Volatilization Factor[(3)] (m^3/kg)	$IR_{air\text{-}hourly}$ Hourly Inhalation Rate (m^3/hr)	EF Exposure Frequency (day/year)	ED Duration of Exposure (years)	ET_{inh} Exposure Time (hr/day)	BW Body Weight (kg)	AT_n Averaging Time Noncancer (days)	ADD_{inhal} Average Daily Dose (mg/kg-day)	**RfD_i Subchronic Inhalation RfD [(4)]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.6	6.80E+08	NA	1	250	1	8	70	365	1.8E-10	NA	NA	0%
Iron	36293	6.80E+08	NA	1	250	1	8	70	365	4.2E-06	NA	NA	0%
Manganese	696	6.80E+08	NA	1	250	1	8	70	365	8.0E-08	1.43E-05	5.6E-03	**40%**
Thallium	40	6.80E+08	NA	1	250	1	8	70	365	4.6E-09	NA	NA	0%
Vanadium	5563	6.80E+08	NA	1	250	1	8	70	365	6.4E-07	NA	NA	0%
1,2-Dichloroethane	0.35	NA	3.91E+03	1	250	1	8	70	365	7.1E-06	7.00E-01	1.0E-05	0%
1,4-Dichlorobenzene	0.17	NA	1.29E+04	1	250	1	8	70	365	1.0E-06	7.14E-01	1.4E-06	0%
Benzene	0.043	NA	2.73E+03	1	250	1	8	70	365	1.2E-06	8.57E-03	1.4E-04	1%
Chloroform	0.0022	NA	2.66E+03	1	250	1	8	70	365	6.5E-08	1.40E-02	4.6E-06	0%
cis-1,2-Dichloroethene	0.27	NA	2.90E+03	1	250	1	8	70	365	7.3E-06	5.71E-02	1.3E-04	1%
Tetrachloroethene	0.28	NA	2.55E+03	1	250	1	8	70	365	8.5E-06	1.00E-02	8.5E-04	6%
Toluene	12	NA	3.98E+03	1	250	1	8	70	365	2.3E-04	1.43E+00	1.6E-04	1%
Trichloroethene	0.13	NA	3.26E+03	1	250	1	8	70	365	3.0E-06	1.0E-02	3.0E-04	2%
Vinyl Chloride	0.0026	NA	1.04E+03	1	250	1	8	70	365	2.0E-07	2.9E-02	6.9E-06	0%
Xylenes (total)	15	NA	6.10E+03	1	250	1	8	70	365	1.9E-04	2.9E-02	6.6E-03	**48%**

Hazard Index = 1.4E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable
(4): A subchronic RfD was only available for 1,4-dichlorobenzene, therefore, chronic values were implemented or the remainder of the chemicals.

Future Excavation Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.6	330	1	250	1	1.0E-06	70	25,550	7.4E-08	1.5E+00	1.1E-07	**91%**
Iron	36293	330	1	250	1	1.0E-06	70	25,550	1.7E-03	NA	NA	0%
Manganese	696	330	1	250	1	1.0E-06	70	25,550	3.2E-05	NA	NA	0%
Thallium	40	330	1	250	1	1.0E-06	70	25,550	1.8E-06	NA	NA	0%
Vanadium	5563	330	1	250	1	1.0E-06	70	25,550	2.6E-04	NA	NA	0%
1,2-Dichloroethane	0.35	330	1	250	1	1.0E-06	70	25,550	1.6E-08	9.1E-02	1.5E-09	1%
1,4-Dichlorobenzene	0.17	330	1	250	1	1.0E-06	70	25,550	7.9E-09	2.4E-02	1.9E-10	0%
Benzene	0.043	330	1	250	1	1.0E-06	70	25,550	2.0E-09	5.5E-02	1.1E-10	0%
Chloroform	0.0022	330	1	250	1	1.0E-06	70	25,550	1.0E-10	1.0E-02	1.0E-12	0%
cis-1,2-Dichloroethene	0.27	330	1	250	1	1.0E-06	70	25,550	1.2E-08	NA	NA	0%
Tetrachloroethene	0.28	330	1	250	1	1.0E-06	70	25,550	1.3E-08	5.4E-01	6.9E-09	6%
Toluene	12	330	1	250	1	1.0E-06	70	25,550	5.4E-07	NA	NA	0%
Trichloroethene	0.13	330	1	250	1	1.0E-06	70	25,550	5.9E-09	4.0E-01	2.3E-09	2%
Vinyl Chloride	0.0026	330	1	250	1	1.0E-06	70	25,550	1.2E-10	7.2E-01	8.6E-11	0%
Xylenes (total)	15	330	1	250	1	1.0E-06	70	25,550	6.8E-07	NA	NA	0%

Excess Lifetime Cancer Risk = 1.2E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.6	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	4.4E-09	9.5E-01	1.6E+00	7.0E-09	**91%**
Iron	36293	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	3.3E-05	2.0E-01	NA	NA	0%
Manganese	696	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	6.4E-07	2.0E-01	NA	NA	0%
Thallium	40	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	3.7E-08	2.0E-01	NA	NA	0%
Vanadium	5563	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	5.1E-06	2.0E-01	NA	NA	0%
1,2-Dichloroethane	0.35	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	9.8E-10	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.17	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	4.7E-10	8.0E-01	3.0E-02	1.4E-11	0%
Benzene	0.043	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	2.0E-12	8.0E-01	6.9E-02	1.4E-13	0%
Chloroform	0.0022	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	1.0E-13	8.0E-01	1.3E-02	1.3E-15	0%
cis-1,2-Dichloroethene	0.27	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	1.2E-11	8.0E-01	NA	NA	0%
Tetrachloroethene	0.28	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	7.6E-10	8.0E-01	6.8E-01	5.2E-10	7%
Toluene	12	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	3.2E-08	8.0E-01	NA	NA	0%
Trichloroethene	0.13	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	3.5E-10	8.0E-01	5.0E-01	1.8E-10	2%
Vinyl Chloride	0.0026	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	1.2E-13	8.0E-01	9.0E-01	1.1E-13	0%
Xylenes (total)	15	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	4.1E-08	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 7.7E-09

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:
C_s = concentration of contaminant in the airborne particulates (mg/kg)
PEF = particulate emission factor (m^3/kg)
VF = volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$ = inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF = exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED = exposure duration: the typical duration of each exposure event (year)
ET_{inh} = exposure time (hr/day)
BW = body weight (kg)
AT_c = averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.6	6.80E+08	NA	1	250	1	8	70	25,550	2.6E-12	1.51E+01	4.0E-11	0%
Iron	36293	6.80E+08	NA	1	250	1	8	70	25,550	6.0E-08	NA	NA	0%
Manganese	696	6.80E+08	NA	1	250	1	8	70	25,550	1.1E-09	NA	NA	0%
Thallium	40	6.80E+08	NA	1	250	1	8	70	25,550	6.6E-11	NA	NA	0%
Vanadium	5563	6.80E+08	NA	1	250	1	8	70	25,550	9.1E-09	NA	NA	0%
1,2-Dichloroethane	0.35	NA	3.91E+03	1	250	1	8	70	25,550	1.0E-07	9.10E-02	9.2E-09	**31%**
1,4-Dichlorobenzene	0.17	NA	1.29E+04	1	250	1	8	70	25,550	1.5E-08	2.20E-02	3.2E-10	1%
Benzene	0.043	NA	2.73E+03	1	250	1	8	70	25,550	1.8E-08	2.70E-02	4.7E-10	2%
Chloroform	0.0022	NA	2.66E+03	1	250	1	8	70	25,550	9.2E-10	8.10E-02	7.5E-11	0%
cis-1,2-Dichloroethene	0.27	NA	2.90E+03	1	250	1	8	70	25,550	1.0E-07	NA	NA	0%
Tetrachloroethene	0.28	NA	2.55E+03	1	250	1	8	70	25,550	1.2E-07	2.10E-02	2.5E-09	9%
Toluene	12	NA	3.98E+03	1	250	1	8	70	25,550	3.3E-06	NA	NA	0%
Trichloroethene	0.13	NA	3.26E+03	1	250	1	8	70	25,550	4.4E-08	3.85E-01	1.7E-08	**57%**
Vinyl Chloride	0.0026	NA	1.04E+03	1	250	1	8	70	25,550	2.8E-09	1.54E-02	4.3E-11	0%
Xylenes (total)	15	NA	6.10E+03	1	250	1	8	70	25,550	2.7E-06	NA	NA	0%

Excess Lifetime Cancer Risk = 2.9E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.18
Subsurface Soil
Excluding Hot Spots
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Excluding Hot Spots	Arsenic	4.E-07	2.E-07	1.E-09			6.E-07	3.E-03	1.E-03	NA			4.E-03
			Iron	NA	NA	NA			0.E+00	3.E-02	2.E-02	NA			4.E-02
			Manganese	NA	NA	NA			0.E+00	2.E-02	1.E-02	6.E-03			3.E-02
			Thallium	NA	NA	NA			0.E+00	3.E-01	2.E-01	NA			5.E-01
			Vanadium	NA	NA	NA			0.E+00	3.E+00	2.E+00	NA			5.E+00
			1,2-Dichloroethane	NA	NA	2.E-07			2.E-07	NA	NA	1.E-05			1.E-05
			1,4-Dichlorobenzene	7.E-10	4.E-10	8.E-09			9.E-09	3.E-06	1.E-06	5.E-06			9.E-06
			Benzene	4.E-10	3.E-12	1.E-08			1.E-08	5.E-06	4.E-08	1.E-04			1.E-04
			Chloroform	4.E-12	3.E-14	2.E-09			2.E-09	1.E-07	9.E-10	5.E-06			5.E-06
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	1.E-05	1.E-07	1.E-04			1.E-04
			Tetrachloroethene	3.E-08	1.E-08	6.E-08			1.E-07	1.E-05	7.E-06	8.E-04			9.E-04
			Toluene	NA	NA	NA			0.E+00	7.E-05	4.E-05	2.E-04			3.E-04
			Trichloroethene	9.E-09	4.E-09	4.E-07			4.E-07	2.E-04	1.E-04	3.E-04			6.E-04
			Vinyl chloride	3.E-10	3.E-12	1.E-09			1.E-09	4.E-07	3.E-09	7.E-06			7.E-06
			Xylenes	NA	NA	NA			0.E+00	4.E-05	2.E-05	7.E-03			7.E-03
			Chemical Total	5.E-07	2.E-07	7.E-07	0.E+00	0.E+00	1.E-06	3.E+00	2.E+00	1.E-02	0.E+00	0.E+00	5.E+00
		Exposure Point Total							1.E-06						5.E+00
	Exposure Medium Total								1.E-06						5.E+00
Soil Total									1.E-06						5.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 9.E-03

Total Hazard Across All Media = 67

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.6	50	1	250	25	1.0E-06	70	9125	7.8E-07	3.0E-04	2.6E-03	0%
Iron	36293	50	1	250	25	1.0E-06	70	9125	1.8E-02	7.0E-01	2.5E-02	1%
Manganese	696	50	1	250	25	1.0E-06	70	9125	3.4E-04	2.0E-02	1.7E-02	1%
Thallium	40	50	1	250	25	1.0E-06	70	9125	2.0E-05	7.0E-05	2.8E-01	**9%**
Vanadium	5563	50	1	250	25	1.0E-06	70	9125	2.7E-03	1.0E-03	2.7E+00	**89%**
1,2-Dichloroethane	0.35	50	1	250	25	1.0E-06	70	9125	1.7E-07	NA	NA	0%
1,4-Dichlorobenzene	0.17	50	1	250	25	1.0E-06	70	9125	8.4E-08	3.0E-02	2.8E-06	0%
Benzene	0.043	50	1	250	25	1.0E-06	70	9125	2.1E-08	4.0E-03	5.3E-06	0%
Chloroform	0.0022	50	1	250	25	1.0E-06	70	9125	1.1E-09	1.0E-02	1.1E-07	0%
cis-1,2-Dichloroethene	0.27	50	1	250	25	1.0E-06	70	9125	1.3E-07	1.0E-02	1.3E-05	0%
Tetrachloroethene	0.28	50	1	250	25	1.0E-06	70	9125	1.4E-07	1.0E-02	1.4E-05	0%
Toluene	12	50	1	250	25	1.0E-06	70	9125	5.7E-06	8.0E-02	7.2E-05	0%
Trichloroethene	0.13	50	1	250	25	1.0E-06	70	9125	6.2E-08	3.0E-04	2.1E-04	0%
Vinyl Chloride	0.0026	50	1	250	25	1.0E-06	70	9125	1.3E-09	3.0E-03	4.2E-07	0%
Xylenes (total)	15	50	1	250	25	1.0E-06	70	9125	7.2E-06	2.0E-01	3.6E-05	0%

Hazard Index = 3.0E+00

Notes: CDM
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s = representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA = skin surface area in contact with soil on days exposed (cm^2)
AF = mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d = absorption efficiency (unitless)
EF = exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED = exposure duration: the typical duration of each exposure event (year)
EV = event frequency (events/day)
BW = body weight (kg)
AT_n = averaging time (days)
C_1 = conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.6	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	3.1E-07	9.5E-01	2.9E-04	1.1E-03	0%
Iron	36293	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	2.3E-03	2.0E-01	1.4E-01	1.7E-02	1%
Manganese	696	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	4.5E-05	2.0E-01	4.0E-03	1.1E-02	1%
Thallium	40	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	2.6E-06	2.0E-01	1.4E-05	1.8E-01	**9%**
Vanadium	5563	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	3.6E-04	2.0E-01	2.0E-04	1.8E+00	**89%**
1,2-Dichloroethane	0.35	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	6.9E-08	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.17	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	3.3E-08	8.0E-01	2.4E-02	1.4E-06	0%
Benzene	0.043	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	1.4E-10	8.0E-01	3.2E-03	4.3E-08	0%
Chloroform	0.0022	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	7.1E-12	8.0E-01	8.0E-03	8.9E-10	0%
cis-1,2-Dichloroethene	0.27	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	8.7E-10	8.0E-01	8.0E-03	1.1E-07	0%
Tetrachloroethene	0.28	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	5.3E-08	8.0E-01	8.0E-03	6.7E-06	0%
Toluene	12	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	2.3E-06	8.0E-01	6.4E-02	3.5E-05	0%
Trichloroethene	0.13	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	2.5E-08	8.0E-01	2.4E-04	1.0E-04	0%
Vinyl Chloride	0.0026	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	8.4E-12	8.0E-01	2.4E-03	3.5E-09	0%
Xylenes (total)	15	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	2.9E-06	8.0E-01	1.6E-01	1.8E-05	0%

Hazard Index = 2.0E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air-hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air-hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air-hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air-hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i** **Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.6	6.80E+08	NA	1	250	25	8	70	9125	1.8E-10	NA	NA	0%
Iron	36293	6.80E+08	NA	1	250	25	8	70	9125	4.2E-06	NA	NA	0%
Manganese	696	6.80E+08	NA	1	250	25	8	70	9125	8.0E-08	1.43E-05	5.6E-03	**40%**
Thallium	40	6.80E+08	NA	1	250	25	8	70	9125	4.6E-09	NA	NA	0%
Vanadium	5563	6.80E+08	NA	1	250	25	8	70	9125	6.4E-07	NA	NA	0%
1,2-Dichloroethane	0.35	NA	3.91E+03	1	250	25	8	70	9125	7.1E-06	7.00E-01	1.0E-05	0%
1,4-Dichlorobenzene	0.17	NA	1.29E+04	1	250	25	8	70	9125	1.0E-06	2.29E-01	4.5E-06	0%
Benzene	0.043	NA	2.73E+03	1	250	25	8	70	9125	1.2E-06	8.57E-03	1.4E-04	1%
Chloroform	0.0022	NA	2.66E+03	1	250	25	8	70	9125	6.5E-08	1.40E-02	4.6E-06	0%
cis-1,2-Dichloroethene	0.27	NA	2.90E+03	1	250	25	8	70	9125	7.3E-06	5.71E-02	1.3E-04	1%
Tetrachloroethene	0.28	NA	2.55E+03	1	250	25	8	70	9125	8.5E-06	1.00E-02	8.5E-04	6%
Toluene	12	NA	3.98E+03	1	250	25	8	70	9125	2.3E-04	1.43E+00	1.6E-04	1%
Trichloroethene	0.13	NA	3.26E+03	1	250	25	8	70	9125	3.0E-06	1.0E-02	3.0E-04	2%
Vinyl Chloride	0.0026	NA	1.04E+03	1	250	25	8	70	9125	2.0E-07	2.9E-02	6.9E-06	0%
Xylenes (total)	15	NA	6.10E+03	1	250	25	8	70	9125	1.9E-04	2.9E-02	6.6E-03	**48%**

Hazard Index = 1.4E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.6	50	1	250	25	1.0E-06	70	25,550	2.8E-07	1.5E+00	4.2E-07	**92%**
Iron	36293	50	1	250	25	1.0E-06	70	25,550	6.3E-03	NA	NA	0%
Manganese	696	50	1	250	25	1.0E-06	70	25,550	1.2E-04	NA	NA	0%
Thallium	40	50	1	250	25	1.0E-06	70	25,550	7.0E-06	NA	NA	0%
Vanadium	5563	50	1	250	25	1.0E-06	70	25,550	9.7E-04	NA	NA	0%
1,2-Dichloroethane	0.35	50	1	250	25	1.0E-06	70	25,550	6.2E-08	9.1E-02	NA	0%
1,4-Dichlorobenzene	0.17	50	1	250	25	1.0E-06	70	25,550	3.0E-08	2.4E-02	7.2E-10	0%
Benzene	0.043	50	1	250	25	1.0E-06	70	25,550	7.5E-09	5.5E-02	4.1E-10	0%
Chloroform	0.0022	50	1	250	25	1.0E-06	70	25,550	3.8E-10	1.0E-02	3.8E-12	0%
cis-1,2-Dichloroethene	0.27	50	1	250	25	1.0E-06	70	25,550	4.7E-08	NA	NA	0%
Tetrachloroethene	0.28	50	1	250	25	1.0E-06	70	25,550	4.8E-08	5.4E-01	2.6E-08	6%
Toluene	12	50	1	250	25	1.0E-06	70	25,550	2.0E-06	NA	NA	0%
Trichloroethene	0.13	50	1	250	25	1.0E-06	70	25,550	2.2E-08	4.0E-01	8.9E-09	2%
Vinyl Chloride	0.0026	50	1	250	25	1.0E-06	70	25,550	4.5E-10	7.2E-01	3.3E-10	0%
Xylenes (total)	15	50	1	250	25	1.0E-06	70	25,550	2.6E-06	NA	NA	0%

Excess Lifetime Cancer Risk = 4.6E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency (2) (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency (3) (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.6	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.1E-07	9.5E-01	1.6E+00	1.7E-07	**91%**
Iron	36293	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	8.4E-04	2.0E-01	NA	NA	0%
Manganese	696	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.6E-05	2.0E-01	NA	NA	0%
Thallium	40	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	9.2E-07	2.0E-01	NA	NA	0%
Vanadium	5563	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.3E-04	2.0E-01	NA	NA	0%
1,2-Dichloroethane	0.35	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.4E-08	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.17	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.2E-08	8.0E-01	3.0E-02	3.5E-10	0%
Benzene	0.043	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	5.0E-11	8.0E-01	6.9E-02	3.4E-12	0%
Chloroform	0.0022	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	2.5E-12	8.0E-01	1.3E-02	3.2E-14	0%
cis-1,2-Dichloroethene	0.27	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	3.1E-10	8.0E-01	NA	NA	0%
Tetrachloroethene	0.28	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.9E-08	8.0E-01	6.8E-01	1.3E-08	7%
Toluene	12	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	8.1E-07	8.0E-01	NA	NA	0%
Trichloroethene	0.13	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	8.8E-09	8.0E-01	5.0E-01	4.4E-09	2%
Vinyl Chloride	0.0026	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	3.0E-12	8.0E-01	9.0E-01	2.7E-12	0%
Xylenes (total)	15	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.0E-06	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 1.9E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.6	6.80E+08	NA	1	250	25	8	70	25,550	6.6E-11	1.51E+01	9.9E-10	0%
Iron	36293	6.80E+08	NA	1	250	25	8	70	25,550	1.5E-06	NA	NA	0%
Manganese	696	6.80E+08	NA	1	250	25	8	70	25,550	2.9E-08	NA	NA	0%
Thallium	40	6.80E+08	NA	1	250	25	8	70	25,550	1.6E-09	NA	NA	0%
Vanadium	5563	6.80E+08	NA	1	250	25	8	70	25,550	2.3E-07	NA	NA	0%
1,2-Dichloroethane	0.35	NA	3.91E+03	1	250	25	8	70	25,550	2.5E-06	9.10E-02	2.3E-07	**31%**
1,4-Dichlorobenzene	0.17	NA	1.29E+04	1	250	25	8	70	25,550	3.7E-07	2.20E-02	8.1E-09	1%
Benzene	0.043	NA	2.73E+03	1	250	25	8	70	25,550	4.4E-07	2.70E-02	1.2E-08	2%
Chloroform	0.0022	NA	2.66E+03	1	250	25	8	70	25,550	2.3E-08	8.10E-02	1.9E-09	0%
cis-1,2-Dichloroethene	0.27	NA	2.90E+03	1	250	25	8	70	25,550	2.6E-06	NA	NA	0%
Tetrachloroethene	0.28	NA	2.55E+03	1	250	25	8	70	25,550	3.0E-06	2.10E-02	6.4E-08	9%
Toluene	12	NA	3.98E+03	1	250	25	8	70	25,550	8.2E-05	NA	NA	0%
Trichloroethene	0.13	NA	3.26E+03	1	250	25	8	70	25,550	1.1E-06	3.85E-01	4.2E-07	**57%**
Vinyl Chloride	0.0026	NA	1.04E+03	1	250	25	8	70	25,550	7.0E-08	1.54E-02	1.1E-09	0%
Xylenes (total)	15	NA	6.10E+03	1	250	25	8	70	25,550	6.8E-05	NA	NA	0%

Excess Lifetime Cancer Risk = 7.4E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.19
Subsurface Soil
Excluding Hot Spots
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
Soil	Subsurface Soil	Excluding Hot Spots	Arsenic	4.E-06	4.E-07	3.E-09			4.E-06	7.E-02	6.E-03	NA			7.E-02
			Iron	NA	NA	NA			0.E+00	7.E-01	9.E-02	NA			8.E-01
			Manganese	NA	NA	NA			0.E+00	4.E-01	6.E-02	2.E-02			5.E-01
			Thallium	NA	NA	NA			0.E+00	7.E+00	1.E+00	NA			8.E+00
			Vanadium	NA	NA	NA			0.E+00	7.E+01	1.E+01	NA			8.E+01
			1,2-Dichloroethane	3.E-07	6.E-07	2.E-06			3.E-06	NA	NA	3.E-05			3.E-05
			1,4-Dichlorobenzene	6.E-09	8.E-10	3.E-08			3.E-08	7.E-05	8.E-06	2.E-05			1.E-04
			Benzene	4.E-09	7.E-12	4.E-08			4.E-08	1.E-04	2.E-07	5.E-04			6.E-04
			Chloroform	3.E-11	7.E-14	6.E-09			6.E-09	3.E-06	5.E-09	2.E-05			2.E-05
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	3.E-04	6.E-07	4.E-04			8.E-04
			Tetrachloroethene	2.E-07	3.E-08	2.E-07			5.E-07	4.E-04	4.E-05	3.E-03			3.E-03
			Toluene	NA	NA	NA			0.E+00	2.E-03	2.E-04	5.E-04			3.E-03
			Trichloroethene	8.E-08	9.E-09	1.E-06			1.E-06	5.E-03	6.E-04	1.E-03			7.E-03
			Vinyl chloride	6.E-09	2.E-08	3.E-07			3.E-07	1.E-05	2.E-08	2.E-05			3.E-05
			Xylenes	NA	NA	NA			0.E+00	9.E-04	1.E-04	2.E-02			2.E-02
			Chemical Total	4.E-06	1.E-06	4.E-06	0.E+00	0.E+00	9.E-06	8.E+01	1.E+01	5.E-02	0.E+00	0.E+00	9.E+01
		Exposure Point Total							9.E-06						9.E+01
	Exposure Medium Total								9.E-06						9.E+01
Soil Total									9.E-06						9.E+01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate					0.E+00	0.E+00					0.E+00	0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron					0.E+00	0.E+00					0.E+00	0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese					0.E+00	0.E+00					0.E+00	0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 3.E-02

Total Hazard Across All Media = 486

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.6	200	1	350	6	1.0E-06	15	2190	2.0E-05	3.0E-04	6.8E-02	0%
Iron	36293	200	1	350	6	1.0E-06	15	2190	4.6E-01	7.0E-01	6.6E-01	1%
Manganese	696	200	1	350	6	1.0E-06	15	2190	8.9E-03	2.0E-02	4.4E-01	1%
Thallium	40	200	1	350	6	1.0E-06	15	2190	5.1E-04	7.0E-05	7.3E+00	9%
Vanadium	5563	200	1	350	6	1.0E-06	15	2190	7.1E-02	1.0E-03	7.1E+01	**89%**
1,2-Dichloroethane	0.35	200	1	350	6	1.0E-06	15	2190	4.5E-06	NA	NA	0%
1,4-Dichlorobenzene	0.17	200	1	350	6	1.0E-06	15	2190	2.2E-06	3.0E-02	7.3E-05	0%
Benzene	0.043	200	1	350	6	1.0E-06	15	2190	5.5E-07	4.0E-03	1.4E-04	0%
Chloroform	0.0022	200	1	350	6	1.0E-06	15	2190	2.8E-08	1.0E-02	2.8E-06	0%
cis-1,2-Dichloroethene	0.27	200	1	350	6	1.0E-06	15	2190	3.5E-06	1.0E-02	3.5E-04	0%
Tetrachloroethene	0.28	200	1	350	6	1.0E-06	15	2190	3.5E-06	1.0E-02	3.5E-04	0%
Toluene	12	200	1	350	6	1.0E-06	15	2190	1.5E-04	8.0E-02	1.9E-03	0%
Trichloroethene	0.13	200	1	350	6	1.0E-06	15	2190	1.6E-06	3.0E-04	5.4E-03	0%
Vinyl chloride	0.0026	200	1	350	6	1.0E-06	15	2190	3.3E-08	3.0E-03	1.1E-05	0%
Xylenes	15	200	1	350	6	1.0E-06	15	2190	1.9E-04	2.0E-01	9.5E-04	0%

Hazard Index = 8.0E+01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of <u>Noncancer</u> Hazard from Dermal Contact
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency (2) (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (years)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency (3) (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.6	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.7E-06	9.5E-01	2.9E-04	6.0E-03	0%
Iron	36293	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.3E-02	2.0E-01	1.4E-01	9.3E-02	1%
Manganese	696	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	2.5E-04	2.0E-01	4.0E-03	6.2E-02	1%
Thallium	40	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.4E-05	2.0E-01	1.4E-05	1.0E+00	9%
Vanadium	5563	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	2.0E-03	2.0E-01	2.0E-04	1.0E+01	**89%**
1,2-Dichloroethane	0.35	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.8E-07	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.17	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.8E-07	8.0E-01	2.4E-02	7.7E-06	0%
Benzene	0.043	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	7.7E-10	8.0E-01	3.2E-03	2.4E-07	0%
Chloroform	0.0022	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	3.9E-11	8.0E-01	8.0E-03	4.9E-09	0%
cis-1,2-Dichloroethene	0.27	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	4.8E-09	8.0E-01	8.0E-03	6.0E-07	0%
Tetrachloroethene	0.28	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.0E-07	8.0E-01	8.0E-03	3.7E-05	0%
Toluene	12	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.3E-05	8.0E-01	6.4E-02	2.0E-04	0%
Trichloroethene	0.13	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.4E-07	8.0E-01	2.4E-04	5.7E-04	0%
Vinyl chloride	0.0026	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	4.7E-11	8.0E-01	2.4E-03	1.9E-08	0%
Xylenes	15	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.6E-05	8.0E-01	1.6E-01	9.9E-05	0%

Hazard Index = 1.1E+01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly} * EF * ED * ET_{inh} / BW * AT_n$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.6	6.80E+08	NA	0.26	350	6	16	15	2190	6.3E-10	NA	NA	0%
Iron	36293	6.80E+08	NA	0.26	350	6	16	15	2190	1.4E-05	NA	NA	0%
Manganese	696	6.80E+08	NA	0.26	350	6	16	15	2190	2.7E-07	1.43E-05	1.9E-02	**40%**
Thallium	40	6.80E+08	NA	0.26	350	6	16	15	2190	1.6E-08	NA	NA	0%
Vanadium	5563	6.80E+08	NA	0.26	350	6	16	15	2190	2.2E-06	NA	NA	0%
1,2-Dichloroethane	0.35	NA	3.91E+03	0.26	350	6	16	15	2190	2.4E-05	7.00E-01	3.4E-05	0%
1,4-Dichlorobenzene	0.17	NA	1.29E+04	0.26	350	6	16	15	2190	3.5E-06	2.29E-01	1.5E-05	0%
Benzene	0.043	NA	2.73E+03	0.26	350	6	16	15	2190	4.2E-06	8.57E-03	4.9E-04	1%
Chloroform	0.0022	NA	2.66E+03	0.26	350	6	16	15	2190	2.2E-07	1.40E-02	1.6E-05	0%
cis-1,2-Dichloroethene	0.27	NA	2.90E+03	0.26	350	6	16	15	2190	2.5E-05	5.71E-02	4.3E-04	1%
Tetrachloroethene	0.28	NA	2.55E+03	0.26	350	6	16	15	2190	2.9E-05	1.00E-02	2.9E-03	6%
Toluene	12	NA	3.98E+03	0.26	350	6	16	15	2190	7.8E-04	1.43E+00	5.5E-04	1%
Trichloroethene	0.13	NA	3.26E+03	0.26	350	6	16	15	2190	1.0E-05	1.0E-02	1.0E-03	2%
Vinyl chloride	0.0026	NA	1.04E+03	0.26	350	6	16	15	2190	6.7E-07	2.9E-02	2.3E-05	0%
Xylenes	15	NA	6.10E+03	0.26	350	6	16	15	2190	6.5E-04	2.9E-02	2.3E-02	**48%**

Hazard Index = 4.7E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not Applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IF_{soil}** Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.6	114	1	350	1.0E-06	25,550	2.5E-06	1.5E+00	3.7E-06	**87%**
Iron	36293	114	1	350	1.0E-06	25,550	5.7E-02	NA	NA	0%
Manganese	696	114	1	350	1.0E-06	25,550	1.1E-03	NA	NA	0%
Thallium	40	114	1	350	1.0E-06	25,550	6.2E-05	NA	NA	0%
Vanadium	5563	114	1	350	1.0E-06	25,550	8.7E-03	NA	NA	0%
1,2-Dichloroethane	0.35		**chemical is considered mutagenic, see Table xx for risk calculation**						2.54E-07	6%
1,4-Dichlorobenzene	0.17	114	1	350	1.0E-06	25,550	2.7E-07	2.4E-02	6.4E-09	0%
Benzene	0.043	114	1	350	1.0E-06	25,550	6.7E-08	5.5E-02	3.7E-09	0%
Chloroform	0.0022	114	1	350	1.0E-06	25,550	3.4E-09	1.0E-02	3.4E-11	0%
cis-1,2-Dichloroethene	0.27	114	1	350	1.0E-06	25,550	4.2E-07	NA	NA	0%
Tetrachloroethene	0.28	114	1	350	1.0E-06	25,550	4.3E-07	5.4E-01	2.3E-07	5%
Toluene	12	114	1	350	1.0E-06	25,550	1.8E-05	NA	NA	0%
Trichloroethene	0.13	114	1	350	1.0E-06	25,550	2.0E-07	4.0E-01	7.9E-08	2%
Vinyl chloride	0.0026		**chemical is considered mutagenic, see Table xx for risk calculation**						6.1E-09	0%
Xylenes	15	114	1	350	1.0E-06	25,550	2.3E-05	NA	NA	0%
						Excess Lifetime Cancer Risk =			**4.3E-06**	

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SFS** Age-Adjusted Dermal Factor (mg-year/kg-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.6	360	0.03	350	1	1.0E-06	25,550	2.4E-07	9.5E-01	1.6E+00	3.7E-07	**38%**
Iron	36293	360	0.01	350	1	1.0E-06	25,550	1.8E-03	2.0E-01	NA	NA	0%
Manganese	696	360	0.01	350	1	1.0E-06	25,550	3.4E-05	2.0E-01	NA	NA	0%
Thallium	40	360	0.01	350	1	1.0E-06	25,550	2.0E-06	2.0E-01	NA	NA	0%
Vanadium	5563	360	0.01	350	1	1.0E-06	25,550	2.7E-04	8.0E-01	NA	NA	0%
1,2-Dichloroethane	0.35		**chemical is considered mutagenic, see Table xx for risk calculation**								5.6E-07	**57%**
1,4-Dichlorobenzene	0.17	360	0.03	350	1	1.0E-06	25,550	2.5E-08	8.0E-01	3.0E-02	7.6E-10	0%
Benzene	0.043	360	0.0005	350	1	1.0E-06	25,550	1.1E-10	8.0E-01	6.9E-02	7.3E-12	0%
Chloroform	0.0022	360	0.0005	350	1	1.0E-06	25,550	5.4E-12	8.0E-01	1.3E-02	6.8E-14	0%
cis-1,2-Dichloroethene	0.27	360	0.0005	350	1	1.0E-06	25,550	6.7E-10	8.0E-01	NA	NA	0%
Tetrachloroethene	0.28	360	0.03	350	1	1.0E-06	25,550	4.1E-08	8.0E-01	6.8E-01	2.8E-08	3%
Toluene	12	360	0.03	350	1	1.0E-06	25,550	1.7E-06	8.0E-01	NA	NA	0%
Trichloroethene	0.13	360	0.03	350	1	1.0E-06	25,550	1.9E-08	8.0E-01	5.0E-01	9.4E-09	1%
Vinyl chloride	0.0026		**chemical is considered mutagenic, see Table xx for risk calculation**								1.5E-08	2%
Xylenes	15	360	0.03	350	1	1.0E-06	25,550	2.2E-06	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 9.9E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil, Excluding Hot Spots

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.6	6.80E+08	NA	1	350	30	16	70	25,550	2.2E-10	1.51E+01	3.3E-09	0%
Iron	36293	6.80E+08	NA	1	350	30	16	70	25,550	5.0E-06	NA	NA	0%
Manganese	696	6.80E+08	NA	1	350	30	16	70	25,550	9.6E-08	NA	NA	0%
Thallium	40	6.80E+08	NA	1	350	30	16	70	25,550	5.5E-09	NA	NA	0%
Vanadium	5563	6.80E+08	NA	1	350	30	16	70	25,550	7.7E-07	NA	NA	0%
1,2-Dichloroethane	0.35			**chemical is considered mutagenic, see Table xx for risk calculation**								1.8E-06	**48%**
1,4-Dichlorobenzene	0.17	NA	1.29E+04	1	350	30	16	70	25,550	1.2E-06	2.20E-02	2.7E-08	1%
Benzene	0.043	NA	2.73E+03	1	350	30	16	70	25,550	1.5E-06	2.70E-02	4.0E-08	1%
Chloroform	0.0022	NA	2.66E+03	1	350	30	16	70	25,550	7.8E-08	8.10E-02	6.3E-09	0%
cis-1,2-Dichloroethene	0.27	NA	2.90E+03	1	350	30	16	70	25,550	8.7E-06	NA	NA	0%
Tetrachloroethene	0.28	NA	2.55E+03	1	350	30	16	70	25,550	1.0E-05	2.10E-02	2.1E-07	6%
Toluene	12	NA	3.98E+03	1	350	30	16	70	25,550	2.8E-04	NA	NA	0%
Trichloroethene	0.13	NA	3.26E+03	1	350	30	16	70	25,550	3.7E-06	3.85E-01	1.4E-06	**37%**
Vinyl chloride	0.0026			**chemical is considered mutagenic, see Table xx for risk calculation**								2.8E-07	7%
Xylenes	15	NA	6.10E+03	1	350	30	16	70	25,550	2.3E-04	NA	NA	0%
											Excess Lifetime Cancer Risk =	**3.8E-06**	

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.35	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	3.05E-07	1.27E-07	8.77E-08	4.09E-08	5.61E-07	**Dermal Risk**
1,2-Dichloroethane	0.35	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	1.60E-07	5.30E-08	3.06E-08	9.73E-09	2.54E-07	**Ingestion risk**
1,2-Dichloroethane	0.35	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	4.94E-07	2.82E-07	6.52E-07	3.99E-07	1.83E-06	**inhalation risk**

Parameter	CS	0-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	Child CSF	Adult CSF	ED			EP	Risk			Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	$(mg/kg*day)^{-1}$	0-6	6-15	15-30		0-6	6-15	15-30		
Vinyl chloride	0.0026	1.28E-05	2.46E-06	1.41E-06	1.5E+00	7.20E-01	6	9	15	70	4.27E-09	1.23E-09	5.66E-10	6.07E-09	**ingestion**
Vinyl chloride	0.0026	2.76E-05	7.06E-06	5.92E-06	1.5E+00	7.20E-01	6	9	15	70	9.22E-09	3.54E-09	2.38E-09	1.51E-08	**dermal**
Vinyl chloride	0.0026	2.49E-04	2.05E-04	2.26E-04	1.5E+00	7.20E-01	6	9	15	70	8.33E-08	1.03E-07	9.05E-08	2.76E-07	**dermal**

Appendix H-5.20
Subsurface Soil
Hot Spot RIMW-6
Future Excavation Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RIMW-6	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane	2.E-12	NA	1.E-11			1.E-11	NA	NA	1.E-08			1.E-08
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene	3.E-12	3.E-15	1.E-11			1.E-11	8.E-07	1.E-09	3.E-06			4.E-06
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	7.E-04	9.E-07	1.E-02			1.E-02
			Tetrachloroethene	9.E-08	7.E-09	3.E-08			1.E-07	1.E-04	9.E-06	1.E-02			1.E-02
			Toluene	NA	NA	NA			0.E+00	1.E-07	1.E-08	1.E-06			1.E-06
			Trichloroethene	6.E-08	4.E-09	4.E-07			5.E-07	3.E-02	3.E-03	8.E-03			4.E-02
			Vinyl chloride	1.E-08	2.E-11	6.E-09			2.E-08	4.E-04	5.E-07	1.E-03			1.E-03
			Xylenes	NA	NA	NA			0.E+00	4.E-07	3.E-08	1.E-05			1.E-05
			Chemical Total	2.E-07	1.E-08	5.E-07	0.E+00	0.E+00	6.E-07	4.E-02	3.E-03	3.E-02	0.E+00	0.E+00	7.E-02
		Exposure Point Total							6.E-07						7.E-02
	Exposure Medium Total								6.E-07						7.E-02
Soil Total									6.E-07						7.E-02
Groundwater	Shallow	Air	1,1,1-Trichloroethane				NA		0.E+00				9.E-05		9.E-05
			1,1,2-Trichloroethane				2.E-11		2.E-11				6.E-06		6.E-06
			1,1-Dichloroethane				NA		0.E+00				1.E-06		1.E-06
			1,1-Dichloroethene				NA		0.E+00				7.E-04		7.E-04
			1,2-Dichlorobenzene				NA		0.E+00				8.E-06		8.E-06
			1,2-Dichloroethane				NA		0.E+00				2.E-05		2.E-05
			1,4-Dichlorobenzene				7.E-11		7.E-11				3.E-07		3.E-07
			2-Chlorophenol				NA		0.E+00				NA		0.E+00
			4-Methyl-2-pentanone				NA		0.E+00				3.E-07		3.E-07
			Benzene				5.E-10		5.E-10				2.E-04		2.E-04
			Bis(2-ethylhexyl)phthalate				NA		0.E+00				NA		0.E+00
			Chlorobenzene				NA		0.E+00				9.E-05		9.E-05
			Chloroethane				NA		0.E+00				5.E-06		5.E-06
			Chloroform				5.E-10		5.E-10				3.E-05		3.E-05
			cis-1,2-Dichloroethene				NA		0.E+00				2.E-04		2.E-04
			Ethylbenzene				NA		0.E+00				1.E-04		1.E-04
			Iron				NA		0.E+00				NA		0.E+00
			Isopropylbenzene				NA		0.E+00				3.E-02		3.E-02
			Manganese				NA		0.E+00				NA		0.E+00
			Methyl tert butyl ether				NA		0.E+00				NA		0.E+00
			Methylcyclohexane				NA		0.E+00				NA		0.E+00
			Methylene chloride				NA		0.E+00				3.E-06		3.E-06
			Naphthalene				NA		0.E+00				8.E-06		8.E-06
			Tetrachloroethene				1.E-08		1.E-08				4.E-03		4.E-03
			Toluene				NA		0.E+00				6.E-05		6.E-05
			Trichloroethene				1.E-07		1.E-07				2.E-03		2.E-03
			Vinyl chloride				NA		0.E+00				4.E-04		4.E-04
			Xylenes (Total)				NA		0.E+00				4.E-03		4.E-03
			Chemical Total	0.E+00	0.E+00	0.E+00	1.E-07	0.E+00	1.E-07	0.E+00	0.E+00	0.E+00	4.E-02	0.E+00	4.E-02
		Exposure Point Total							1.E-07						4.E-02
	Exposure Medium Total								1.E-07						4.E-02
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									1.E-07						4.E-02

Total Risk Across All Media = 8.E-07

Total Hazard Across All Media = 0.1

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil -Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Subchronic Oral RfD (2)** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	330	1	250	1	1.0E-06	70	365	1.2E-09	NA	NA	0%
Benzene	0.0010	330	1	250	1	1.0E-06	70	365	3.3E-09	4.0E-03	8.2E-07	0%
cis-1,2-Dichloroethene	23	330	1	250	1	1.0E-06	70	365	7.4E-05	1.0E-01	7.4E-04	2%
Tetrachloroethene	3.7	330	1	250	1	1.0E-06	70	365	1.2E-05	1.0E-01	1.2E-04	0%
Toluene	0.091	330	1	250	1	1.0E-06	70	365	2.9E-07	2.0E+00	1.5E-07	0%
Trichloroethene	3.2	330	1	250	1	1.0E-06	70	365	1.0E-05	3.0E-04	3.4E-02	**96%**
Vinyl Chloride	0.37	330	1	250	1	1.0E-06	70	365	1.2E-06	3.0E-03	4.0E-04	1%
Xylenes (total)	0.027	330	1	250	1	1.0E-06	70	365	8.7E-08	2.0E-01	4.4E-07	0%

Hazard Index = 3.6E-02

Notes:
(1): Soil EPCs (see Appenidx H-3)
(2): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil -Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Subchronic Dermal Adj. RfD [4]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	7.2E-11	8.0E-01	NA	NA	0%
Benzene	0.0010	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	3.3E-12	8.0E-01	3.2E-03	1.0E-09	0%
cis-1,2-Dichloroethene	23	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	7.4E-08	8.0E-01	8.0E-02	9.3E-07	0%
Tetrachloroethene	3.7	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	7.2E-07	8.0E-01	8.0E-02	9.0E-06	0%
Toluene	0.091	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	1.8E-08	8.0E-01	1.6E+00	1.1E-08	0%
Trichloroethene	3.2	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	6.2E-07	8.0E-01	2.4E-04	2.6E-03	**100%**
Vinyl Chloride	0.37	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	1.2E-09	8.0E-01	2.4E-03	5.0E-07	0%
Xylenes (total)	0.027	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	5.2E-09	8.0E-01	1.6E-01	3.3E-08	0%

Hazard Index = 2.6E-03

Notes:
(1): Soil EPCs (see Appenidx H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
(4): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil -Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i Subchronic Inhalation RfD [(4)]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	NA	3.91E+03	1	250	1	8	70	365	7.4E-09	7.00E-01	1.1E-08	0%
Benzene	0.0010	NA	2.73E+03	1	250	1	8	70	365	2.9E-08	8.57E-03	3.4E-06	0%
cis-1,2-Dichloroethene	23	NA	2.90E+03	1	250	1	8	70	365	6.2E-04	5.71E-02	1.1E-02	**35%**
Tetrachloroethene	3.7	NA	2.55E+03	1	250	1	8	70	365	1.1E-04	1.00E-02	1.1E-02	**37%**
Toluene	0.091	NA	3.98E+03	1	250	1	8	70	365	1.8E-06	1.43E+00	1.3E-06	0%
Trichloroethene	3.2	NA	3.26E+03	1	250	1	8	70	365	7.7E-05	1.0E-02	7.7E-03	**25%**
Vinyl Chloride	0.37	NA	1.04E+03	1	250	1	8	70	365	2.8E-05	2.9E-02	9.8E-04	3%
Xylenes (total)	0.027	NA	6.10E+03	1	250	1	8	70	365	3.5E-07	2.9E-02	1.2E-05	0%

Hazard Index = 3.1E-02

Notes:
(1): Soil EPCs (see Appenidx H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable
(4): A subchronic RfD was only available for 1,4-dichlorobenzene, therefore, chronic values were implemented or the remainder of the chemicals.

Future Excavation Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil -Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	330	1	250	1	1.0E-06	70	25,550	1.7E-11	9.1E-02	1.6E-12	0%
Benzene	0.0010	330	1	250	1	1.0E-06	70	25,550	4.7E-11	5.5E-02	2.6E-12	0%
cis-1,2-Dichloroethene	23	330	1	250	1	1.0E-06	70	25,550	1.1E-06	NA	NA	0%
Tetrachloroethene	3.7	330	1	250	1	1.0E-06	70	25,550	1.7E-07	5.4E-01	9.2E-08	**56%**
Toluene	0.091	330	1	250	1	1.0E-06	70	25,550	4.2E-09	NA	NA	0%
Trichloroethene	3.2	330	1	250	1	1.0E-06	70	25,550	1.5E-07	4.0E-01	5.9E-08	**36%**
Vinyl Chloride	0.37	330	1	250	1	1.0E-06	70	25,550	1.7E-08	7.2E-01	1.2E-08	8%
Xylenes (total)	0.027	330	1	250	1	1.0E-06	70	25,550	1.2E-09	NA	NA	0%

Excess Lifetime Cancer Risk = 1.6E-07

Notes:
(1): Soil EPCs (see Appenidx H-3)
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil -Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil (1) (mg/kg)	SA Skin Surface Area Exposed (cm^2)	AF Skin-soil Adherence Factor (mg/cm^2-event)	AE_d Dermal Absorption Efficiency (2) (unitless)	EF Exposure Frequency (days/year)	ED Exposure Duration (years)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency (3) (unitless)	$SF_{dermal-adj}$ **Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.0E-12	8.0E-01	NA	NA	0%
Benzene	0.0010	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	4.7E-14	8.0E-01	6.9E-02	3.2E-15	0%
cis-1,2-Dichloroethene	23	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	1.1E-09	8.0E-01	NA	NA	0%
Tetrachloroethene	3.7	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.0E-08	8.0E-01	6.8E-01	6.9E-09	**61%**
Toluene	0.091	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	2.5E-10	8.0E-01	NA	NA	0%
Trichloroethene	3.2	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	8.9E-09	8.0E-01	5.0E-01	4.4E-09	**39%**
Vinyl Chloride	0.37	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	1.7E-11	8.0E-01	9.0E-01	1.5E-11	0%
Xylenes (total)	0.027	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	7.5E-11	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 1.1E-08

Notes:
(1): Soil EPCs (see Appenidx H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil -Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	NA	3.91E+03	1	250	1	8	70	25,550	1.1E-10	9.10E-02	9.6E-12	0%
Benzene	0.0010	NA	2.73E+03	1	250	1	8	70	25,550	4.1E-10	2.70E-02	1.1E-11	0%
cis-1,2-Dichloroethene	23	NA	2.90E+03	1	250	1	8	70	25,550	8.9E-06	NA	NA	0%
Tetrachloroethene	3.7	NA	2.55E+03	1	250	1	8	70	25,550	1.6E-06	2.10E-02	3.4E-08	7%
Toluene	0.091	NA	3.98E+03	1	250	1	8	70	25,550	2.6E-08	NA	NA	0%
Trichloroethene	3.2	NA	3.26E+03	1	250	1	8	70	25,550	1.1E-06	3.85E-01	4.2E-07	**91%**
Vinyl Chloride	0.37	NA	1.04E+03	1	250	1	8	70	25,550	4.0E-07	1.54E-02	6.1E-09	1%
Xylenes (total)	0.027	NA	6.10E+03	1	250	1	8	70	25,550	4.9E-09	NA	NA	0%

Excess Lifetime Cancer Risk = 4.6E-07

Notes:
(1): Soil EPCs (see Appenidx H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.21
Subsurface Soil
Hot Spot RIMW-6
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RIMW-6	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane	NA	NA	2.E-10			2.E-10	NA	NA	1.E-08			1.E-08
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene	1.E-11	8.E-14	3.E-10			3.E-10	1.E-07	1.E-09	3.E-06			3.E-06
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	1.E-03	9.E-06	1.E-02			1.E-02
			Tetrachloroethene	3.E-07	2.E-07	9.E-07			1.E-06	2.E-04	9.E-05	1.E-02			1.E-02
			Toluene	NA	NA	NA			0.E+00	6.E-07	3.E-07	1.E-06			2.E-06
			Trichloroethene	2.E-07	1.E-07	1.E-05			1.E-05	5.E-03	3.E-03	8.E-03			2.E-02
			Vinyl chloride	5.E-08	4.E-10	2.E-07			2.E-07	6.E-05	5.E-07	1.E-03			1.E-03
			Xylenes	NA	NA	NA			0.E+00	7.E-08	3.E-08	1.E-05			1.E-05
			Chemical Total	6.E-07	3.E-07	1.E-05	0.E+00	0.E+00	1.E-05	7.E-03	3.E-03	3.E-02	0.E+00	0.E+00	4.E-02
		Exposure Point Total							1.E-05						4.E-02
	Exposure Medium Total								1.E-05						4.E-02
Soil Total									1.E-05						4.E-02
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer Ingestion	Cancer Dermal	Cancer Inhalation of Dust and Vapors	Cancer Inhalation Ambient Air	Cancer Inhalation Indoor Air	Cancer Exposure Route Total	Non-Carcinogenic Hazard Quotient Ingestion	Non-Carcinogenic Hazard Quotient Dermal	Non-Carcinogenic Hazard Quotient Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient Exposure Route Total
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 9.E-03

Total Hazard Across All Media = 62

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	50	1	250	25	1.0E-06	70	9125	1.8E-10	NA	NA	0%
Benzene	0.0010	50	1	250	25	1.0E-06	70	9125	4.9E-10	4.0E-03	1.2E-07	0%
cis-1,2-Dichloroethene	23	50	1	250	25	1.0E-06	70	9125	1.1E-05	1.0E-02	1.1E-03	**17%**
Tetrachloroethene	3.7	50	1	250	25	1.0E-06	70	9125	1.8E-06	1.0E-02	1.8E-04	3%
Toluene	0.091	50	1	250	25	1.0E-06	70	9125	4.5E-08	8.0E-02	5.6E-07	0%
Trichloroethene	3.2	50	1	250	25	1.0E-06	70	9125	1.6E-06	3.0E-04	5.2E-03	**79%**
Vinyl Chloride	0.37	50	1	250	25	1.0E-06	70	9125	1.8E-07	3.0E-03	6.0E-05	1%
Xylenes (total)	0.027	50	1	250	25	1.0E-06	70	9125	1.3E-08	2.0E-01	6.6E-08	0%

Hazard Index = 6.6E-03

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency (2) (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency (3) (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	7.2E-11	8.0E-01	NA	NA	0%
Benzene	0.0010	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	3.3E-12	8.0E-01	3.2E-03	1.0E-09	0%
cis-1,2-Dichloroethene	23	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	7.4E-08	8.0E-01	8.0E-03	9.3E-06	0%
Tetrachloroethene	3.7	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	7.2E-07	8.0E-01	8.0E-03	9.0E-05	3%
Toluene	0.091	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	1.8E-08	8.0E-01	6.4E-02	2.8E-07	0%
Trichloroethene	3.2	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	6.2E-07	8.0E-01	2.4E-04	2.6E-03	**96%**
Vinyl Chloride	0.37	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	1.2E-09	8.0E-01	2.4E-03	5.0E-07	0%
Xylenes (total)	0.027	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	5.2E-09	8.0E-01	1.6E-01	3.3E-08	0%

Hazard Index = 2.7E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air-hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air-hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air-hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air-hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	NA	3.91E+03	1	250	25	8	70	9125	7.4E-09	7.00E-01	1.1E-08	0%
Benzene	0.0010	NA	2.73E+03	1	250	25	8	70	9125	2.9E-08	8.57E-03	3.4E-06	0%
cis-1,2-Dichloroethene	23	NA	2.90E+03	1	250	25	8	70	9125	6.2E-04	5.71E-02	1.1E-02	**35%**
Tetrachloroethene	3.7	NA	2.55E+03	1	250	25	8	70	9125	1.1E-04	1.00E-02	1.1E-02	**37%**
Toluene	0.091	NA	3.98E+03	1	250	25	8	70	9125	1.8E-06	1.43E+00	1.3E-06	0%
Trichloroethene	3.2	NA	3.26E+03	1	250	25	8	70	9125	7.7E-05	1.0E-02	7.7E-03	**25%**
Vinyl Chloride	0.37	NA	1.04E+03	1	250	25	8	70	9125	2.8E-05	2.9E-02	9.8E-04	3%
Xylenes (total)	0.027	NA	6.10E+03	1	250	25	8	70	9125	3.5E-07	2.9E-02	1.2E-05	0%

Hazard Index = 3.1E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	50	1	250	25	1.0E-06	70	25,550	6.5E-11	9.1E-02	NA	0%
Benzene	0.0010	50	1	250	25	1.0E-06	70	25,550	1.8E-10	5.5E-02	9.7E-12	0%
cis-1,2-Dichloroethene	23	50	1	250	25	1.0E-06	70	25,550	4.0E-06	NA	NA	0%
Tetrachloroethene	3.7	50	1	250	25	1.0E-06	70	25,550	6.5E-07	5.4E-01	3.5E-07	**56%**
Toluene	0.091	50	1	250	25	1.0E-06	70	25,550	1.6E-08	NA	NA	0%
Trichloroethene	3.2	50	1	250	25	1.0E-06	70	25,550	5.6E-07	4.0E-01	2.2E-07	**36%**
Vinyl Chloride	0.37	50	1	250	25	1.0E-06	70	25,550	6.5E-08	7.2E-01	4.7E-08	8%
Xylenes (total)	0.027	50	1	250	25	1.0E-06	70	25,550	4.7E-09	NA	NA	0%

Excess Lifetime Cancer Risk = 6.2E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.6E-11	8.0E-01	NA	NA	0%
Benzene	0.0010	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	1.2E-12	8.0E-01	6.9E-02	8.0E-14	0%
cis-1,2-Dichloroethene	23	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	2.7E-08	8.0E-01	NA	NA	0%
Tetrachloroethene	3.7	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.6E-07	8.0E-01	6.8E-01	1.7E-07	**61%**
Toluene	0.091	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	6.3E-09	8.0E-01	NA	NA	0%
Trichloroethene	3.2	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.2E-07	8.0E-01	5.0E-01	1.1E-07	**39%**
Vinyl Chloride	0.37	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	4.3E-10	8.0E-01	9.0E-01	3.8E-10	0%
Xylenes (total)	0.027	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.9E-09	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 2.8E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	NA	3.91E+03	1	250	25	8	70	25,550	2.6E-09	9.10E-02	2.4E-10	0%
Benzene	0.0010	NA	2.73E+03	1	250	25	8	70	25,550	1.0E-08	2.70E-02	2.8E-10	0%
cis-1,2-Dichloroethene	23	NA	2.90E+03	1	250	25	8	70	25,550	2.2E-04	NA	NA	0%
Tetrachloroethene	3.7	NA	2.55E+03	1	250	25	8	70	25,550	4.1E-05	2.10E-02	8.5E-07	7%
Toluene	0.091	NA	3.98E+03	1	250	25	8	70	25,550	6.4E-07	NA	NA	0%
Trichloroethene	3.2	NA	3.26E+03	1	250	25	8	70	25,550	2.7E-05	3.85E-01	1.1E-05	**91%**
Vinyl Chloride	0.37	NA	1.04E+03	1	250	25	8	70	25,550	1.0E-05	1.54E-02	1.5E-07	1%
Xylenes (total)	0.027	NA	6.10E+03	1	250	25	8	70	25,550	1.2E-07	NA	NA	0%

Excess Lifetime Cancer Risk = 1.2E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.22
Subsurface Soil
Hot Spot RIMW-6
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RIMW-6	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane	3.E-10	6.E-10	2.E-09			3.E-09	NA	NA	4.E-08			4.E-08
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene	9.E-11	2.E-13	9.E-10			1.E-09	3.E-06	6.E-09	1.E-05			1.E-05
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	3.E-02	5.E-05	4.E-02			7.E-02
			Tetrachloroethene	3.E-06	4.E-07	3.E-06			6.E-06	5.E-03	5.E-04	4.E-02			4.E-02
			Toluene	NA	NA	NA			0.E+00	1.E-05	2.E-06	4.E-06			2.E-05
			Trichloroethene	2.E-06	2.E-07	4.E-05			4.E-05	1.E-01	1.E-02	3.E-02			2.E-01
			Vinyl chloride	9.E-07	2.E-06	4.E-05			4.E-05	2.E-03	3.E-06	3.E-03			5.E-03
			Xylenes	NA	NA	NA			0.E+00	2.E-06	2.E-07	4.E-05			4.E-05
			Chemical Total	6.E-06	3.E-06	8.E-05	0.E+00	0.E+00	9.E-05	2.E-01	1.E-02	1.E-01	0.E+00	0.E+00	3.E-01
		Exposure Point Total							9.E-05						3.E-01
	Exposure Medium Total								9.E-05						3.E-01
Soil Total									9.E-05						3.E-01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate					0.E+00	0.E+00					0.E+00	0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron					0.E+00	0.E+00					0.E+00	0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese					0.E+00	0.E+00					0.E+00	0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 3.E-02

Total Hazard Across All Media = 395

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	200	1	350	6	1.0E-06	15	2190	4.7E-09	NA	NA	0%
Benzene	0.0010	200	1	350	6	1.0E-06	15	2190	1.3E-08	4.0E-03	3.2E-06	0%
cis-1,2-Dichloroethene	23	200	1	350	6	1.0E-06	15	2190	2.9E-04	1.0E-02	2.9E-02	**17%**
Tetrachloroethene	3.7	200	1	350	6	1.0E-06	15	2190	4.7E-05	1.0E-02	4.7E-03	3%
Toluene	0.091	200	1	350	6	1.0E-06	15	2190	1.2E-06	8.0E-02	1.5E-05	0%
Trichloroethene	3.2	200	1	350	6	1.0E-06	15	2190	4.1E-05	3.0E-04	1.4E-01	**79%**
Vinyl chloride	0.37	200	1	350	6	1.0E-06	15	2190	4.7E-06	3.0E-03	1.6E-03	1%
Xylenes	0.027	200	1	350	6	1.0E-06	15	2190	3.5E-07	2.0E-01	1.7E-06	0%

Hazard Index = 1.7E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (years)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	4.0E-10	8.0E-01	NA	NA	0%
Benzene	0.0010	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	1.8E-11	8.0E-01	3.2E-03	5.6E-09	0%
cis-1,2-Dichloroethene	23	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	4.1E-07	8.0E-01	8.0E-03	5.1E-05	0%
Tetrachloroethene	3.7	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	4.0E-06	8.0E-01	8.0E-03	5.0E-04	3%
Toluene	0.091	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	9.8E-08	8.0E-01	6.4E-02	1.5E-06	0%
Trichloroethene	3.2	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.4E-06	8.0E-01	2.4E-04	1.4E-02	**96%**
Vinyl chloride	0.37	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	6.6E-09	8.0E-01	2.4E-03	2.8E-06	0%
Xylenes	0.027	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	2.9E-08	8.0E-01	1.6E-01	1.8E-07	0%

Hazard Index = 1.5E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly} * EF * ED * ET_{inh} / BW * AT_n$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037	NA	3.91E+03	0.26	350	6	16	15	2190	2.5E-08	7.00E-01	3.6E-08	0%
Benzene	0.0010	NA	2.73E+03	0.26	350	6	16	15	2190	9.8E-08	8.57E-03	1.1E-05	0%
cis-1,2-Dichloroethene	23	NA	2.90E+03	0.26	350	6	16	15	2190	2.1E-03	5.71E-02	3.7E-02	**35%**
Tetrachloroethene	3.7	NA	2.55E+03	0.26	350	6	16	15	2190	3.9E-04	1.00E-02	3.9E-02	**37%**
Toluene	0.091	NA	3.98E+03	0.26	350	6	16	15	2190	6.1E-06	1.43E+00	4.3E-06	0%
Trichloroethene	3.2	NA	3.26E+03	0.26	350	6	16	15	2190	2.6E-04	1.0E-02	2.6E-02	**25%**
Vinyl chloride	0.37	NA	1.04E+03	0.26	350	6	16	15	2190	9.5E-05	2.9E-02	3.3E-03	**3%**
Xylenes	0.027	NA	6.10E+03	0.26	350	6	16	15	2190	1.2E-06	2.9E-02	4.1E-05	0%

Hazard Index = 1.0E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IF_{soil}** Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037		**chemical is considered mutagenic, see Table xx for risk calculation**						2.65E-10	0%
Benzene	0.0010	114	1	350	1.0E-06	25,550	1.6E-09	5.5E-02	8.7E-11	0%
cis-1,2-Dichloroethene	23	114	1	350	1.0E-06	25,550	3.6E-05	NA	NA	0%
Tetrachloroethene	3.7	114	1	350	1.0E-06	25,550	5.8E-06	5.4E-01	3.1E-06	**52%**
Toluene	0.091	114	1	350	1.0E-06	25,550	1.4E-07	NA	NA	0%
Trichloroethene	3.2	114	1	350	1.0E-06	25,550	5.0E-06	4.0E-01	2.0E-06	**33%**
Vinyl chloride	0.37		**chemical is considered mutagenic, see Table xx for risk calculation**						8.6E-07	**14%**
Xylenes	0.027	114	1	350	1.0E-06	25,550	4.2E-08	NA	NA	0%

Excess Lifetime Cancer Risk = 6.0E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**SFS** Age-Adjusted Dermal Factor (mg-year/kg-event)	**AE_d** Dermal Absorption Efficiency (2) (unitless)	**EF** Exposure Frequency (days/year)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency (3) (unitless)	**$SF_{dermal-adj}$** **Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037			**chemical is considered mutagenic, see Table xx for risk calculation**							5.9E-10	0%
Benzene	0.0010	360	0.0005	350	1	1.0E-06	25,550	2.5E-12	8.0E-01	6.9E-02	1.7E-13	0%
cis-1,2-Dichloroethene	23	360	0.0005	350	1	1.0E-06	25,550	5.7E-08	8.0E-01	NA	NA	0%
Tetrachloroethene	3.7	360	0.03	350	1	1.0E-06	25,550	5.5E-07	8.0E-01	6.8E-01	3.7E-07	**13%**
Toluene	0.091	360	0.03	350	1	1.0E-06	25,550	1.3E-08	8.0E-01	NA	NA	0%
Trichloroethene	3.2	360	0.03	350	1	1.0E-06	25,550	4.7E-07	8.0E-01	5.0E-01	2.4E-07	9%
Vinyl chloride	0.37			**chemical is considered mutagenic, see Table xx for risk calculation**							2.2E-06	**78%**
Xylenes	0.027	360	0.03	350	1	1.0E-06	25,550	4.0E-09	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 2.8E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RIMW-6

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air-hourly=} * EF * ED * ET_{inh} / BW * AT_c$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air-hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air-hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	0.00037			**chemical is considered mutagenic, see Table xx for risk calculation**								1.9E-09	0%
Benzene	0.0010	NA	2.73E+03	1	350	30	16	70	25,550	3.5E-08	2.70E-02	9.4E-10	0%
cis-1,2-Dichloroethene	23	NA	2.90E+03	1	350	30	16	70	25,550	7.4E-04	NA	NA	0%
Tetrachloroethene	3.7	NA	2.55E+03	1	350	30	16	70	25,550	1.4E-04	2.10E-02	2.9E-06	4%
Toluene	0.091	NA	3.98E+03	1	350	30	16	70	25,550	2.1E-06	NA	NA	0%
Trichloroethene	3.2	NA	3.26E+03	1	350	30	16	70	25,550	9.2E-05	3.85E-01	3.5E-05	**46%**
Vinyl chloride	0.37			**chemical is considered mutagenic, see Table xx for risk calculation**								3.9E-05	**51%**
Xylenes	0.027	NA	6.10E+03	1	350	30	16	70	25,550	4.2E-07	NA	NA	0%
											Excess Lifetime Cancer Risk =	**7.8E-05**	

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	0.00	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	3.19E-10	1.33E-10	9.16E-11	4.27E-11	5.86E-10	**Dermal Risk**
1,2-Dichloroethane	0.00	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	1.68E-10	5.53E-11	3.19E-11	1.02E-11	2.65E-10	**Ingestion risk**
1,2-Dichloroethane	0.00	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	5.16E-10	2.95E-10	6.81E-10	4.17E-10	1.91E-09	**inhalation risk**

Parameter	CS	0-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	Child CSF	Adult CSF	ED			EP	Risk			Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	$(mg/kg*day)^{-1}$	0-6	6-15	15-30		0-6	6-15	15-30		
Vinyl chloride	0.37	1.28E-05	2.46E-06	1.41E-06	1.5E+00	7.20E-01	6	9	15	70	6.08E-07	1.75E-07	8.05E-08	8.64E-07	**ingestion**
Vinyl chloride	0.37	2.76E-05	7.06E-06	5.92E-06	1.5E+00	7.20E-01	6	9	15	70	1.31E-06	5.04E-07	3.38E-07	2.15E-06	**dermal**
Vinyl chloride	0.37	2.49E-04	2.05E-04	2.26E-04	1.5E+00	7.20E-01	6	9	15	70	1.19E-05	1.46E-05	1.29E-05	3.93E-05	**dermal**

Appendix H-5.23
Subsurface Soil
Hot Spot RISB-12
Future Excavation Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-12	Arsenic	1.E-07	7.E-09	4.E-11			1.E-07	2.E-02	1.E-03	NA			2.E-02
			Iron	NA	NA	NA			0.E+00	2.E-01	2.E-02	NA			2.E-01
			Manganese	NA	NA	NA			0.E+00	2.E-02	2.E-03	7.E-03			3.E-02
			Thallium	NA	NA	NA			0.E+00	2.E+00	2.E-01	NA			3.E+00
			Vanadium	NA	NA	NA			0.E+00	1.E-01	1.E-02	NA			1.E-01
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene	1.E-08	2.E-11	6.E-08			8.E-08	5.E-03	6.E-06	2.E-02			2.E-02
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	1.E-05	2.E-08	2.E-04			2.E-04
			Tetrachloroethene	7.E-09	6.E-10	3.E-09			1.E-08	1.E-05	7.E-07	9.E-04			9.E-04
			Toluene	NA	NA	NA			0.E+00	3.E-03	2.E-04	3.E-02			3.E-02
			Trichloroethene	4.E-09	3.E-10	3.E-08			4.E-08	3.E-03	2.E-04	6.E-04			3.E-03
			Vinyl chloride						0.E+00						0.E+00
			Xylenes	NA	NA	NA			0.E+00	1.E-02	8.E-04	3.E-01			3.E-01
			Chemical Total	1.E-07	7.E-09	1.E-07	0.E+00	0.E+00	2.E-07	3.E+00	3.E-01	3.E-01	0.E+00	0.E+00	3.E+00
		Exposure Point Total							2.E-07						3.E+00
	Exposure Medium Total								2.E-07						3.E+00
Soil Total									2.E-07						3.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane				NA		0.E+00				9.E-05		9.E-05
			1,1,2-Trichloroethane				2.E-11		2.E-11				6.E-06		6.E-06
			1,1-Dichloroethane				NA		0.E+00				1.E-06		1.E-06
			1,1-Dichloroethene				NA		0.E+00				7.E-04		7.E-04
			1,2-Dichlorobenzene				NA		0.E+00				8.E-06		8.E-06
			1,2-Dichloroethane				NA		0.E+00				2.E-05		2.E-05
			1,4-Dichlorobenzene				7.E-11		7.E-11				3.E-07		3.E-07
			2-Chlorophenol				NA		0.E+00				NA		0.E+00
			4-Methyl-2-pentanone				NA		0.E+00				3.E-07		3.E-07
			Benzene				5.E-10		5.E-10				2.E-04		2.E-04
			Bis(2-ethylhexyl)phthalate				NA		0.E+00				NA		0.E+00
			Chlorobenzene				NA		0.E+00				9.E-05		9.E-05
			Chloroethane				NA		0.E+00				5.E-06		5.E-06
			Chloroform				5.E-10		5.E-10				3.E-05		3.E-05
			cis-1,2-Dichloroethene				NA		0.E+00				2.E-04		2.E-04
			Ethylbenzene				NA		0.E+00				1.E-04		1.E-04
			Iron				NA		0.E+00				NA		0.E+00
			Isopropylbenzene				NA		0.E+00				3.E-02		3.E-02
			Manganese				NA		0.E+00				NA		0.E+00
			Methyl tert butyl ether				NA		0.E+00				NA		0.E+00
			Methylcyclohexane				NA		0.E+00				NA		0.E+00
			Methylene chloride				NA		0.E+00				3.E-06		3.E-06
			Naphthalene				NA		0.E+00				8.E-06		8.E-06
			Tetrachloroethene				1.E-08		1.E-08				4.E-03		4.E-03
			Toluene				NA		0.E+00				6.E-05		6.E-05
			Trichloroethene				1.E-07		1.E-07				2.E-03		2.E-03
			Vinyl chloride				NA		0.E+00				4.E-04		4.E-04
			Xylenes (Total)				NA		0.E+00				4.E-03		4.E-03
			Chemical Total	0.E+00	0.E+00	0.E+00	1.E-07	0.E+00	1.E-07	0.E+00	0.E+00	0.E+00	4.E-02	0.E+00	4.E-02
		Exposure Point Total							1.E-07						4.E-02
	Exposure Medium Total								1.E-07						4.E-02
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									1.E-07						4.E-02

Total Risk Across All Media = 3.E-07

Total Hazard Across All Media = 3

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Subchronic Oral RfD [2]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.5	330	1	250	1	1.0E-06	70	365	4.8E-06	3.0E-04	1.6E-02	1%
Iron	49000	330	1	250	1	1.0E-06	70	365	1.6E-01	7.0E-01	2.3E-01	8%
Manganese	920	330	1	250	1	1.0E-06	70	365	3.0E-03	1.4E-01	2.1E-02	1%
Thallium	52	330	1	250	1	1.0E-06	70	365	1.7E-04	7.0E-05	2.4E+00	**86%**
Vanadium	210	330	1	250	1	1.0E-06	70	365	6.8E-04	7.0E-03	9.7E-02	**3%**
Benzene	5.6	330	1	250	1	1.0E-06	70	365	1.8E-05	4.0E-03	4.5E-03	0%
cis-1,2-Dichloroethene	0.39	330	1	250	1	1.0E-06	70	365	1.3E-06	1.0E-01	1.3E-05	0%
Tetrachloroethene	0.30	330	1	250	1	1.0E-06	70	365	9.7E-07	1.0E-01	9.7E-06	0%
Toluene	1900	330	1	250	1	1.0E-06	70	365	6.1E-03	2.0E+00	3.1E-03	0%
Trichloroethene	0.24	330	1	250	1	1.0E-06	70	365	7.7E-07	3.0E-04	2.6E-03	0%
Xylenes (total)	650	330	1	250	1	1.0E-06	70	365	2.1E-03	2.0E-01	1.0E-02	0%

Hazard Index = 2.8E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Subchronic Dermal Adj. RfD [4]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.5	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	2.9E-07	9.5E-01	2.9E-04	1.0E-03	0%
Iron	49000	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	3.2E-03	2.0E-01	1.4E-01	2.3E-02	8%
Manganese	920	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	5.9E-05	2.0E-01	2.8E-02	2.1E-03	1%
Thallium	52	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	3.4E-06	2.0E-01	1.4E-05	2.4E-01	**87%**
Vanadium	210	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	1.4E-05	2.0E-01	1.4E-03	9.7E-03	4%
Benzene	5.6	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	1.8E-08	8.0E-01	3.2E-03	5.7E-06	0%
cis-1,2-Dichloroethene	0.39	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	1.3E-09	8.0E-01	8.0E-02	1.6E-08	0%
Tetrachloroethene	0.30	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	5.8E-08	8.0E-01	8.0E-02	7.3E-07	0%
Toluene	1900	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	3.7E-04	8.0E-01	1.6E+00	2.3E-04	0%
Trichloroethene	0.24	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	4.6E-08	8.0E-01	2.4E-04	1.9E-04	0%
Xylenes (total)	650	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	1.3E-04	8.0E-01	1.6E-01	7.9E-04	0%

Hazard Index = 2.8E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
(4): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i** **Subchronic Inhalation RfD (4)** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.5	6.80E+08	NA	1	250	1	8	70	365	1.7E-10	NA	NA	0%
Iron	49000	6.80E+08	NA	1	250	1	8	70	365	5.6E-06	NA	NA	0%
Manganese	920	6.80E+08	NA	1	250	1	8	70	365	1.1E-07	1.43E-05	7.4E-03	2%
Thallium	52	6.80E+08	NA	1	250	1	8	70	365	6.0E-09	NA	NA	0%
Vanadium	210	6.80E+08	NA	1	250	1	8	70	365	2.4E-08	NA	NA	0%
Benzene	5.6	NA	2.73E+03	1	250	1	8	70	365	1.6E-04	8.57E-03	1.9E-02	5%
cis-1,2-Dichloroethene	0.39	NA	2.90E+03	1	250	1	8	70	365	1.1E-05	5.71E-02	1.8E-04	0%
Tetrachloroethene	0.30	NA	2.55E+03	1	250	1	8	70	365	9.2E-06	1.00E-02	9.2E-04	0%
Toluene	1900	NA	3.98E+03	1	250	1	8	70	365	3.7E-02	1.43E+00	2.6E-02	8%
Trichloroethene	0.24	NA	3.26E+03	1	250	1	8	70	365	5.8E-06	1.0E-02	5.8E-04	0%
Xylenes (total)	650	NA	6.10E+03	1	250	1	8	70	365	8.3E-03	2.9E-02	2.9E-01	**84%**

Hazard Index = 3.5E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable
(4): A subchronic RfD was only available for 1,4-dichlorobenzene, therefore, chronic values were implemented or the remainder of the chemicals.

Future Excavation Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.5	330	1	250	1	1.0E-06	70	25,550	6.9E-08	1.5E+00	1.0E-07	**80%**
Iron	49000	330	1	250	1	1.0E-06	70	25,550	2.3E-03	NA	NA	0%
Manganese	920	330	1	250	1	1.0E-06	70	25,550	4.2E-05	NA	NA	0%
Thallium	52	330	1	250	1	1.0E-06	70	25,550	2.4E-06	NA	NA	0%
Vanadium	210	330	1	250	1	1.0E-06	70	25,550	9.7E-06	NA	NA	0%
Benzene	5.6	330	1	250	1	1.0E-06	70	25,550	2.6E-07	5.5E-02	1.4E-08	**11%**
cis-1,2-Dichloroethene	0.39	330	1	250	1	1.0E-06	70	25,550	1.8E-08	NA	NA	0%
Tetrachloroethene	0.30	330	1	250	1	1.0E-06	70	25,550	1.4E-08	5.4E-01	7.5E-09	6%
Toluene	1900	330	1	250	1	1.0E-06	70	25,550	8.8E-05	NA	NA	0%
Trichloroethene	0.24	330	1	250	1	1.0E-06	70	25,550	1.1E-08	4.0E-01	4.4E-09	3%
Xylenes (total)	650	330	1	250	1	1.0E-06	70	25,550	3.0E-05	NA	NA	0%

Excess Lifetime Cancer Risk = 1.3E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:
C_s = representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA = skin surface area in contact with soil on days exposed (cm^2)
AF = mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d = absorption efficiency (unitless)
EF = exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED = exposure duration: the typical duration of each exposure event (years)
EV = event frequency (events/day)
BW = body weight (kg)
AT_c = averaging time (days)
C_1 = conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.5	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	4.2E-09	9.5E-01	1.6E+00	6.6E-09	**88%**
Iron	49000	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	4.5E-05	2.0E-01	NA	NA	0%
Manganese	920	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	8.5E-07	2.0E-01	NA	NA	0%
Thallium	52	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	4.8E-08	2.0E-01	NA	NA	0%
Vanadium	210	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	1.9E-07	2.0E-01	NA	NA	0%
Benzene	5.6	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	2.6E-10	8.0E-01	6.9E-02	1.8E-11	0%
cis-1,2-Dichloroethene	0.39	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	1.8E-11	8.0E-01	NA	NA	0%
Tetrachloroethene	0.30	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	8.3E-10	8.0E-01	6.8E-01	5.6E-10	8%
Toluene	1900	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	5.3E-06	8.0E-01	NA	NA	0%
Trichloroethene	0.24	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	6.6E-10	8.0E-01	5.0E-01	3.3E-10	4%
Xylenes (total)	650	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.8E-06	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 7.5E-09

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.5	6.80E+08	NA	1	250	1	8	70	25,550	2.5E-12	1.51E+01	3.7E-11	0%
Iron	49000	6.80E+08	NA	1	250	1	8	70	25,550	8.1E-08	NA	NA	0%
Manganese	920	6.80E+08	NA	1	250	1	8	70	25,550	1.5E-09	NA	NA	0%
Thallium	52	6.80E+08	NA	1	250	1	8	70	25,550	8.6E-11	NA	NA	0%
Vanadium	210	6.80E+08	NA	1	250	1	8	70	25,550	3.5E-10	NA	NA	0%
Benzene	5.6	NA	2.73E+03	1	250	1	8	70	25,550	2.3E-06	2.70E-02	6.2E-08	**64%**
cis-1,2-Dichloroethene	0.39	NA	2.90E+03	1	250	1	8	70	25,550	1.5E-07	NA	NA	0%
Tetrachloroethene	0.30	NA	2.55E+03	1	250	1	8	70	25,550	1.3E-07	2.10E-02	2.8E-09	3%
Toluene	1900	NA	3.98E+03	1	250	1	8	70	25,550	5.3E-04	NA	NA	0%
Trichloroethene	0.24	NA	3.26E+03	1	250	1	8	70	25,550	8.2E-08	3.85E-01	3.2E-08	**33%**
Xylenes (total)	650	NA	6.10E+03	1	250	1	8	70	25,550	1.2E-04	NA	NA	0%

Excess Lifetime Cancer Risk = 9.6E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.24
Subsurface Soil
Hot Spot RISB-12
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-12	Arsenic	4.E-07	2.E-07	9.E-10			6.E-07	2.E-03	1.E-03	NA			3.E-03
			Iron	NA	NA	NA			0.E+00	3.E-02	2.E-02	NA			6.E-02
			Manganese	NA	NA	NA			0.E+00	2.E-02	1.E-02	7.E-03			4.E-02
			Thallium	NA	NA	NA			0.E+00	4.E-01	2.E-01	NA			6.E-01
			Vanadium	NA	NA	NA			0.E+00	1.E-01	7.E-02	NA			2.E-01
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene	5.E-08	4.E-10	2.E-06			2.E-06	7.E-04	6.E-06	2.E-02			2.E-02
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	2.E-05	2.E-07	2.E-04			2.E-04
			Tetrachloroethene	3.E-08	1.E-08	7.E-08			1.E-07	1.E-05	7.E-06	9.E-04			9.E-04
			Toluene	NA	NA	NA			0.E+00	1.E-02	6.E-03	3.E-02			4.E-02
			Trichloroethene	2.E-08	8.E-09	8.E-07			8.E-07	4.E-04	2.E-04	6.E-04			1.E-03
			Vinyl chloride						0.E+00						0.E+00
			Xylenes	NA	NA	NA			0.E+00	2.E-03	8.E-04	3.E-01			3.E-01
			Chemical Total	5.E-07	2.E-07	2.E-06	0.E+00	0.E+00	3.E-06	5.E-01	4.E-01	3.E-01	0.E+00	0.E+00	1.E+00
		Exposure Point Total							3.E-06						1.E+00
	Exposure Medium Total								3.E-06						1.E+00
Soil Total									3.E-06						1.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 9.E-03

Total Hazard Across All Media = 63

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.5	50	1	250	25	1.0E-06	70	9125	7.3E-07	3.0E-04	2.4E-03	0%
Iron	49000	50	1	250	25	1.0E-06	70	9125	2.4E-02	7.0E-01	3.4E-02	6%
Manganese	920	50	1	250	25	1.0E-06	70	9125	4.5E-04	2.0E-02	2.3E-02	4%
Thallium	52	50	1	250	25	1.0E-06	70	9125	2.5E-05	7.0E-05	3.6E-01	**67%**
Vanadium	210	50	1	250	25	1.0E-06	70	9125	1.0E-04	1.0E-03	1.0E-01	**19%**
Benzene	5.6	50	1	250	25	1.0E-06	70	9125	2.7E-06	4.0E-03	6.8E-04	0%
cis-1,2-Dichloroethene	0.39	50	1	250	25	1.0E-06	70	9125	1.9E-07	1.0E-02	1.9E-05	0%
Tetrachloroethene	0.30	50	1	250	25	1.0E-06	70	9125	1.5E-07	1.0E-02	1.5E-05	0%
Toluene	1900	50	1	250	25	1.0E-06	70	9125	9.3E-04	8.0E-02	1.2E-02	2%
Trichloroethene	0.24	50	1	250	25	1.0E-06	70	9125	1.2E-07	3.0E-04	3.9E-04	0%
Xylenes (total)	650	50	1	250	25	1.0E-06	70	9125	3.2E-04	2.0E-01	1.6E-03	0%

Hazard Index = 5.4E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.5	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	2.9E-07	9.5E-01	2.9E-04	1.0E-03	0%
Iron	49000	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	3.2E-03	2.0E-01	1.4E-01	2.3E-02	6%
Manganese	920	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	5.9E-05	2.0E-01	4.0E-03	1.5E-02	4%
Thallium	52	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	3.4E-06	2.0E-01	1.4E-05	2.4E-01	**68%**
Vanadium	210	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	1.4E-05	2.0E-01	2.0E-04	6.8E-02	**19%**
Benzene	5.6	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	1.8E-08	8.0E-01	3.2E-03	5.7E-06	0%
cis-1,2-Dichloroethene	0.39	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	1.3E-09	8.0E-01	8.0E-03	1.6E-07	0%
Tetrachloroethene	0.30	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	5.8E-08	8.0E-01	8.0E-03	7.3E-06	0%
Toluene	1900	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	3.7E-04	8.0E-01	6.4E-02	5.8E-03	2%
Trichloroethene	0.24	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	4.6E-08	8.0E-01	2.4E-04	1.9E-04	0%
Xylenes (total)	650	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	1.3E-04	8.0E-01	1.6E-01	7.9E-04	0%

Hazard Index = 3.5E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	C_s Conc. in Soil [(1)] (mg/kg)	PEF Particulate Emission Factor[(2)] (m^3/kg)	VF Volatilization Factor[(3)] (m^3/kg)	$IR_{air\text{-}hourly}$ Hourly Inhalation Rate (m^3/hr)	EF Exposure Frequency (day/year)	ED Duration of Exposure (years)	ET_{inh} Exposure Time (hr/day)	BW Body Weight (kg)	AT_n Averaging Time Noncancer (days)	ADD_{inhal} Average Daily Dose (mg/kg-day)	RfD_i Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient	Percent Distribution of Risk (%)
Arsenic	1.5	6.80E+08	NA	1	250	25	8	70	9125	1.7E-10	NA	NA	0%
Iron	49000	6.80E+08	NA	1	250	25	8	70	9125	5.6E-06	NA	NA	0%
Manganese	920	6.80E+08	NA	1	250	25	8	70	9125	1.1E-07	1.43E-05	7.4E-03	2%
Thallium	52	6.80E+08	NA	1	250	25	8	70	9125	6.0E-09	NA	NA	0%
Vanadium	210	6.80E+08	NA	1	250	25	8	70	9125	2.4E-08	NA	NA	0%
Benzene	5.6	NA	2.73E+03	1	250	25	8	70	9125	1.6E-04	8.57E-03	1.9E-02	5%
cis-1,2-Dichloroethene	0.39	NA	2.90E+03	1	250	25	8	70	9125	1.1E-05	5.71E-02	1.8E-04	0%
Tetrachloroethene	0.30	NA	2.55E+03	1	250	25	8	70	9125	9.2E-06	1.00E-02	9.2E-04	0%
Toluene	1900	NA	3.98E+03	1	250	25	8	70	9125	3.7E-02	1.43E+00	2.6E-02	8%
Trichloroethene	0.24	NA	3.26E+03	1	250	25	8	70	9125	5.8E-06	1.0E-02	5.8E-04	0%
Xylenes (total)	650	NA	6.10E+03	1	250	25	8	70	9125	8.3E-03	2.9E-02	2.9E-01	**84%**

Hazard Index = 3.5E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.5	50	1	250	25	1.0E-06	70	25,550	2.6E-07	1.5E+00	3.9E-07	**80%**
Iron	49000	50	1	250	25	1.0E-06	70	25,550	8.6E-03	NA	NA	0%
Manganese	920	50	1	250	25	1.0E-06	70	25,550	1.6E-04	NA	NA	0%
Thallium	52	50	1	250	25	1.0E-06	70	25,550	9.1E-06	NA	NA	0%
Vanadium	210	50	1	250	25	1.0E-06	70	25,550	3.7E-05	NA	NA	0%
Benzene	5.6	50	1	250	25	1.0E-06	70	25,550	9.8E-07	5.5E-02	5.4E-08	**11%**
cis-1,2-Dichloroethene	0.39	50	1	250	25	1.0E-06	70	25,550	6.8E-08	NA	NA	0%
Tetrachloroethene	0.30	50	1	250	25	1.0E-06	70	25,550	5.2E-08	5.4E-01	2.8E-08	6%
Toluene	1900	50	1	250	25	1.0E-06	70	25,550	3.3E-04	NA	NA	0%
Trichloroethene	0.24	50	1	250	25	1.0E-06	70	25,550	4.2E-08	4.0E-01	1.7E-08	3%
Xylenes (total)	650	50	1	250	25	1.0E-06	70	25,550	1.1E-04	NA	NA	0%

Excess Lifetime Cancer Risk = 4.9E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [1] (mg/kg)	SA Skin Surface Area Exposed (cm^2)	AF Skin-soil Adherence Factor (mg/cm^2-event)	AE_d Dermal Absorption Efficiency [2] (unitless)	EF Exposure Frequency (days/year)	ED Exposure Duration (years)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.5	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.0E-07	9.5E-01	1.6E+00	1.6E-07	**88%**
Iron	49000	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.1E-03	2.0E-01	NA	NA	0%
Manganese	920	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	2.1E-05	2.0E-01	NA	NA	0%
Thallium	52	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.2E-06	2.0E-01	NA	NA	0%
Vanadium	210	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	4.8E-06	2.0E-01	NA	NA	0%
Benzene	5.6	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	6.5E-09	8.0E-01	6.9E-02	4.4E-10	0%
cis-1,2-Dichloroethene	0.39	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	4.5E-10	8.0E-01	NA	NA	0%
Tetrachloroethene	0.30	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.1E-08	8.0E-01	6.8E-01	1.4E-08	8%
Toluene	1900	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.3E-04	8.0E-01	NA	NA	0%
Trichloroethene	0.24	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.7E-08	8.0E-01	5.0E-01	8.3E-09	4%
Xylenes (total)	650	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	4.5E-05	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 1.9E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.5	6.80E+08	NA	1	250	25	8	70	25,550	6.2E-11	1.51E+01	9.3E-10	0%
Iron	49000	6.80E+08	NA	1	250	25	8	70	25,550	2.0E-06	NA	NA	0%
Manganese	920	6.80E+08	NA	1	250	25	8	70	25,550	3.8E-08	NA	NA	0%
Thallium	52	6.80E+08	NA	1	250	25	8	70	25,550	2.1E-09	NA	NA	0%
Vanadium	210	6.80E+08	NA	1	250	25	8	70	25,550	8.6E-09	NA	NA	0%
Benzene	5.6	NA	2.73E+03	1	250	25	8	70	25,550	5.7E-05	2.70E-02	1.5E-06	**64%**
cis-1,2-Dichloroethene	0.39	NA	2.90E+03	1	250	25	8	70	25,550	3.8E-06	NA	NA	0%
Tetrachloroethene	0.30	NA	2.55E+03	1	250	25	8	70	25,550	3.3E-06	2.10E-02	6.9E-08	3%
Toluene	1900	NA	3.98E+03	1	250	25	8	70	25,550	1.3E-02	NA	NA	0%
Trichloroethene	0.24	NA	3.26E+03	1	250	25	8	70	25,550	2.1E-06	3.85E-01	7.9E-07	**33%**
Xylenes (total)	650	NA	6.10E+03	1	250	25	8	70	25,550	3.0E-03	NA	NA	0%

Excess Lifetime Cancer Risk = 2.4E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.25
Subsurface Soil
Hot Spot RISB-12
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-12	Arsenic	4.E-06	4.E-07	3.E-09			4.E-06	6.E-02	6.E-03	NA			7.E-02
			Iron	NA	NA	NA			0.E+00	9.E-01	1.E-01	NA			1.E+00
			Manganese	NA	NA	NA			0.E+00	6.E-01	8.E-02	3.E-02			7.E-01
			Thallium	NA	NA	NA			0.E+00	9.E+00	1.E+00	NA			1.E+01
			Vanadium	NA	NA	NA			0.E+00	3.E+00	4.E-01	NA			3.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene	5.E-07	9.E-10	5.E-06			6.E-06	2.E-02	3.E-05	6.E-02			8.E-02
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	5.E-04	9.E-07	NA			5.E-04
			Tetrachloroethene	3.E-07	3.E-08	2.E-07			5.E-07	4.E-04	4.E-05	3.E-03			4.E-03
			Toluene	NA	NA	NA			0.E+00	3.E-01	3.E-02	9.E-02			4.E-01
			Trichloroethene	1.E-07	2.E-08	3.E-06			3.E-06	1.E-02	1.E-03	2.E-03			1.E-02
			Vinyl chloride						0.E+00						0.E+00
			Xylenes	NA	NA	NA			0.E+00	4.E-02	4.E-03	1.E+00			1.E+00
			Chemical Total	4.E-06	4.E-07	8.E-06	0.E+00	0.E+00	1.E-05	1.E+01	2.E+00	1.E+00	0.E+00	0.E+00	2.E+01
		Exposure Point Total							1.E-05						2.E+01
	Exposure Medium Total								1.E-05						2.E+01
Soil Total									1.E-05						2.E+01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate					0.E+00	0.E+00					0.E+00	0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron					0.E+00	0.E+00					0.E+00	0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese					0.E+00	0.E+00					0.E+00	0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 3.E-02

Total Hazard Across All Media = 412

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.5	200	1	350	6	1.0E-06	15	2190	1.9E-05	3.0E-04	6.4E-02	0%
Iron	49000	200	1	350	6	1.0E-06	15	2190	6.3E-01	7.0E-01	8.9E-01	6%
Manganese	920	200	1	350	6	1.0E-06	15	2190	1.2E-02	2.0E-02	5.9E-01	4%
Thallium	52	200	1	350	6	1.0E-06	15	2190	6.6E-04	7.0E-05	9.5E+00	**67%**
Vanadium	210	200	1	350	6	1.0E-06	15	2190	2.7E-03	1.0E-03	2.7E+00	**19%**
Benzene	5.6	200	1	350	6	1.0E-06	15	2190	7.2E-05	4.0E-03	1.8E-02	0%
cis-1,2-Dichloroethene	0.39	200	1	350	6	1.0E-06	15	2190	5.0E-06	1.0E-02	5.0E-04	0%
Tetrachloroethene	0.30	200	1	350	6	1.0E-06	15	2190	3.8E-06	1.0E-02	3.8E-04	0%
Toluene	1,900	200	1	350	6	1.0E-06	15	2190	2.4E-02	8.0E-02	3.0E-01	2%
Trichloroethene	0.24	200	1	350	6	1.0E-06	15	2190	3.1E-06	3.0E-04	1.0E-02	0%
Xylenes	650	200	1	350	6	1.0E-06	15	2190	8.3E-03	2.0E-01	4.2E-02	0%

Hazard Index = 1.4E+01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (years)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.5	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.6E-06	9.5E-01	2.9E-04	5.7E-03	0%
Iron	49000	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.8E-02	2.0E-01	1.4E-01	1.3E-01	6%
Manganese	920	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	3.3E-04	2.0E-01	4.0E-03	8.2E-02	4%
Thallium	52	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.9E-05	2.0E-01	1.4E-05	1.3E+00	**68%**
Vanadium	210	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	7.5E-05	2.0E-01	2.0E-04	3.8E-01	**19%**
Benzene	5.6	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	1.0E-07	8.0E-01	3.2E-03	3.1E-05	0%
cis-1,2-Dichloroethene	0.39	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	7.0E-09	8.0E-01	8.0E-03	8.7E-07	0%
Tetrachloroethene	0.30	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.2E-07	8.0E-01	8.0E-03	4.0E-05	0%
Toluene	1,900	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	2.0E-03	8.0E-01	6.4E-02	3.2E-02	2%
Trichloroethene	0.24	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	2.6E-07	8.0E-01	2.4E-04	1.1E-03	0%
Xylenes	650	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	7.0E-04	8.0E-01	1.6E-01	4.4E-03	0%

Hazard Index = 2.0E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air-hourly} * EF * ED * ET_{inh} / BW * AT_n$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air-hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air-hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	1.5	6.80E+08	NA	0.26	350	6	16	15	2190	5.9E-10	NA	NA	0%
Iron	49000	6.80E+08	NA	0.26	350	6	16	15	2190	1.9E-05	NA	NA	0%
Manganese	920	6.80E+08	NA	0.26	350	6	16	15	2190	3.6E-07	1.43E-05	2.5E-02	2%
Thallium	52	6.80E+08	NA	0.26	350	6	16	15	2190	2.0E-08	NA	NA	0%
Vanadium	210	6.80E+08	NA	0.26	350	6	16	15	2190	8.2E-08	NA	NA	0%
Benzene	5.6	NA	2.73E+03	0.26	350	6	16	15	2190	5.4E-04	8.57E-03	6.4E-02	5%
cis-1,2-Dichloroethene	0.39	NA	2.90E+03	0.26	350	6	16	15	2190	3.6E-05	5.71E-02	NA	0%
Tetrachloroethene	0.30	NA	2.55E+03	0.26	350	6	16	15	2190	3.1E-05	1.00E-02	3.1E-03	0%
Toluene	1,900	NA	3.98E+03	0.26	350	6	16	15	2190	1.3E-01	1.43E+00	8.9E-02	8%
Trichloroethene	0.24	NA	3.26E+03	0.26	350	6	16	15	2190	2.0E-05	1.0E-02	2.0E-03	0%
Xylenes	650	NA	6.10E+03	0.26	350	6	16	15	2190	2.8E-02	2.9E-02	9.9E-01	**84%**

Hazard Index = 1.2E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IF_{soil}** Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.5	114	1	350	1.0E-06	25,550	2.3E-06	1.5E+00	3.5E-06	**80%**
Iron	49000	114	1	350	1.0E-06	25,550	7.7E-02	NA	NA	0%
Manganese	920	114	1	350	1.0E-06	25,550	1.4E-03	NA	NA	0%
Thallium	52	114	1	350	1.0E-06	25,550	8.1E-05	NA	NA	0%
Vanadium	210	114	1	350	1.0E-06	25,550	3.3E-04	NA	NA	0%
Benzene	5.6	114	1	350	1.0E-06	25,550	8.7E-06	5.5E-02	4.8E-07	**11%**
cis-1,2-Dichloroethene	0.39	114	1	350	1.0E-06	25,550	6.1E-07	NA	NA	0%
Tetrachloroethene	0.30	114	1	350	1.0E-06	25,550	4.7E-07	5.4E-01	2.5E-07	6%
Toluene	1,900	114	1	350	1.0E-06	25,550	3.0E-03	NA	NA	0%
Trichloroethene	0.24	114	1	350	1.0E-06	25,550	3.7E-07	4.0E-01	1.5E-07	3%
Xylenes	650	114	1	350	1.0E-06	25,550	1.0E-03	NA	NA	0%

Excess Lifetime Cancer Risk = 4.4E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$

where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [(1)] (mg/kg)	SFS Age-Adjusted Dermal Factor (mg-year/kg-event)	AE_d Dermal Absorption Efficiency [(2)] (unitless)	EF Exposure Frequency (days/year)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency [(3)] (unitless)	$SF_{dermal\text{-}adj}$ **Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.5	360	0.03	350	1	1.0E-06	25,550	2.2E-07	9.5E-01	1.6E+00	3.5E-07	**88%**
Iron	49000	360	0.01	350	1	1.0E-06	25,550	2.4E-03	2.0E-01	NA	NA	0%
Manganese	920	360	0.01	350	1	1.0E-06	25,550	4.5E-05	2.0E-01	NA	NA	0%
Thallium	52	360	0.01	350	1	1.0E-06	25,550	2.6E-06	2.0E-01	NA	NA	0%
Vanadium	210	360	0.01	350	1	1.0E-06	25,550	1.0E-05	8.0E-01	NA	NA	0%
Benzene	5.6	360	0.0005	350	1	1.0E-06	25,550	1.4E-08	8.0E-01	6.9E-02	9.5E-10	0%
cis-1,2-Dichloroethene	0.39	360	0.0005	350	1	1.0E-06	25,550	9.6E-10	8.0E-01	NA	NA	0%
Tetrachloroethene	0.30	360	0.03	350	1	1.0E-06	25,550	4.4E-08	8.0E-01	6.8E-01	3.0E-08	8%
Toluene	1,900	360	0.03	350	1	1.0E-06	25,550	2.8E-04	8.0E-01	NA	NA	0%
Trichloroethene	0.24	360	0.03	350	1	1.0E-06	25,550	3.6E-08	8.0E-01	5.0E-01	1.8E-08	4%
Xylenes	650	360	0.03	350	1	1.0E-06	25,550	9.6E-05	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 4.0E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-12

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$

where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	1.5	6.80E+08	NA	1	350	30	16	70	25,550	2.1E-10	1.51E+01	3.1E-09	0%
Iron	49000	6.80E+08	NA	1	350	30	16	70	25,550	6.8E-06	NA	NA	0%
Manganese	920	6.80E+08	NA	1	350	30	16	70	25,550	1.3E-07	NA	NA	0%
Thallium	52	6.80E+08	NA	1	350	30	16	70	25,550	7.2E-09	NA	NA	0%
Vanadium	210	6.80E+08	NA	1	350	30	16	70	25,550	2.9E-08	NA	NA	0%
Benzene	5.6	NA	2.73E+03	1	350	30	16	70	25,550	1.9E-04	2.70E-02	5.2E-06	**64%**
cis-1,2-Dichloroethene	0.39	NA	2.90E+03	1	350	30	16	70	25,550	1.3E-05	NA	NA	0%
Tetrachloroethene	0.30	NA	2.55E+03	1	350	30	16	70	25,550	1.1E-05	2.10E-02	2.3E-07	3%
Toluene	1,900	NA	3.98E+03	1	350	30	16	70	25,550	4.5E-02	NA	NA	0%
Trichloroethene	0.24	NA	3.26E+03	1	350	30	16	70	25,550	6.9E-06	3.85E-01	2.7E-06	**33%**
Xylenes	650	NA	6.10E+03	1	350	30	16	70	25,550	1.0E-02	NA	NA	0%

Excess Lifetime Cancer Risk = 8.1E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	######	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Dermal Risk**
1,2-Dichloroethane	######	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Ingestion risk**
1,2-Dichloroethane	######	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**inhalation risk**

Parameter	CS	0-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	Child CSF	Adult CSF	ED			EP	Risk			Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	$(mg/kg*day)^{-1}$	0-6	6-15	15-30		0-6	6-15	15-30		
Vinyl chloride	0.00	1.28E-05	2.46E-06	1.41E-06	1.5E+00	7.20E-01	6	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**ingestion**
Vinyl chloride	0.00	2.76E-05	7.06E-06	5.92E-06	1.5E+00	7.20E-01	6	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**dermal**
Vinyl chloride	0.00	2.49E-04	2.05E-04	2.26E-04	1.5E+00	7.20E-01	6	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**dermal**

4	8			
4	8			
4.5	9			
4.5	9			
5.5	11			
5.5	11			
7	13			
7	13			
8	16			
8	16			
		8.6	0.52	6-15
			0.15	0-2
			0.26	2-6

Appendix H-5.26
Subsurface Soil
Hot Spot RISB-18
Future Excavation Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-18	Arsenic	6.E-08	4.E-09	2.E-11			7.E-08	1.E-02	6.E-04	NA			1.E-02
			Iron	NA	NA	NA			0.E+00	1.E-01	1.E-02	NA			1.E-01
			Manganese	NA	NA	NA			0.E+00	2.E-02	2.E-03	7.E-03			3.E-02
			Thallium	NA	NA	NA			0.E+00	1.E+00	1.E-01	NA			1.E+00
			Vanadium	NA	NA	NA			0.E+00	2.E-02	2.E-03	NA			2.E-02
			1,2-Dichloroethane	2.E-08	NA	1.E-07			1.E-07	NA	NA	1.E-04			1.E-04
			1,4-Dichlorobenzene	4.E-09	3.E-10	8.E-09			1.E-08	1.E-05	1.E-06	3.E-05			5.E-05
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	1.E-05	2.E-08	2.E-04			2.E-04
			Tetrachloroethene	8.E-10	6.E-11	3.E-10			1.E-09	1.0E-06	8.E-08	1.E-04			1.E-04
			Toluene						0.E+00						0.E+00
			Trichloroethene	8.E-09	6.E-10	6.E-08			7.E-08	5.E-03	4.E-04	1.E-03			6.E-03
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	1.E-07	5.E-09	2.E-07	0.E+00	0.E+00	3.E-07	1.E+00	1.E-01	8.E-03	0.E+00	0.E+00	1.E+00
		Exposure Point Total							3.E-07						1.E+00
	Exposure Medium Total								3.E-07						1.E+00
Soil Total									3.E-07						1.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane				NA		0.E+00				9.E-05		9.E-05
			1,1,2-Trichloroethane				2.E-11		2.E-11				6.E-06		6.E-06
			1,1-Dichloroethane				NA		0.E+00				1.E-06		1.E-06
			1,1-Dichloroethene				NA		0.E+00				7.E-04		7.E-04
			1,2-Dichlorobenzene				NA		0.E+00				8.E-06		8.E-06
			1,2-Dichloroethane				NA		0.E+00				2.E-05		2.E-05
			1,4-Dichlorobenzene				7.E-11		7.E-11				3.E-07		3.E-07
			2-Chlorophenol				NA		0.E+00				NA		0.E+00
			4-Methyl-2-pentanone				NA		0.E+00				3.E-07		3.E-07
			Benzene				5.E-10		5.E-10				2.E-04		2.E-04
			Bis(2-ethylhexyl)phthalate				NA		0.E+00				NA		0.E+00
			Chlorobenzene				NA		0.E+00				9.E-05		9.E-05
			Chloroethane				NA		0.E+00				5.E-06		5.E-06
			Chloroform				5.E-10		5.E-10				3.E-05		3.E-05
			cis-1,2-Dichloroethene				NA		0.E+00				2.E-04		2.E-04
			Ethylbenzene				NA		0.E+00				1.E-04		1.E-04
			Iron				NA		0.E+00				NA		0.E+00
			Isopropylbenzene				NA		0.E+00				3.E-02		3.E-02
			Manganese				NA		0.E+00				NA		0.E+00
			Methyl tert butyl ether				NA		0.E+00				NA		0.E+00
			Methylcyclohexane				NA		0.E+00				NA		0.E+00
			Methylene chloride				NA		0.E+00				3.E-06		3.E-06
			Naphthalene				NA		0.E+00				8.E-06		8.E-06
			Tetrachloroethene				1.E-08		1.E-08				4.E-03		4.E-03
			Toluene				NA		0.E+00				6.E-05		6.E-05
			Trichloroethene				1.E-07		1.E-07				2.E-03		2.E-03
			Vinyl chloride				NA		0.E+00				4.E-04		4.E-04
			Xylenes (Total)				NA		0.E+00				4.E-03		4.E-03
			Chemical Total	0.E+00	0.E+00	0.E+00	1.E-07	0.E+00	1.E-07	0.E+00	0.E+00	0.E+00	4.E-02	0.E+00	4.E-02
		Exposure Point Total							1.E-07						4.E-02
	Exposure Medium Total								1.E-07						4.E-02
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									1.E-07						4.E-02

Total Risk Across All Media = 4.E-07

Total Hazard Across All Media = 1

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Subchronic Oral RfD** [(2)] (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	0.92	330	1	250	1	1.0E-06	70	365	3.0E-06	3.0E-04	9.9E-03	1%
Iron	21000	330	1	250	1	1.0E-06	70	365	6.8E-02	7.0E-01	9.7E-02	8%
Manganese	830	330	1	250	1	1.0E-06	70	365	2.7E-03	1.4E-01	1.9E-02	2%
Thallium	22	330	1	250	1	1.0E-06	70	365	7.1E-05	7.0E-05	1.0E+00	**87%**
Vanadium	42	330	1	250	1	1.0E-06	70	365	1.4E-04	7.0E-03	1.9E-02	2%
1,2-Dichloroethane	4.8	330	1	250	1	1.0E-06	70	365	1.5E-05	NA	NA	0%
1,4-Dichlorobenzene	4.0	330	1	250	1	1.0E-06	70	365	1.3E-05	9.0E-01	1.4E-05	0%
cis-1,2-Dichloroethene	0.46	330	1	250	1	1.0E-06	70	365	1.5E-06	1.0E-01	1.5E-05	0%
Tetrachloroethene	0.031	330	1	250	1	1.0E-06	70	365	1.0E-07	1.0E-01	1.0E-06	0%
Trichloroethene	0.45	330	1	250	1	1.0E-06	70	365	1.5E-06	3.0E-04	4.9E-03	0%

Hazard Index = 1.2E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Subchronic Dermal Adj. RfD [4]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	0.92	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	1.8E-07	9.5E-01	2.9E-04	6.3E-04	1%
Iron	21000	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	1.4E-03	2.0E-01	1.4E-01	9.7E-03	8%
Manganese	830	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	5.4E-05	2.0E-01	2.8E-02	1.9E-03	2%
Thallium	22	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	1.4E-06	2.0E-01	1.4E-05	1.0E-01	**87%**
Vanadium	42	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	2.7E-06	2.0E-01	1.4E-03	1.9E-03	2%
1,2-Dichloroethane	4.8	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	9.3E-07	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	4.0	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	7.7E-07	8.0E-01	7.2E-01	1.1E-06	0%
cis-1,2-Dichloroethene	0.46	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	1.5E-09	8.0E-01	8.0E-02	1.9E-08	0%
Tetrachloroethene	0.031	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	6.0E-09	8.0E-01	8.0E-02	7.5E-08	0%
Trichloroethene	0.45	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	8.8E-08	8.0E-01	2.4E-04	3.6E-04	0%

Hazard Index = 1.2E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
(4): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i** **Subchronic Inhalation RfD [(4)]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	0.92	6.80E+08	NA	1	250	1	8	70	365	1.1E-10	NA	NA	0%
Iron	21000	6.80E+08	NA	1	250	1	8	70	365	2.4E-06	NA	NA	0%
Manganese	830	6.80E+08	NA	1	250	1	8	70	365	9.6E-08	1.43E-05	6.7E-03	**81%**
Thallium	22	6.80E+08	NA	1	250	1	8	70	365	2.5E-09	NA	NA	0%
Vanadium	42	6.80E+08	NA	1	250	1	8	70	365	4.8E-09	NA	NA	0%
1,2-Dichloroethane	4.8	NA	3.91E+03	1	250	1	8	70	365	9.6E-05	7.00E-01	1.4E-04	2%
1,4-Dichlorobenzene	4.0	NA	1.29E+04	1	250	1	8	70	365	2.4E-05	7.14E-01	3.4E-05	0%
cis-1,2-Dichloroethene	0.46	NA	2.90E+03	1	250	1	8	70	365	1.2E-05	5.71E-02	2.2E-04	3%
Tetrachloroethene	0.031	NA	2.55E+03	1	250	1	8	70	365	9.5E-07	1.00E-02	9.5E-05	1%
Trichloroethene	0.45	NA	3.26E+03	1	250	1	8	70	365	1.1E-05	1.0E-02	1.1E-03	**13%**

Hazard Index = 8.3E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable
(4): A subchronic RfD was only available for 1,4-dichlorobenzene, therefore, chronic values were implemented or the remainder of the chemicals.

Future Excavation Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [1] (mg/kg)	IR_{soil} Ingestion Rate (mg/day)	AE_i Ingestion Absorption Efficiency (unitless)	EF Exposure Frequency (day/year)	ED Duration of Exposure (years)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	0.92	330	1	250	1	1.0E-06	70	25,550	4.2E-08	1.5E+00	6.4E-08	**65%**
Iron	21000	330	1	250	1	1.0E-06	70	25,550	9.7E-04	NA	NA	0%
Manganese	830	330	1	250	1	1.0E-06	70	25,550	3.8E-05	NA	NA	0%
Thallium	22	330	1	250	1	1.0E-06	70	25,550	1.0E-06	NA	NA	0%
Vanadium	42	330	1	250	1	1.0E-06	70	25,550	1.9E-06	NA	NA	0%
1,2-Dichloroethane	4.8	330	1	250	1	1.0E-06	70	25,550	2.2E-07	9.1E-02	2.0E-08	**21%**
1,4-Dichlorobenzene	4.0	330	1	250	1	1.0E-06	70	25,550	1.8E-07	2.4E-02	4.4E-09	5%
cis-1,2-Dichloroethene	0.46	330	1	250	1	1.0E-06	70	25,550	2.1E-08	NA	NA	0%
Tetrachloroethene	0.031	330	1	250	1	1.0E-06	70	25,550	1.4E-09	5.4E-01	7.7E-10	1%
Trichloroethene	0.45	330	1	250	1	1.0E-06	70	25,550	2.1E-08	4.0E-01	8.3E-09	**9%**

Excess Lifetime Cancer Risk = 9.7E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$

where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	0.92	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	2.5E-09	9.5E-01	1.6E+00	4.0E-09	**80%**
Iron	21000	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	1.9E-05	2.0E-01	NA	NA	0%
Manganese	830	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	7.7E-07	2.0E-01	NA	NA	0%
Thallium	22	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	2.0E-08	2.0E-01	NA	NA	0%
Vanadium	42	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	3.9E-08	2.0E-01	NA	NA	0%
1,2-Dichloroethane	4.8	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.3E-08	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	4.0	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.1E-08	8.0E-01	3.0E-02	3.3E-10	7%
cis-1,2-Dichloroethene	0.46	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	2.1E-11	8.0E-01	NA	NA	0%
Tetrachloroethene	0.031	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	8.6E-11	8.0E-01	6.8E-01	5.8E-11	1%
Trichloroethene	0.45	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.3E-09	8.0E-01	5.0E-01	6.3E-10	**12%**

Excess Lifetime Cancer Risk = 5.0E-09

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	0.92	6.80E+08	NA	1	250	1	8	70	25,550	1.5E-12	1.51E+01	2.3E-11	0%
Iron	21000	6.80E+08	NA	1	250	1	8	70	25,550	3.5E-08	NA	NA	0%
Manganese	830	6.80E+08	NA	1	250	1	8	70	25,550	1.4E-09	NA	NA	0%
Thallium	22	6.80E+08	NA	1	250	1	8	70	25,550	3.6E-11	NA	NA	0%
Vanadium	42	6.80E+08	NA	1	250	1	8	70	25,550	6.9E-11	NA	NA	0%
1,2-Dichloroethane	4.8	NA	3.91E+03	1	250	1	8	70	25,550	1.4E-06	9.10E-02	1.2E-07	**65%**
1,4-Dichlorobenzene	4.0	NA	1.29E+04	1	250	1	8	70	25,550	3.5E-07	2.20E-02	7.6E-09	4%
cis-1,2-Dichloroethene	0.46	NA	2.90E+03	1	250	1	8	70	25,550	1.8E-07	NA	NA	0%
Tetrachloroethene	0.031	NA	2.55E+03	1	250	1	8	70	25,550	1.4E-08	2.10E-02	2.9E-10	0%
Trichloroethene	0.45	NA	3.26E+03	1	250	1	8	70	25,550	1.6E-07	3.85E-01	6.0E-08	**31%**

Excess Lifetime Cancer Risk = 1.9E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.27
Subsurface Soil
Hot Spot RISB-18
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-18	Arsenic	2.E-07	1.E-07	6.E-10			3.E-07	2.E-03	6.E-04	NA			2.E-03
			Iron	NA	NA	NA			0.E+00	1.E-02	1.E-02	NA			2.E-02
			Manganese	NA	NA	NA			0.E+00	2.E-02	1.E-02	7.E-03			4.E-02
			Thallium	NA	NA	NA			0.E+00	2.E-01	1.E-01	NA			3.E-01
			Vanadium	NA	NA	NA			0.E+00	2.E-02	1.E-02	NA			3.E-02
			1,2-Dichloroethane	NA	NA	3.E-06			3.E-06	NA	NA	1.E-04			1.E-04
			1,4-Dichlorobenzene	2.E-08	8.E-09	2.E-07			2.E-07	7.E-05	3.E-05	1.E-04			2.E-04
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	2.E-05	2.E-07	2.E-04			2.E-04
			Tetrachloroethene	3.E-09	1.E-09	7.E-09			1.E-08	2.E-06	8.E-07	1.E-04			1.E-04
			Toluene						0.E+00						0.E+00
			Trichloroethene	3.E-08	2.E-08	1.E-06			2.E-06	7.E-04	4.E-04	1.E-03			2.E-03
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	3.E-07	1.E-07	5.E-06	0.E+00	0.E+00	5.E-06	2.E-01	1.E-01	8.E-03	0.E+00	0.E+00	4.E-01
		Exposure Point Total							5.E-06						4.E-01
	Exposure Medium Total								5.E-06						4.E-01
Soil Total									5.E-06						4.E-01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 9.E-03

Total Hazard Across All Media = 62

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil- Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	0.92	50	1	250	25	1.0E-06	70	9125	4.5E-07	3.0E-04	1.5E-03	1%
Iron	21000	50	1	250	25	1.0E-06	70	9125	1.0E-02	7.0E-01	1.5E-02	7%
Manganese	830	50	1	250	25	1.0E-06	70	9125	4.1E-04	2.0E-02	2.0E-02	**10%**
Thallium	22	50	1	250	25	1.0E-06	70	9125	1.1E-05	7.0E-05	1.5E-01	**73%**
Vanadium	42	50	1	250	25	1.0E-06	70	9125	2.1E-05	1.0E-03	2.1E-02	**10%**
1,2-Dichloroethane	4.8	50	1	250	25	1.0E-06	70	9125	2.3E-06	NA	NA	0%
1,4-Dichlorobenzene	4.0	50	1	250	25	1.0E-06	70	9125	2.0E-06	3.0E-02	6.5E-05	0%
cis-1,2-Dichloroethene	0.46	50	1	250	25	1.0E-06	70	9125	2.3E-07	1.0E-02	2.3E-05	0%
Tetrachloroethene	0.031	50	1	250	25	1.0E-06	70	9125	1.5E-08	1.0E-02	1.5E-06	0%
Toluene	0.044	50	1	250	25	1.0E-06	70	9125	2.2E-08	8.0E-02	2.7E-07	0%
Trichloroethene	0.45	50	1	250	25	1.0E-06	70	9125	2.2E-07	3.0E-04	7.4E-04	0%

Hazard Index = 2.1E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil- Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	0.92	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	1.8E-07	9.5E-01	2.9E-04	6.3E-04	0%
Iron	21000	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	1.4E-03	2.0E-01	1.4E-01	9.7E-03	7%
Manganese	830	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	5.4E-05	2.0E-01	4.0E-03	1.3E-02	**10%**
Thallium	22	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	1.4E-06	2.0E-01	1.4E-05	1.0E-01	**73%**
Vanadium	42	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	2.7E-06	2.0E-01	2.0E-04	1.4E-02	**10%**
1,2-Dichloroethane	4.8	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	9.3E-07	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	4.0	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	7.7E-07	8.0E-01	2.4E-02	3.2E-05	0%
cis-1,2-Dichloroethene	0.46	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	1.5E-09	8.0E-01	8.0E-03	1.9E-07	0%
Tetrachloroethene	0.031	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	6.0E-09	8.0E-01	8.0E-03	7.5E-07	0%
Toluene	0.044	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	8.5E-09	8.0E-01	6.4E-02	1.3E-07	0%
Trichloroethene	0.45	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	8.8E-08	8.0E-01	2.4E-04	3.6E-04	0%

Hazard Index = 1.4E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil- Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung}$ = (C_s / PEF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (non-VOCs)
$ADD_{inhal\ lung}$ = (Cs / VF) * $IR_{air\text{-}hourly=}$ * EF * ED * ET_{inh} / BW * AT_c (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	0.92	6.80E+08	NA	1	250	25	8	70	9125	1.1E-10	NA	NA	0%
Iron	21000	6.80E+08	NA	1	250	25	8	70	9125	2.4E-06	NA	NA	0%
Manganese	830	6.80E+08	NA	1	250	25	8	70	9125	9.6E-08	1.43E-05	6.7E-03	**80%**
Thallium	22	6.80E+08	NA	1	250	25	8	70	9125	2.5E-09	NA	NA	0%
Vanadium	42	6.80E+08	NA	1	250	25	8	70	9125	4.8E-09	NA	NA	0%
1,2-Dichloroethane	4.8	NA	3.91E+03	1	250	25	8	70	9125	9.6E-05	7.00E-01	1.4E-04	2%
1,4-Dichlorobenzene	4.0	NA	1.29E+04	1	250	25	8	70	9125	2.4E-05	2.29E-01	1.1E-04	1%
cis-1,2-Dichloroethene	0.46	NA	2.90E+03	1	250	25	8	70	9125	1.2E-05	5.71E-02	2.2E-04	3%
Tetrachloroethene	0.031	NA	2.55E+03	1	250	25	8	70	9125	9.5E-07	1.00E-02	9.5E-05	1%
Toluene	0.044	NA	3.98E+03	1	250	25	8	70	9125	8.7E-07	1.43E+00	6.1E-07	0%
Trichloroethene	0.45	NA	3.26E+03	1	250	25	8	70	9125	1.1E-05	1.0E-02	1.1E-03	**13%**

Hazard Index = 8.3E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil- Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	0.92	50	1	250	25	1.0E-06	70	25,550	1.6E-07	1.5E+00	2.4E-07	**82%**
Iron	21000	50	1	250	25	1.0E-06	70	25,550	3.7E-03	NA	NA	0%
Manganese	830	50	1	250	25	1.0E-06	70	25,550	1.5E-04	NA	NA	0%
Thallium	22	50	1	250	25	1.0E-06	70	25,550	3.8E-06	NA	NA	0%
Vanadium	42	50	1	250	25	1.0E-06	70	25,550	7.3E-06	NA	NA	0%
1,2-Dichloroethane	4.8	50	1	250	25	1.0E-06	70	25,550	8.4E-07	9.1E-02	NA	0%
1,4-Dichlorobenzene	4.0	50	1	250	25	1.0E-06	70	25,550	7.0E-07	2.4E-02	1.7E-08	6%
cis-1,2-Dichloroethene	0.46	50	1	250	25	1.0E-06	70	25,550	8.0E-08	NA	NA	0%
Tetrachloroethene	0.031	50	1	250	25	1.0E-06	70	25,550	5.4E-09	5.4E-01	2.9E-09	1%
Toluene	0.044	50	1	250	25	1.0E-06	70	25,550	7.7E-09	NA	NA	0%
Trichloroethene	0.45	50	1	250	25	1.0E-06	70	25,550	7.9E-08	4.0E-01	3.2E-08	**11%**

Excess Lifetime Cancer Risk = 2.9E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil- Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	0.92	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	6.4E-08	9.5E-01	1.6E+00	1.0E-07	**80%**
Iron	21000	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	4.8E-04	2.0E-01	NA	NA	0%
Manganese	830	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.9E-05	2.0E-01	NA	NA	0%
Thallium	22	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	5.1E-07	2.0E-01	NA	NA	0%
Vanadium	42	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	9.7E-07	2.0E-01	NA	NA	0%
1,2-Dichloroethane	4.8	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	3.3E-07	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	4.0	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.8E-07	8.0E-01	3.0E-02	8.3E-09	7%
cis-1,2-Dichloroethene	0.46	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	5.3E-10	8.0E-01	NA	NA	0%
Tetrachloroethene	0.031	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.1E-09	8.0E-01	6.8E-01	1.4E-09	1%
Toluene	0.044	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	3.0E-09	8.0E-01	NA	NA	0%
Trichloroethene	0.45	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	3.1E-08	8.0E-01	5.0E-01	1.6E-08	**12%**

Excess Lifetime Cancer Risk = 1.3E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil- Hot Spot RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	0.92	6.80E+08	NA	1	250	25	8	70	25,550	3.8E-11	1.51E+01	5.7E-10	0%
Iron	21000	6.80E+08	NA	1	250	25	8	70	25,550	8.6E-07	NA	NA	0%
Manganese	830	6.80E+08	NA	1	250	25	8	70	25,550	3.4E-08	NA	NA	0%
Thallium	22	6.80E+08	NA	1	250	25	8	70	25,550	9.0E-10	NA	NA	0%
Vanadium	42	6.80E+08	NA	1	250	25	8	70	25,550	1.7E-09	NA	NA	0%
1,2-Dichloroethane	4.8	NA	3.91E+03	1	250	25	8	70	25,550	3.4E-05	9.10E-02	3.1E-06	**65%**
1,4-Dichlorobenzene	4.0	NA	1.29E+04	1	250	25	8	70	25,550	8.6E-06	2.20E-02	1.9E-07	4%
cis-1,2-Dichloroethene	0.46	NA	2.90E+03	1	250	25	8	70	25,550	4.4E-06	NA	NA	0%
Tetrachloroethene	0.031	NA	2.55E+03	1	250	25	8	70	25,550	3.4E-07	2.10E-02	7.1E-09	0%
Toluene	0.044	NA	3.98E+03	1	250	25	8	70	25,550	3.1E-07	NA	NA	0%
Trichloroethene	0.45	NA	3.26E+03	1	250	25	8	70	25,550	3.9E-06	3.85E-01	1.5E-06	**31%**

Excess Lifetime Cancer Risk = 4.8E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.28
Subsurface Soil
Hot Spot RISB-18
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

				Cancer						Non-Carcinogenic Hazard Quotient					
Medium	**Exposure Medium**	**Exposure Point**	**COPC**	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-18	Arsenic	2.E-06	2.E-07	2.E-09			2.E-06	4.E-02	3.E-03	NA			4.E-02
			Iron	NA	NA	NA			0.E+00	4.E-01	5.E-02	NA			4.E-01
			Manganese	NA	NA	NA			0.E+00	5.E-01	7.E-02	2.E-02			6.E-01
			Thallium	NA	NA	NA			0.E+00	4.E+00	6.E-01	NA			5.E+00
			Vanadium	NA	NA	NA			0.E+00	5.E-01	8.E-02	NA			6.E-01
			1,2-Dichloroethane	3.E-06	8.E-06	2.E-05			4.E-05	NA	NA	5.E-04			5.E-04
			1,4-Dichlorobenzene	1.E-07	2.E-08	6.E-07			8.E-07	2.E-03	2.E-04	4.E-04			2.E-03
			Benzene						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	6.E-04	1.E-06	7.E-04			1.E-03
			Tetrachloroethene	3.E-08	3.E-09	2.E-08			5.E-08	4.E-05	4.E-06	3.E-04			4.E-04
			Toluene						0.E+00						0.E+00
			Trichloroethene	3.E-07	3.E-08	5.E-06			5.E-06	2.E-02	2.E-03	4.E-03			2.E-02
			Vinyl chloride						0.E+00						0.E+00
			Xylenes						0.E+00						0.E+00
			Chemical Total	6.E-06	8.E-06	3.E-05	0.E+00	0.E+00	4.E-05	6.E+00	8.E-01	3.E-02	0.E+00	0.E+00	6.E+00
		Exposure Point Total							4.E-05						6.E+00
	Exposure Medium Total								4.E-05						6.E+00
Soil Total									4.E-05						6.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate					0.E+00	0.E+00					0.E+00	0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron					0.E+00	0.E+00					0.E+00	0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese					0.E+00	0.E+00					0.E+00	0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer Ingestion	Cancer Dermal	Cancer Inhalation of Dust and Vapors	Cancer Inhalation Ambient Air	Cancer Inhalation Indoor Air	Cancer Exposure Route Total	Non-Carcinogenic Hazard Quotient Ingestion	Non-Carcinogenic Hazard Quotient Dermal	Non-Carcinogenic Hazard Quotient Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient Exposure Route Total
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 3.E-02

Total Hazard Across All Media = 401

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	0.92	200	1	350	6	1.0E-06	15	2190	1.2E-05	3.0E-04	3.9E-02	1%
Iron	21000	200	1	350	6	1.0E-06	15	2190	2.7E-01	7.0E-01	3.8E-01	7%
Manganese	830	200	1	350	6	1.0E-06	15	2190	1.1E-02	2.0E-02	5.3E-01	**10%**
Thallium	22	200	1	350	6	1.0E-06	15	2190	2.8E-04	7.0E-05	4.0E+00	**73%**
Vanadium	42	200	1	350	6	1.0E-06	15	2190	5.4E-04	1.0E-03	5.4E-01	**10%**
1,2-Dichloroethane	4.8	200	1	350	6	1.0E-06	15	2190	6.1E-05	NA	NA	0%
1,4-Dichlorobenzene	4.0	200	1	350	6	1.0E-06	15	2190	5.1E-05	3.0E-02	1.7E-03	0%
cis-1,2-Dichloroethene	0.46	200	1	350	6	1.0E-06	15	2190	5.9E-06	1.0E-02	5.9E-04	0%
Tetrachloroethene	0.031	200	1	350	6	1.0E-06	15	2190	4.0E-07	1.0E-02	4.0E-05	0%
Toluene	0.044	200	1	350	6	1.0E-06	15	2190	5.6E-07	8.0E-02	7.0E-06	0%
Trichloroethene	0.45	200	1	350	6	1.0E-06	15	2190	5.8E-06	3.0E-04	1.9E-02	0%

Hazard Index = 5.5E+00

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [1] (mg/kg)	SA Skin Surface Area Exposed (cm^2)	AF Skin-soil Adherence Factor (mg/cm^2-event)	AE_d Dermal Absorption Efficiency [2] (unitless)	EF Exposure Frequency (days/year)	ED Exposure Duration (years)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_n Averaging Time Noncancer (years)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	0.92	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	9.9E-07	9.5E-01	2.9E-04	3.5E-03	0%
Iron	21000	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	7.5E-03	2.0E-01	1.4E-01	5.4E-02	7%
Manganese	830	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	3.0E-04	2.0E-01	4.0E-03	7.4E-02	**10%**
Thallium	22	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	7.9E-06	2.0E-01	1.4E-05	5.6E-01	**73%**
Vanadium	42	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.5E-05	2.0E-01	2.0E-04	7.5E-02	**10%**
1,2-Dichloroethane	4.8	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	5.2E-06	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	4.0	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	4.3E-06	8.0E-01	2.4E-02	1.8E-04	0%
cis-1,2-Dichloroethene	0.46	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	8.2E-09	8.0E-01	8.0E-03	1.0E-06	0%
Tetrachloroethene	0.031	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.3E-08	8.0E-01	8.0E-03	4.2E-06	0%
Toluene	0.044	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	4.7E-08	8.0E-01	6.4E-02	7.4E-07	0%
Trichloroethene	0.45	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	4.9E-07	8.0E-01	2.4E-04	2.0E-03	0%

Hazard Index = 7.7E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air-hourly} * EF * ED * ET_{inh} / BW * AT_n$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air-hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	C_s Conc. in Soil (1) (mg/kg)	PEF Particulate Emission Factor(2) (m^3/kg)	VF Volatilization Factor(3) (m^3/kg)	$IR_{air-hourly}$ Hourly Inhalation Rate (m^3/hr)	EF Exposure Frequency (day/year)	ED Duration of Exposure (years)	ET_{inh} Exposure Time (hr/day)	BW Body Weight (kg)	AT_n Averaging Time Noncancer (days)	ADD_{inhal} Average Daily Dose (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient	Percent Distribution of Risk (%)
Arsenic	0.92	6.80E+08	NA	0.26	350	6	16	15	2190	3.6E-10	NA	NA	0%
Iron	21000	6.80E+08	NA	0.26	350	6	16	15	2190	8.2E-06	NA	NA	0%
Manganese	830	6.80E+08	NA	0.26	350	6	16	15	2190	3.2E-07	1.43E-05	2.3E-02	**80%**
Thallium	22	6.80E+08	NA	0.26	350	6	16	15	2190	8.6E-09	NA	NA	0%
Vanadium	42	6.80E+08	NA	0.26	350	6	16	15	2190	1.6E-08	NA	NA	0%
1,2-Dichloroethane	4.8	NA	3.91E+03	0.26	350	6	16	15	2190	3.3E-04	7.00E-01	4.7E-04	2%
1,4-Dichlorobenzene	4.0	NA	1.29E+04	0.26	350	6	16	15	2190	8.2E-05	2.29E-01	3.6E-04	1%
cis-1,2-Dichloroethene	0.46	NA	2.90E+03	0.26	350	6	16	15	2190	4.2E-05	5.71E-02	7.4E-04	3%
Tetrachloroethene	0.031	NA	2.55E+03	0.26	350	6	16	15	2190	3.2E-06	1.00E-02	3.2E-04	1%
Toluene	0.044	NA	3.98E+03	0.26	350	6	16	15	2190	2.9E-06	1.43E+00	2.1E-06	0%
Trichloroethene	0.45	NA	3.26E+03	0.26	350	6	16	15	2190	3.7E-05	1.0E-02	3.7E-03	**13%**

Hazard Index = 2.8E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IF_{soil}** Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	0.92	114	1	350	1.0E-06	25,550	1.4E-06	1.5E+00	2.2E-06	**36%**
Iron	21000	114	1	350	1.0E-06	25,550	3.3E-02	NA	NA	0%
Manganese	830	114	1	350	1.0E-06	25,550	1.3E-03	NA	NA	0%
Thallium	22	114	1	350	1.0E-06	25,550	3.4E-05	NA	NA	0%
Vanadium	42	114	1	350	1.0E-06	25,550	6.6E-05	NA	NA	0%
1,2-Dichloroethane	4.8		**chemical is considered mutagenic, see Table xx for risk calculation**						3.44E-06	**57%**
1,4-Dichlorobenzene	4.0	114	1	350	1.0E-06	25,550	6.2E-06	2.4E-02	1.5E-07	2%
cis-1,2-Dichloroethene	0.46	114	1	350	1.0E-06	25,550	7.2E-07	NA	NA	0%
Tetrachloroethene	0.031	114	1	350	1.0E-06	25,550	4.8E-08	5.4E-01	2.6E-08	0%
Toluene	0.044	114	1	350	1.0E-06	25,550	6.9E-08	NA	NA	0%
Trichloroethene	0.45	114	1	350	1.0E-06	25,550	7.1E-07	4.0E-01	2.8E-07	5%

Excess Lifetime Cancer Risk = 6.1E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [1] (mg/kg)	SFS Age-Adjusted Dermal Factor (mg-year/kg-event)	AE_d Dermal Absorption Efficiency [2] (unitless)	EF Exposure Frequency (days/year)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	0.92	360	0.03	350	1	1.0E-06	25,550	1.4E-07	9.5E-01	1.6E+00	2.1E-07	3%
Iron	21000	360	0.01	350	1	1.0E-06	25,550	1.0E-03	2.0E-01	NA	NA	0%
Manganese	830	360	0.01	350	1	1.0E-06	25,550	4.1E-05	2.0E-01	NA	NA	0%
Thallium	22	360	0.01	350	1	1.0E-06	25,550	1.1E-06	2.0E-01	NA	NA	0%
Vanadium	42	360	0.01	350	1	1.0E-06	25,550	2.1E-06	8.0E-01	NA	NA	0%
1,2-Dichloroethane	4.8		**chemical is considered mutagenic, see Table xx for risk calculation**								7.6E-06	**97%**
1,4-Dichlorobenzene	4.0	360	0.03	350	1	1.0E-06	25,550	5.9E-07	8.0E-01	3.0E-02	1.8E-08	0%
cis-1,2-Dichloroethene	0.46	360	0.0005	350	1	1.0E-06	25,550	1.1E-09	8.0E-01	NA	NA	0%
Tetrachloroethene	0.031	360	0.03	350	1	1.0E-06	25,550	4.6E-09	8.0E-01	6.8E-01	3.1E-09	0%
Toluene	0.044	360	0.03	350	1	1.0E-06	25,550	6.5E-09	8.0E-01	NA	NA	0%
Trichloroethene	0.45	360	0.03	350	1	1.0E-06	25,550	6.7E-08	8.0E-01	5.0E-01	3.3E-08	0%

Excess Lifetime Cancer Risk = 7.9E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - RISB-18

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air-hourly=} * EF * ED * ET_{inh} / BW * AT_c$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air-hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air-hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	0.92	6.80E+08	NA	1	350	30	16	70	25,550	1.3E-10	1.51E+01	1.9E-09	0%
Iron	21000	6.80E+08	NA	1	350	30	16	70	25,550	2.9E-06	NA	NA	0%
Manganese	830	6.80E+08	NA	1	350	30	16	70	25,550	1.1E-07	NA	NA	0%
Thallium	22	6.80E+08	NA	1	350	30	16	70	25,550	3.0E-09	NA	NA	0%
Vanadium	42	6.80E+08	NA	1	350	30	16	70	25,550	5.8E-09	NA	NA	0%
1,2-Dichloroethane	4.8			**chemical is considered mutagenic, see Table xx for risk calculation**								2.5E-05	**81%**
1,4-Dichlorobenzene	4.0	NA	1.29E+04	1	350	30	16	70	25,550	2.9E-05	2.20E-02	6.4E-07	2%
cis-1,2-Dichloroethene	0.46	NA	2.90E+03	1	350	30	16	70	25,550	1.5E-05	NA	NA	0%
Tetrachloroethene	0.031	NA	2.55E+03	1	350	30	16	70	25,550	1.1E-06	2.10E-02	2.4E-08	0%
Toluene	0.044	NA	3.98E+03	1	350	30	16	70	25,550	1.0E-06	NA	NA	0%
Trichloroethene	0.45	NA	3.26E+03	1	350	30	16	70	25,550	1.3E-05	3.85E-01	5.0E-06	**16%**
											Excess Lifetime Cancer Risk =	**3.0E-05**	

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS	0-2 Years Child Mult.	2-6 Years Child Mult.	6-15 Years Child Mult.	15-30 Years Adult Mult.	CSF	CSF adjustment factor				ED				EP	Risk				Total Risk	
	(mg/kg)	(1/day)	(1/day)	(1/day)	(1/day)	$(mg/kg*day)^{-1}$	0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	4.80	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	4.13E-06	1.72E-06	1.19E-06	5.54E-07	7.60E-06	**Dermal Risk**
1,2-Dichloroethane	4.80	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	2.18E-06	7.18E-07	4.14E-07	1.32E-07	3.44E-06	**Ingestion risk**
1,2-Dichloroethane	4.80	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	6.69E-06	3.83E-06	8.84E-06	5.41E-06	2.48E-05	**inhalation risk**

Appendix H-5.29
Subsurface Soil
Hot Spot RISB-25
Future Excavation Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-25	Arsenic	2.E-07	1.E-08	7.E-11			2.E-07	3.E-02	2.E-03	NA			3.E-02
			Iron	NA	NA	NA			0.E+00	1.E-01	1.E-02	NA			1.E-01
			Manganese	NA	NA	NA			0.E+00	8.E-03	8.E-04	3.E-03			1.E-02
			Thallium	NA	NA	NA			0.E+00	1.E+00	1.E-01	NA			1.E+00
			Vanadium	NA	NA	NA			0.E+00	3.E-02	3.E-03	NA			3.E-02
			1,2-Dichloroethane	2.E-07	1.E-08	1.E-06			1.E-06	NA	NA	1.E-03			1.E-03
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform	3.E-10	4.E-13	2.E-08			2.E-08	2.E-04	3.E-07	1.E-03			2.E-03
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	1.E-04	2.E-07	2.E-03			2.E-03
			Tetrachloroethene	7.E-09	6.E-10	3.E-09			1.E-08	1.E-05	7.E-07	9.E-04			9.E-04
			Toluene	NA	NA	NA			0.E+00	5.E-07	4.E-08	4.E-06			5.E-06
			Trichloroethene	9.E-09	7.E-10	6.E-08			7.E-08	5.E-03	4.E-04	1.E-03			7.E-03
			Vinyl chloride						0.E+00						0.E+00
			Xylenes	NA	NA				0.E+00	3.E-06	2.E-07	8.E-05			8.E-05
			Chemical Total	4.E-07	3.E-08	1.E-06	0.E+00	0.E+00	2.E-06	1.E+00	1.E-01	1.E-02	0.E+00	0.E+00	1.E+00
		Exposure Point Total							2.E-06						1.E+00
	Exposure Medium Total								2.E-06						1.E+00
Soil Total									2.E-06						1.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane				NA		0.E+00				9.E-05		9.E-05
			1,1,2-Trichloroethane				2.E-11		2.E-11				6.E-06		6.E-06
			1,1-Dichloroethane				NA		0.E+00				1.E-06		1.E-06
			1,1-Dichloroethene				NA		0.E+00				7.E-04		7.E-04
			1,2-Dichlorobenzene				NA		0.E+00				8.E-06		8.E-06
			1,2-Dichloroethane				NA		0.E+00				2.E-05		2.E-05
			1,4-Dichlorobenzene				7.E-11		7.E-11				3.E-07		3.E-07
			2-Chlorophenol				NA		0.E+00				NA		0.E+00
			4-Methyl-2-pentanone				NA		0.E+00				3.E-07		3.E-07
			Benzene				5.E-10		5.E-10				2.E-04		2.E-04
			Bis(2-ethylhexyl)phthalate				NA		0.E+00				NA		0.E+00
			Chlorobenzene				NA		0.E+00				9.E-05		9.E-05
			Chloroethane				NA		0.E+00				5.E-06		5.E-06
			Chloroform				5.E-10		5.E-10				3.E-05		3.E-05
			cis-1,2-Dichloroethene				NA		0.E+00				2.E-04		2.E-04
			Ethylbenzene				NA		0.E+00				1.E-04		1.E-04
			Iron				NA		0.E+00				NA		0.E+00
			Isopropylbenzene				NA		0.E+00				3.E-02		3.E-02
			Manganese				NA		0.E+00				NA		0.E+00
			Methyl tert butyl ether				NA		0.E+00				NA		0.E+00
			Methylcyclohexane				NA		0.E+00				NA		0.E+00
			Methylene chloride				NA		0.E+00				3.E-06		3.E-06
			Naphthalene				NA		0.E+00				8.E-06		8.E-06
			Tetrachloroethene				1.E-08		1.E-08				4.E-03		4.E-03
			Toluene				NA		0.E+00				6.E-05		6.E-05
			Trichloroethene				1.E-07		1.E-07				2.E-03		2.E-03
			Vinyl chloride				NA		0.E+00				4.E-04		4.E-04
			Xylenes (Total)				NA		0.E+00				4.E-03		4.E-03
			Chemical Total	0.E+00	0.E+00	0.E+00	1.E-07	0.E+00	1.E-07	0.E+00	0.E+00	0.E+00	4.E-02	0.E+00	4.E-02
		Exposure Point Total							1.E-07						4.E-02
	Exposure Medium Total								1.E-07						4.E-02
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer Ingestion	Cancer Dermal	Cancer Inhalation of Dust and Vapors	Cancer Inhalation Ambient Air	Cancer Inhalation Indoor Air	Cancer Exposure Route Total	Non-Carcinogenic Hazard Quotient Ingestion	Non-Carcinogenic Hazard Quotient Dermal	Non-Carcinogenic Hazard Quotient Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient Exposure Route Total
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									1.E-07						4.E-02

Total Risk Across All Media = 2.E-06

Total Hazard Across All Media = 2

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Subchronic Oral RfD** [2] (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.8	330	1	250	1	1.0E-06	70	365	9.0E-06	3.0E-04	3.0E-02	2%
Iron	22000	330	1	250	1	1.0E-06	70	365	7.1E-02	7.0E-01	1.0E-01	8%
Manganese	340	330	1	250	1	1.0E-06	70	365	1.1E-03	1.4E-01	7.8E-03	1%
Thallium	25	330	1	250	1	1.0E-06	70	365	8.1E-05	7.0E-05	1.2E+00	**87%**
Vanadium	63	330	1	250	1	1.0E-06	70	365	2.0E-04	7.0E-03	2.9E-02	2%
1,2-Dichloroethane	45.00	330	1	250	1	1.0E-06	70	365	1.5E-04	NA	NA	0%
Chloroform	0.69	330	1	250	1	1.0E-06	70	365	2.2E-06	1.0E-02	2.2E-04	0%
cis-1,2-Dichloroethene	4.1	330	1	250	1	1.0E-06	70	365	1.3E-05	1.0E-01	1.3E-04	0%
Tetrachloroethene	0.30	330	1	250	1	1.0E-06	70	365	9.7E-07	1.0E-01	9.7E-06	0%
Trichloroethene	0.47	330	1	250	1	1.0E-06	70	365	1.5E-06	3.0E-04	5.1E-03	0%
Xylenes (total)	0.17	330	1	250	1	1.0E-06	70	365	5.5E-07	2.0E-01	2.7E-06	0%

Hazard Index = 1.3E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$** **Subchronic Dermal Adj. RfD** [4] (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.8	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	5.4E-07	9.5E-01	2.9E-04	1.9E-03	1%
Iron	22000	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	1.4E-03	2.0E-01	1.4E-01	1.0E-02	8%
Manganese	340	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	2.2E-05	2.0E-01	2.8E-02	7.8E-04	1%
Thallium	25	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	1.6E-06	2.0E-01	1.4E-05	1.2E-01	**88%**
Vanadium	63	3,300	0.2	0.01	250	1	1	1.0E-06	70	365	4.1E-06	2.0E-01	1.4E-03	2.9E-03	2%
1,2-Dichloroethane	45.00	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	8.7E-06	8.0E-01	NA	NA	0%
Chloroform	0.69	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	2.2E-09	8.0E-01	8.0E-03	2.8E-07	0%
cis-1,2-Dichloroethene	4.1	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	1.3E-08	8.0E-01	8.0E-02	1.7E-07	0%
Tetrachloroethene	0.30	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	5.8E-08	8.0E-01	8.0E-02	7.3E-07	0%
Trichloroethene	0.47	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	9.1E-08	8.0E-01	2.4E-04	3.8E-04	0%
Xylenes (total)	0.17	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	3.3E-08	8.0E-01	1.6E-01	2.1E-07	0%

Hazard Index = 1.3E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
(4): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i** **Subchronic Inhalation RfD** [(4)] (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.8	6.80E+08	NA	1	250	1	8	70	365	3.2E-10	NA	NA	0%
Iron	22000	6.80E+08	NA	1	250	1	8	70	365	2.5E-06	NA	NA	0%
Manganese	340	6.80E+08	NA	1	250	1	8	70	365	3.9E-08	1.43E-05	2.7E-03	**29%**
Thallium	25	6.80E+08	NA	1	250	1	8	70	365	2.9E-09	NA	NA	0%
Vanadium	63	6.80E+08	NA	1	250	1	8	70	365	7.3E-09	NA	NA	0%
1,2-Dichloroethane	45.00	NA	3.91E+03	1	250	1	8	70	365	9.0E-04	7.00E-01	1.3E-03	**13%**
Chloroform	0.69	NA	2.66E+03	1	250	1	8	70	365	2.0E-05	1.40E-02	1.5E-03	**15%**
cis-1,2-Dichloroethene	4.1	NA	2.90E+03	1	250	1	8	70	365	1.1E-04	5.71E-02	1.9E-03	**20%**
Tetrachloroethene	0.30	NA	2.55E+03	1	250	1	8	70	365	9.2E-06	1.00E-02	9.2E-04	**10%**
Trichloroethene	0.47	NA	3.26E+03	1	250	1	8	70	365	1.1E-05	1.0E-02	1.1E-03	**12%**
Xylenes (total)	0.17	NA	6.10E+03	1	250	1	8	70	365	2.2E-06	2.9E-02	7.6E-05	1%

Hazard Index = 9.5E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable
(4): A subchronic RfD was only available for 1,4-dichlorobenzene, therefore, chronic values were implemented or the remainder of the chemicals.

Future Excavation Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.8	330	1	250	1	1.0E-06	70	25,550	1.3E-07	1.5E+00	1.9E-07	**49%**
Iron	22000	330	1	250	1	1.0E-06	70	25,550	1.0E-03	NA	NA	0%
Manganese	340	330	1	250	1	1.0E-06	70	25,550	1.6E-05	NA	NA	0%
Thallium	25	330	1	250	1	1.0E-06	70	25,550	1.2E-06	NA	NA	0%
Vanadium	63	330	1	250	1	1.0E-06	70	25,550	2.9E-06	NA	NA	0%
1,2-Dichloroethane	45.00	330	1	250	1	1.0E-06	70	25,550	2.1E-06	9.1E-02	1.9E-07	**47%**
Chloroform	0.69	330	1	250	1	1.0E-06	70	25,550	3.2E-08	1.0E-02	3.2E-10	0%
cis-1,2-Dichloroethene	4.1	330	1	250	1	1.0E-06	70	25,550	1.9E-07	NA	NA	0%
Tetrachloroethene	0.30	330	1	250	1	1.0E-06	70	25,550	1.4E-08	5.4E-01	7.5E-09	2%
Trichloroethene	0.47	330	1	250	1	1.0E-06	70	25,550	2.2E-08	4.0E-01	8.7E-09	2%
Xylenes (total)	0.17	330	1	250	1	1.0E-06	70	25,550	7.8E-09	NA	NA	0%

Excess Lifetime Cancer Risk = 4.0E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.8	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	7.7E-09	9.5E-01	1.6E+00	1.2E-08	**44%**
Iron	22000	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	2.0E-05	2.0E-01	NA	NA	0%
Manganese	340	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	3.1E-07	2.0E-01	NA	NA	0%
Thallium	25	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	2.3E-08	2.0E-01	NA	NA	0%
Vanadium	63	3,300	0.2	0.01	250	1	1	1.0E-06	70	25,550	5.8E-08	2.0E-01	NA	NA	0%
1,2-Dichloroethane	45.00	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.2E-07	8.0E-01	1.1E-01	1.4E-08	**51%**
Chloroform	0.69	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	3.2E-11	8.0E-01	1.3E-02	4.0E-13	0%
cis-1,2-Dichloroethene	4.1	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	1.9E-10	8.0E-01	NA	NA	0%
Tetrachloroethene	0.30	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	8.3E-10	8.0E-01	6.8E-01	5.6E-10	2%
Trichloroethene	0.47	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.3E-09	8.0E-01	5.0E-01	6.5E-10	2%
Xylenes (total)	0.17	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	4.7E-10	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 2.8E-08

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.8	6.80E+08	NA	1	250	1	8	70	25,550	4.6E-12	1.51E+01	7.0E-11	0%
Iron	22000	6.80E+08	NA	1	250	1	8	70	25,550	3.6E-08	NA	NA	0%
Manganese	340	6.80E+08	NA	1	250	1	8	70	25,550	5.6E-10	NA	NA	0%
Thallium	25	6.80E+08	NA	1	250	1	8	70	25,550	4.1E-11	NA	NA	0%
Vanadium	63	6.80E+08	NA	1	250	1	8	70	25,550	1.0E-10	NA	NA	0%
1,2-Dichloroethane	45.00	NA	3.91E+03	1	250	1	8	70	25,550	1.3E-05	9.10E-02	1.2E-06	**93%**
Chloroform	0.69	NA	2.66E+03	1	250	1	8	70	25,550	2.9E-07	8.10E-02	2.3E-08	2%
cis-1,2-Dichloroethene	4.1	NA	2.90E+03	1	250	1	8	70	25,550	1.6E-06	NA	NA	0%
Tetrachloroethene	0.30	NA	2.55E+03	1	250	1	8	70	25,550	1.3E-07	2.10E-02	2.8E-09	0%
Trichloroethene	0.47	NA	3.26E+03	1	250	1	8	70	25,550	1.6E-07	3.85E-01	6.2E-08	5%
Xylenes (total)	0.17	NA	6.10E+03	1	250	1	8	70	25,550	3.1E-08	NA	NA	0%

Excess Lifetime Cancer Risk = 1.3E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.30
Subsurface Soil
Hot Spot RISB-25
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

				Cancer						Non-Carcinogenic Hazard Quotient					
Medium	Exposure Medium	Exposure Point	COPC	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-25	Arsenic	7.E-07	3.E-07	2.E-09			1.E-06	5.E-03	2.E-03	NA			6.E-03
			Iron	NA	NA	NA			0.E+00	2.E-02	1.E-02	NA			3.E-02
			Manganese	NA	NA	NA			0.E+00	8.E-03	5.E-03	3.E-03			2.E-02
			Thallium	NA	NA	NA			0.E+00	2.E-01	1.E-01	NA			3.E-01
			Vanadium	NA	NA	NA			0.E+00	3.E-02	2.E-02	NA			5.E-02
			1,2-Dichloroethane	NA	NA	3.E-05			3.E-05	NA	NA	1.E-03			1.E-03
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform	1.E-09	1.E-11	6.E-07			6.E-07	3.E-05	3.E-07	1.E-03			1.E-03
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	2.E-04	2.E-06	2.E-03			2.E-03
			Tetrachloroethene	3.E-08	1.E-08	7.E-08			1.E-07	1.E-05	7.E-06	9.E-04			9.E-04
			Toluene	NA	NA	NA			0.E+00	2.E-06	9.E-07	4.E-06			7.E-06
			Trichloroethene	3.E-08	2.E-08	2.E-06			2.E-06	8.E-04	4.E-04	1.E-03			2.E-03
			Vinyl chloride						0.E+00						0.E+00
			Xylenes	NA	NA	NA			0.E+00	4.E-07	2.E-07	8.E-05			8.E-05
			Chemical Total	8.E-07	3.E-07	3.E-05	0.E+00	0.E+00	3.E-05	2.E-01	2.E-01	1.E-02	0.E+00	0.E+00	4.E-01
		Exposure Point Total							3.E-05						4.E-01
	Exposure Medium Total								3.E-05						4.E-01
Soil Total									3.E-05						4.E-01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 9.E-03

Total Hazard Across All Media = 62

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [(1)] (mg/kg)	IR_{soil} Ingestion Rate (mg/day)	AE_i Ingestion Absorption Efficiency (unitless)	EF Exposure Frequency (day/year)	ED Duration of Exposure (years)	C_1 Conv. Factor (mass) (kg/mg)	BW Body Weight (kg)	AT_n Averaging Time Noncancer (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.8	50	1	250	25	1.0E-06	70	9125	1.4E-06	3.0E-04	4.6E-03	2%
Iron	22000	50	1	250	25	1.0E-06	70	9125	1.1E-02	7.0E-01	1.5E-02	7%
Manganese	340	50	1	250	25	1.0E-06	70	9125	1.7E-04	2.0E-02	8.3E-03	4%
Thallium	25	50	1	250	25	1.0E-06	70	9125	1.2E-05	7.0E-05	1.7E-01	**74%**
Vanadium	63	50	1	250	25	1.0E-06	70	9125	3.1E-05	1.0E-03	3.1E-02	**13%**
1,2-Dichloroethane	45	50	1	250	25	1.0E-06	70	9125	2.2E-05	NA	NA	0%
Chloroform	0.69	50	1	250	25	1.0E-06	70	9125	3.4E-07	1.0E-02	3.4E-05	0%
cis-1,2-Dichloroethene	4.1	50	1	250	25	1.0E-06	70	9125	2.0E-06	1.0E-02	2.0E-04	0%
Tetrachloroethene	0.30	50	1	250	25	1.0E-06	70	9125	1.5E-07	1.0E-02	1.5E-05	0%
Toluene	0.31	50	1	250	25	1.0E-06	70	9125	1.5E-07	8.0E-02	1.9E-06	0%
Trichloroethene	0.47	50	1	250	25	1.0E-06	70	9125	2.3E-07	3.0E-04	7.7E-04	0%
Xylenes (total)	0.17	50	1	250	25	1.0E-06	70	9125	8.3E-08	2.0E-01	4.2E-07	0%

Hazard Index = 2.3E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$RfD_{dermal-adj}$** **Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.8	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	5.4E-07	9.5E-01	2.9E-04	1.9E-03	1%
Iron	22000	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	1.4E-03	2.0E-01	1.4E-01	1.0E-02	7%
Manganese	340	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	2.2E-05	2.0E-01	4.0E-03	5.5E-03	4%
Thallium	25	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	1.6E-06	2.0E-01	1.4E-05	1.2E-01	**75%**
Vanadium	63	3,300	0.2	0.01	250	25	1	1.0E-06	70	9125	4.1E-06	2.0E-01	2.0E-04	2.0E-02	**13%**
1,2-Dichloroethane	45	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	8.7E-06	8.0E-01	NA	NA	0%
Chloroform	0.69	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	2.2E-09	8.0E-01	8.0E-03	2.8E-07	0%
cis-1,2-Dichloroethene	4.1	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	1.3E-08	8.0E-01	8.0E-03	1.7E-06	0%
Tetrachloroethene	0.30	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	5.8E-08	8.0E-01	8.0E-03	7.3E-06	0%
Toluene	0.31	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	6.0E-08	8.0E-01	6.4E-02	9.4E-07	0%
Trichloroethene	0.47	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	9.1E-08	8.0E-01	2.4E-04	3.8E-04	0%
Xylenes (total)	0.17	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	3.3E-08	8.0E-01	1.6E-01	2.1E-07	0%

Hazard Index = 1.5E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i** **Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.8	6.80E+08	NA	1	250	25	8	70	9125	3.2E-10	NA	NA	0%
Iron	22000	6.80E+08	NA	1	250	25	8	70	9125	2.5E-06	NA	NA	0%
Manganese	340	6.80E+08	NA	1	250	25	8	70	9125	3.9E-08	1.43E-05	2.7E-03	**29%**
Thallium	25	6.80E+08	NA	1	250	25	8	70	9125	2.9E-09	NA	NA	0%
Vanadium	63	6.80E+08	NA	1	250	25	8	70	9125	7.3E-09	NA	NA	0%
1,2-Dichloroethane	45	NA	3.91E+03	1	250	25	8	70	9125	9.0E-04	7.00E-01	1.3E-03	**13%**
Chloroform	0.69	NA	2.66E+03	1	250	25	8	70	9125	2.0E-05	1.40E-02	1.5E-03	**15%**
cis-1,2-Dichloroethene	4.1	NA	2.90E+03	1	250	25	8	70	9125	1.1E-04	5.71E-02	1.9E-03	**20%**
Tetrachloroethene	0.30	NA	2.55E+03	1	250	25	8	70	9125	9.2E-06	1.00E-02	9.2E-04	**10%**
Toluene	0.31	NA	3.98E+03	1	250	25	8	70	9125	6.1E-06	1.43E+00	4.3E-06	0%
Trichloroethene	0.47	NA	3.26E+03	1	250	25	8	70	9125	1.1E-05	1.0E-02	1.1E-03	**12%**
Xylenes (total)	0.17	NA	6.10E+03	1	250	25	8	70	9125	2.2E-06	2.9E-02	7.6E-05	1%

Hazard Index = 9.5E-03

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.8	50	1	250	25	1.0E-06	70	25,550	4.9E-07	1.5E+00	7.3E-07	**92%**
Iron	22000	50	1	250	25	1.0E-06	70	25,550	3.8E-03	NA	NA	0%
Manganese	340	50	1	250	25	1.0E-06	70	25,550	5.9E-05	NA	NA	0%
Thallium	25	50	1	250	25	1.0E-06	70	25,550	4.4E-06	NA	NA	0%
Vanadium	63	50	1	250	25	1.0E-06	70	25,550	1.1E-05	NA	NA	0%
1,2-Dichloroethane	45	50	1	250	25	1.0E-06	70	25,550	7.9E-06	9.1E-02	NA	0%
Chloroform	0.69	50	1	250	25	1.0E-06	70	25,550	1.2E-07	1.0E-02	1.2E-09	0%
cis-1,2-Dichloroethene	4.1	50	1	250	25	1.0E-06	70	25,550	7.2E-07	NA	NA	0%
Tetrachloroethene	0.30	50	1	250	25	1.0E-06	70	25,550	5.2E-08	5.4E-01	2.8E-08	4%
Toluene	0.31	50	1	250	25	1.0E-06	70	25,550	5.4E-08	NA	NA	0%
Trichloroethene	0.47	50	1	250	25	1.0E-06	70	25,550	8.2E-08	4.0E-01	3.3E-08	4%
Xylenes (total)	0.17	50	1	250	25	1.0E-06	70	25,550	3.0E-08	NA	NA	0%

Excess Lifetime Cancer Risk = 8.0E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.8	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.9E-07	9.5E-01	1.6E+00	3.1E-07	**91%**
Iron	22000	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	5.1E-04	2.0E-01	NA	NA	0%
Manganese	340	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	7.8E-06	2.0E-01	NA	NA	0%
Thallium	25	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	5.8E-07	2.0E-01	NA	NA	0%
Vanadium	63	3,300	0.2	0.01	250	25	1	1.0E-06	70	25,550	1.5E-06	2.0E-01	NA	NA	0%
1,2-Dichloroethane	45	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	3.1E-06	8.0E-01	NA	NA	0%
Chloroform	0.69	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	8.0E-10	8.0E-01	1.3E-02	9.9E-12	0%
cis-1,2-Dichloroethene	4.1	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	4.7E-09	8.0E-01	NA	NA	0%
Tetrachloroethene	0.30	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.1E-08	8.0E-01	6.8E-01	1.4E-08	4%
Toluene	0.31	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.1E-08	8.0E-01	NA	NA	0%
Trichloroethene	0.47	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	3.3E-08	8.0E-01	5.0E-01	1.6E-08	5%
Xylenes (total)	0.17	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.2E-08	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 3.4E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.8	6.80E+08	NA	1	250	25	8	70	25,550	1.2E-10	1.51E+01	1.7E-09	0%
Iron	22000	6.80E+08	NA	1	250	25	8	70	25,550	9.0E-07	NA	NA	0%
Manganese	340	6.80E+08	NA	1	250	25	8	70	25,550	1.4E-08	NA	NA	0%
Thallium	25	6.80E+08	NA	1	250	25	8	70	25,550	1.0E-09	NA	NA	0%
Vanadium	63	6.80E+08	NA	1	250	25	8	70	25,550	2.6E-09	NA	NA	0%
1,2-Dichloroethane	45	NA	3.91E+03	1	250	25	8	70	25,550	3.2E-04	9.10E-02	2.9E-05	**93%**
Chloroform	0.69	NA	2.66E+03	1	250	25	8	70	25,550	7.3E-06	8.10E-02	5.9E-07	2%
cis-1,2-Dichloroethene	4.1	NA	2.90E+03	1	250	25	8	70	25,550	3.9E-05	NA	NA	0%
Tetrachloroethene	0.30	NA	2.55E+03	1	250	25	8	70	25,550	3.3E-06	2.10E-02	6.9E-08	0%
Toluene	0.31	NA	3.98E+03	1	250	25	8	70	25,550	2.2E-06	NA	NA	0%
Trichloroethene	0.47	NA	3.26E+03	1	250	25	8	70	25,550	4.0E-06	3.85E-01	1.6E-06	5%
Xylenes (total)	0.17	NA	6.10E+03	1	250	25	8	70	25,550	7.8E-07	NA	NA	0%

Excess Lifetime Cancer Risk = 3.1E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.31
Subsurface Soil
Hot Spot RISB-25
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-25	Arsenic	7.E-06	7.E-07	6.E-09			7.E-06	1.E-01	1.E-02	NA			1.E-01
			Iron	NA	NA	NA			0.E+00	4.E-01	6.E-02	NA			5.E-01
			Manganese	NA	NA	NA			0.E+00	2.E-01	3.E-02	9.E-03			3.E-01
			Thallium	NA	NA	NA			0.E+00	5.E+00	6.E-01	NA			5.E+00
			Vanadium	NA	NA	NA			0.E+00	8.E-01	1.E-01	NA			9.E-01
			1,2-Dichloroethane	3.E-05	7.E-05	2.E-04			3.E-04	NA	NA	4.E-03			4.E-03
			1,4-Dichlorobenzene						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Chloroform	1.E-08	2.E-11	2.E-06			2.E-06	9.E-04	2.E-06	5.E-03			6.E-03
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	5.E-03	9.E-06	7.E-03			1.E-02
			Tetrachloroethene	3.E-07	3.E-08	2.E-07			5.E-07	4.E-04	4.E-05	3.E-03			4.E-03
			Toluene	NA	NA	NA			0.E+00	5.E-05	5.E-06	1.E-05			7.E-05
			Trichloroethene	3.E-07	3.E-08	5.E-06			6.E-06	2.E-02	2.E-03	4.E-03			3.E-02
			Vinyl chloride						0.E+00						0.E+00
			Xylenes	NA	NA	NA			0.E+00	1.E-05	1.E-06	3.E-04			3.E-04
			Chemical Total	4.E-05	7.E-05	2.E-04	0.E+00	0.E+00	4.E-04	6.E+00	9.E-01	3.E-02	0.E+00	0.E+00	7.E+00
		Exposure Point Total							4.E-04						7.E+00
	Exposure Medium Total								4.E-04						7.E+00
Soil Total									4.E-04						7.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate					0.E+00	0.E+00					0.E+00	0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron					0.E+00	0.E+00					0.E+00	0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese					0.E+00	0.E+00					0.E+00	0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer Ingestion	Cancer Dermal	Cancer Inhalation of Dust and Vapors	Cancer Inhalation Ambient Air	Cancer Inhalation Indoor Air	Cancer Exposure Route Total	Non-Carcinogenic Hazard Quotient Ingestion	Non-Carcinogenic Hazard Quotient Dermal	Non-Carcinogenic Hazard Quotient Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient Exposure Route Total
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 3.E-02

Total Hazard Across All Media = 402

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.8	200	1	350	6	1.0E-06	15	2190	3.6E-05	3.0E-04	1.2E-01	2%
Iron	22000	200	1	350	6	1.0E-06	15	2190	2.8E-01	7.0E-01	4.0E-01	7%
Manganese	340	200	1	350	6	1.0E-06	15	2190	4.3E-03	2.0E-02	2.2E-01	4%
Thallium	25	200	1	350	6	1.0E-06	15	2190	3.2E-04	7.0E-05	4.6E+00	**74%**
Vanadium	63	200	1	350	6	1.0E-06	15	2190	8.1E-04	1.0E-03	8.1E-01	**13%**
1,2-Dichloroethane	45	200	1	350	6	1.0E-06	15	2190	5.8E-04	NA	NA	0%
Chloroform	0.69	200	1	350	6	1.0E-06	15	2190	8.8E-06	1.0E-02	8.8E-04	0%
cis-1,2-Dichloroethene	4.1	200	1	350	6	1.0E-06	15	2190	5.2E-05	1.0E-02	5.2E-03	0%
Tetrachloroethene	0.30	200	1	350	6	1.0E-06	15	2190	3.8E-06	1.0E-02	3.8E-04	0%
Toluene	0.31	200	1	350	6	1.0E-06	15	2190	4.0E-06	8.0E-02	5.0E-05	0%
Trichloroethene	0.47	200	1	350	6	1.0E-06	15	2190	6.0E-06	3.0E-04	2.0E-02	0%
Xylenes	0.17	200	1	350	6	1.0E-06	15	2190	2.2E-06	2.0E-01	1.1E-05	0%

Hazard Index = 6.1E+00

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s = representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA = skin surface area in contact with soil on days exposed (cm^2)
AF = mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d = absorption efficiency (unitless)
EF = exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED = exposure duration: the typical duration of each exposure event (year)
EV = event frequency (events/day)
BW = body weight (kg)
AT_n = averaging time (days)
C_1 = conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency (2) (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (years)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency (3) (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.8	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.0E-06	9.5E-01	2.9E-04	1.1E-02	1%
Iron	22000	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	7.9E-03	2.0E-01	1.4E-01	5.6E-02	7%
Manganese	340	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	1.2E-04	2.0E-01	4.0E-03	3.0E-02	4%
Thallium	25	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	8.9E-06	2.0E-01	1.4E-05	6.4E-01	**75%**
Vanadium	63	2,800	0.2	0.01	350	6	1	1.0E-06	15	2190	2.3E-05	2.0E-01	2.0E-04	1.1E-01	**13%**
1,2-Dichloroethane	45	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	4.8E-05	8.0E-01	NA	NA	0%
Chloroform	0.69	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	1.2E-08	8.0E-01	8.0E-03	1.5E-06	0%
cis-1,2-Dichloroethene	4.1	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	7.3E-08	8.0E-01	8.0E-03	9.2E-06	0%
Tetrachloroethene	0.30	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.2E-07	8.0E-01	8.0E-03	4.0E-05	0%
Toluene	0.31	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	3.3E-07	8.0E-01	6.4E-02	5.2E-06	0%
Trichloroethene	0.47	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	5.0E-07	8.0E-01	2.4E-04	2.1E-03	0%
Xylenes	0.17	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.8E-07	8.0E-01	1.6E-01	1.1E-06	0%

Hazard Index = 8.5E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly} * EF * ED * ET_{inh} / BW * AT_n$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
Arsenic	2.8	6.80E+08	NA	0.26	350	6	16	15	2190	1.1E-09	NA	NA	0%
Iron	22000	6.80E+08	NA	0.26	350	6	16	15	2190	8.6E-06	NA	NA	0%
Manganese	340	6.80E+08	NA	0.26	350	6	16	15	2190	1.3E-07	1.43E-05	9.3E-03	**29%**
Thallium	25	6.80E+08	NA	0.26	350	6	16	15	2190	9.8E-09	NA	NA	0%
Vanadium	63	6.80E+08	NA	0.26	350	6	16	15	2190	2.5E-08	NA	NA	0%
1,2-Dichloroethane	45	NA	3.91E+03	0.26	350	6	16	15	2190	3.1E-03	7.00E-01	4.4E-03	**13%**
Chloroform	0.69	NA	2.66E+03	0.26	350	6	16	15	2190	6.9E-05	1.40E-02	4.9E-03	**15%**
cis-1,2-Dichloroethene	4.1	NA	2.90E+03	0.26	350	6	16	15	2190	3.8E-04	5.71E-02	6.6E-03	**20%**
Tetrachloroethene	0.30	NA	2.55E+03	0.26	350	6	16	15	2190	3.1E-05	1.00E-02	3.1E-03	**10%**
Toluene	0.31	NA	3.98E+03	0.26	350	6	16	15	2190	2.1E-05	1.43E+00	1.4E-05	0%
Trichloroethene	0.47	NA	3.26E+03	0.26	350	6	16	15	2190	3.8E-05	1.0E-02	3.8E-03	**12%**
Xylenes	0.17	NA	6.10E+03	0.26	350	6	16	15	2190	7.4E-06	2.9E-02	2.6E-04	1%

Hazard Index = 3.2E-02

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [1] (mg/kg)	IF_{soil} Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	AE_i Ingestion Absorption Efficiency (unitless)	EF Exposure Frequency (day/year)	C_1 Conv. Factor (mass) (kg/mg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	SF_o **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.8	114	1	350	1.0E-06	25,550	4.4E-06	1.5E+00	6.6E-06	**17%**
Iron	22000	114	1	350	1.0E-06	25,550	3.4E-02	NA	NA	0%
Manganese	340	114	1	350	1.0E-06	25,550	5.3E-04	NA	NA	0%
Thallium	25	114	1	350	1.0E-06	25,550	3.9E-05	NA	NA	0%
Vanadium	63	114	1	350	1.0E-06	25,550	9.8E-05	NA	NA	0%
1,2-Dichloroethane	45		**chemical is considered mutagenic, see Table xx for risk calculation**						3.23E-05	**82%**
Chloroform	0.69	114	1	350	1.0E-06	25,550	1.1E-06	1.0E-02	1.1E-08	0%
cis-1,2-Dichloroethene	4.1	114	1	350	1.0E-06	25,550	6.4E-06	NA	NA	0%
Tetrachloroethene	0.30	114	1	350	1.0E-06	25,550	4.7E-07	5.4E-01	2.5E-07	1%
Toluene	0.31	114	1	350	1.0E-06	25,550	4.8E-07	NA	NA	0%
Trichloroethene	0.47	114	1	350	1.0E-06	25,550	7.3E-07	4.0E-01	2.9E-07	1%
Xylenes	0.17	114	1	350	1.0E-06	25,550	2.7E-07	NA	NA	0%

Excess Lifetime Cancer Risk = 3.9E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	C_s Conc. in Soil [1] (mg/kg)	SFS Age-Adjusted Dermal Factor (mg-year/kg-event)	AE_d Dermal Absorption Efficiency [2] (unitless)	EF Exposure Frequency (days/year)	EV Event Frequency (events/day)	C_1 Conv. Factor (mass) (kg/mg)	AT_c Averaging Time Carcinogens (days)	ADD_{soil} Average Daily Dose (mg/kg-day)	ABS_{GI} GI Absorption Efficiency [3] (unitless)	$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor $(mg/kg-day)^{-1}$	Chemical Specific Cancer Risk	Percent Distribution of Risk (%)
Arsenic	2.8	360	0.03	350	1	1.0E-06	25,550	4.1E-07	9.5E-01	1.6E+00	6.5E-07	1%
Iron	22000	360	0.01	350	1	1.0E-06	25,550	1.1E-03	2.0E-01	NA	NA	0%
Manganese	340	360	0.01	350	1	1.0E-06	25,550	1.7E-05	2.0E-01	NA	NA	0%
Thallium	25	360	0.01	350	1	1.0E-06	25,550	1.2E-06	2.0E-01	NA	NA	0%
Vanadium	63	360	0.01	350	1	1.0E-06	25,550	3.1E-06	8.0E-01	NA	NA	0%
1,2-Dichloroethane	45		**chemical is considered mutagenic, see Table xx for risk calculation**								7.1E-05	**99%**
Chloroform	0.69	360	0.0005	350	1	1.0E-06	25,550	1.7E-09	8.0E-01	1.3E-02	2.1E-11	0%
cis-1,2-Dichloroethene	4.1	360	0.0005	350	1	1.0E-06	25,550	1.0E-08	8.0E-01	NA	NA	0%
Tetrachloroethene	0.30	360	0.03	350	1	1.0E-06	25,550	4.4E-08	8.0E-01	6.8E-01	3.0E-08	0%
Toluene	0.31	360	0.03	350	1	1.0E-06	25,550	4.6E-08	8.0E-01	NA	NA	0%
Trichloroethene	0.47	360	0.03	350	1	1.0E-06	25,550	7.0E-08	8.0E-01	5.0E-01	3.5E-08	0%
Xylenes	0.17	360	0.03	350	1	1.0E-06	25,550	2.5E-08	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 7.2E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - RISB-25

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air-hourly=} * EF * ED * ET_{inh} / BW * AT_c$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air-hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air-hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Arsenic	2.8	6.80E+08	NA	1	350	30	16	70	25,550	3.9E-10	1.51E+01	5.8E-09	0%
Iron	22000	6.80E+08	NA	1	350	30	16	70	25,550	3.0E-06	NA	NA	0%
Manganese	340	6.80E+08	NA	1	350	30	16	70	25,550	4.7E-08	NA	NA	0%
Thallium	25	6.80E+08	NA	1	350	30	16	70	25,550	3.5E-09	NA	NA	0%
Vanadium	63	6.80E+08	NA	1	350	30	16	70	25,550	8.7E-09	NA	NA	0%
1,2-Dichloroethane	45			**chemical is considered mutagenic, see Table xx for risk calculation**								2.3E-04	**97%**
Chloroform	0.69	NA	2.66E+03	1	350	30	16	70	25,550	2.4E-05	8.10E-02	2.0E-06	1%
cis-1,2-Dichloroethene	4.1	NA	2.90E+03	1	350	30	16	70	25,550	1.3E-04	NA	NA	0%
Tetrachloroethene	0.30	NA	2.55E+03	1	350	30	16	70	25,550	1.1E-05	2.10E-02	2.3E-07	0%
Toluene	0.31	NA	3.98E+03	1	350	30	16	70	25,550	7.3E-06	NA	NA	0%
Trichloroethene	0.47	NA	3.26E+03	1	350	30	16	70	25,550	1.4E-05	3.85E-01	5.2E-06	2%
Xylenes	0.17	NA	6.10E+03	1	350	30	16	70	25,550	2.6E-06	NA	NA	0%
											Excess Lifetime Cancer Risk =	**2.4E-04**	

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS (mg/kg)	0-2 Years Child Mult. (1/day)	2-6 Years Child Mult. (1/day)	6-15 Years Child Mult. (1/day)	15-30 Years Adult Mult. (1/day)	CSF $(mg/kg*day)^{-1}$	CSF adjustment factor				ED				EP	Risk				Total Risk	
							0-2	2-6	6-15	15-30	0-2	2-6	6-15	15-30		0-2	2-6	6-15	15-30		
1,2-Dichloroethane	45	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	3.88E-05	1.62E-05	1.11E-05	5.20E-06	7.13E-05	**Dermal Risk**
1,2-Dichloroethane	45	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	2.04E-05	6.73E-06	3.88E-06	1.24E-06	3.23E-05	**Ingestion risk**
1,2-Dichloroethane	45	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	6.28E-05	3.59E-05	8.28E-05	5.08E-05	2.32E-04	**inhalation risk**

Parameter	CS (mg/kg)	0-6 Years Child Mult. (1/day)	6-15 Years Child Mult. (1/day)	15-30 Years Adult Mult. (1/day)	Child CSF $(mg/kg*day)^{-1}$	Adult CSF $(mg/kg*day)^{-1}$	ED			EP	Risk			Total Risk	
							0-6	6-15	15-30		0-6	6-15	15-30		
Vinyl chloride	0.00	1.28E-05	2.46E-06	1.41E-06	1.5E+00	7.20E-01	6	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**ingestion**
Vinyl chloride	0.00	2.76E-05	7.06E-06	5.92E-06	1.5E+00	7.20E-01	6	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**dermal**
Vinyl chloride	0.00	2.49E-04	2.05E-04	2.26E-04	1.5E+00	7.20E-01	6	9	15	70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**dermal**

Appendix H-5.32
Subsurface Soil
Hot Spot RISB-64
Future Excavation Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

				Cancer						Non-Carcinogenic Hazard Quotient					
Medium	**Exposure Medium**	**Exposure Point**	**COPC**	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-64	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane	NA	NA	3.E-07			3.E-07	NA	NA	3.E-04			3.E-04
			1,4-Dichlorobenzene	7.E-10	5.E-11	1.E-09			2.E-09	2.E-06	2.E-07	5.E-06			8.E-06
			Benzene	5.E-09	7.E-12	2.E-08			3.E-08	2.E-03	2.E-06	7.E-03			9.E-03
			Chloroform	3.E-10	4.E-13	3.E-08			3.E-08	2.E-04	3.E-07	2.E-03			2.E-03
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	2.E-03	2.E-06	3.E-02			3.E-02
			Tetrachloroethene	2.E-06	1.E-07	7.E-07			3.E-06	2.E-03	2.E-04	2.E-01			2.E-01
			Toluene	NA	NA	NA			0.E+00	6.E-04	4.E-05	5.E-03			6.E-03
			Trichloroethene	3.E-06	2.E-07	2.E-05			2.E-05	2.E+00	1.E-01	4.E-01			2.E+00
			Vinyl chloride	3.E-09	4.E-12	1.E-09			4.E-09	9.E-05	1.E-07	2.E-04			3.E-04
			Xylenes	NA	NA	NA			0.E+00	3.E-03	2.E-04	7.E-02			7.E-02
			Chemical Total	5.E-06	3.E-07	2.E-05	0.E+00	0.E+00	3.E-05	2.E+00	1.E-01	7.E-01	0.E+00	0.E+00	2.E+00
		Exposure Point Total							3.E-05						2.E+00
	Exposure Medium Total								3.E-05						2.E+00
Soil Total									3.E-05						2.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane				NA		0.E+00				9.E-05		9.E-05
			1,1,2-Trichloroethane				2.E-11		2.E-11				6.E-06		6.E-06
			1,1-Dichloroethane				NA		0.E+00				1.E-06		1.E-06
			1,1-Dichloroethene				NA		0.E+00				7.E-04		7.E-04
			1,2-Dichlorobenzene				NA		0.E+00				8.E-06		8.E-06
			1,2-Dichloroethane				NA		0.E+00				2.E-05		2.E-05
			1,4-Dichlorobenzene				7.E-11		7.E-11				3.E-07		3.E-07
			2-Chlorophenol				NA		0.E+00				NA		0.E+00
			4-Methyl-2-pentanone				NA		0.E+00				3.E-07		3.E-07
			Benzene				5.E-10		5.E-10				2.E-04		2.E-04
			Bis(2-ethylhexyl)phthalate				NA		0.E+00				NA		0.E+00
			Chlorobenzene				NA		0.E+00				9.E-05		9.E-05
			Chloroethane				NA		0.E+00				5.E-06		5.E-06
			Chloroform				5.E-10		5.E-10				3.E-05		3.E-05
			cis-1,2-Dichloroethene				NA		0.E+00				2.E-04		2.E-04
			Ethylbenzene				NA		0.E+00				1.E-04		1.E-04
			Iron				NA		0.E+00				NA		0.E+00
			Isopropylbenzene				NA		0.E+00				3.E-02		3.E-02
			Manganese				NA		0.E+00				NA		0.E+00
			Methyl tert butyl ether				NA		0.E+00				NA		0.E+00
			Methylcyclohexane				NA		0.E+00				NA		0.E+00
			Methylene chloride				NA		0.E+00				3.E-06		3.E-06
			Naphthalene				NA		0.E+00				8.E-06		8.E-06
			Tetrachloroethene				1.E-08		1.E-08				4.E-03		4.E-03
			Toluene				NA		0.E+00				6.E-05		6.E-05
			Trichloroethene				1.E-07		1.E-07				2.E-03		2.E-03
			Vinyl chloride				NA		0.E+00				4.E-04		4.E-04
			Xylenes (Total)				NA		0.E+00				4.E-03		4.E-03
			Chemical Total	0.E+00	0.E+00	0.E+00	1.E-07	0.E+00	1.E-07	0.E+00	0.E+00	0.E+00	4.E-02	0.E+00	4.E-02
		Exposure Point Total							1.E-07						4.E-02
	Exposure Medium Total								1.E-07						4.E-02
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane						0.E+00						0.E+00
			1,1,2-Trichloroethane						0.E+00						0.E+00
			1,1-Dichloroethane						0.E+00						0.E+00
			1,1-Dichloroethene						0.E+00						0.E+00
			1,2,4-Trichlorobenzene						0.E+00						0.E+00
			1,2-Dichlorobenzene						0.E+00						0.E+00
			1,2-Dichloroethane						0.E+00						0.E+00
			1,4-Dichlorobenzene						0.E+00						0.E+00
			2-Chlorophenol						0.E+00						0.E+00
			4-Methyl-2-pentanone						0.E+00						0.E+00
			Benzene						0.E+00						0.E+00
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Bromodichloromethane						0.E+00						0.E+00
			Chlorobenzene						0.E+00						0.E+00
			Chloroethane						0.E+00						0.E+00
			Chloroform						0.E+00						0.E+00
			cis-1,2-Dichloroethene						0.E+00						0.E+00
			Ethylbenzene						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Isopropylbenzene						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Excavation Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer: Ingestion	Cancer: Dermal	Cancer: Inhalation of Dust and Vapors	Cancer: Inhalation Ambient Air	Cancer: Inhalation Indoor Air	Cancer: Exposure Route Total	Non-Carcinogenic Hazard Quotient: Ingestion	Non-Carcinogenic Hazard Quotient: Dermal	Non-Carcinogenic Hazard Quotient: Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient: Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient: Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient: Exposure Route Total
			Methyl tert butyl ether						0.E+00						0.E+00
			Methylcyclohexane						0.E+00						0.E+00
			Methylene chloride						0.E+00						0.E+00
			Naphthalene						0.E+00						0.E+00
			Tetrachloroethene						0.E+00						0.E+00
			Toluene						0.E+00						0.E+00
			Trichloroethene						0.E+00						0.E+00
			Vinyl chloride						0.E+00						0.E+00
			Xylenes (Total)						0.E+00						0.E+00
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
		Exposure Point Total							0.E+00						0.E+00
	Exposure Medium Total								0.E+00						0.E+00
Groundwater Total									1.E-07						4.E-02

Total Risk Across All Media = 3.E-05

Total Hazard Across All Media = 2.478857

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Subchronic Oral RfD [(2)]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	330	1	250	1	1.0E-06	70	365	3.6E-05	NA	NA	0%
1,4-Dichlorobenzene	0.64	330	1	250	1	1.0E-06	70	365	2.1E-06	9.0E-01	2.3E-06	0%
Benzene	2.1	330	1	250	1	1.0E-06	70	365	6.8E-06	4.0E-03	1.7E-03	0%
Chloroform	0.75	330	1	250	1	1.0E-06	70	365	2.4E-06	1.0E-02	2.4E-04	0%
cis-1,2-Dichloroethene	58	330	1	250	1	1.0E-06	70	365	1.9E-04	1.0E-01	1.9E-03	0%
Tetrachloroethene	72	330	1	250	1	1.0E-06	70	365	2.3E-04	1.0E-01	2.3E-03	0%
Toluene	370	330	1	250	1	1.0E-06	70	365	1.2E-03	2.0E+00	6.0E-04	0%
Trichloroethene	150	330	1	250	1	1.0E-06	70	365	4.8E-04	3.0E-04	1.6E+00	**99%**
Vinyl Chloride	0.086	330	1	250	1	1.0E-06	70	365	2.8E-07	3.0E-03	9.3E-05	0%
Xylenes (total)	160	330	1	250	1	1.0E-06	70	365	5.2E-04	2.0E-01	2.6E-03	0%

Hazard Index = 1.6E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Subchronic Dermal Adj. RfD [4]** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	2.1E-06	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.64	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	1.2E-07	8.0E-01	7.2E-01	1.7E-07	0%
Benzene	2.1	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	6.8E-09	8.0E-01	3.2E-03	2.1E-06	0%
Chloroform	0.75	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	2.4E-09	8.0E-01	8.0E-03	3.0E-07	0%
cis-1,2-Dichloroethene	58	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	1.9E-07	8.0E-01	8.0E-02	2.3E-06	0%
Tetrachloroethene	72	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	1.4E-05	8.0E-01	8.0E-02	1.7E-04	0%
Toluene	370	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	7.2E-05	8.0E-01	1.6E+00	4.5E-05	0%
Trichloroethene	150	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	2.9E-05	8.0E-01	2.4E-04	1.2E-01	**100%**
Vinyl Chloride	0.086	3,300	0.2	0.0005	250	1	1	1.0E-06	70	365	2.8E-10	8.0E-01	2.4E-03	1.2E-07	0%
Xylenes (total)	160	3,300	0.2	0.03	250	1	1	1.0E-06	70	365	3.1E-05	8.0E-01	1.6E-01	1.9E-04	0%

Hazard Index = 1.2E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
(4): Subchronic RfDs were not available for iron, thallium, benzene, trichloroethene, vinyl chloride or xylenes, therefore, chronic values were implemented.

Future Excavation Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s /\ PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} /\ BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} /\ BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i** **Subchronic Inhalation RfD** [(4)] (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	NA	3.91E+03	1	250	1	8	70	365	2.2E-04	7.00E-01	3.1E-04	0%
1,4-Dichlorobenzene	0.64	NA	1.29E+04	1	250	1	8	70	365	3.9E-06	7.14E-01	5.4E-06	0%
Benzene	2.1	NA	2.73E+03	1	250	1	8	70	365	6.0E-05	8.57E-03	7.0E-03	1%
Chloroform	0.75	NA	2.66E+03	1	250	1	8	70	365	2.2E-05	1.40E-02	1.6E-03	0%
cis-1,2-Dichloroethene	58	NA	2.90E+03	1	250	1	8	70	365	1.6E-03	5.71E-02	2.7E-02	4%
Tetrachloroethene	72	NA	2.55E+03	1	250	1	8	70	365	2.2E-03	1.00E-02	2.2E-01	**32%**
Toluene	370	NA	3.98E+03	1	250	1	8	70	365	7.3E-03	1.43E+00	5.1E-03	1%
Trichloroethene	150	NA	3.26E+03	1	250	1	8	70	365	3.6E-03	1.0E-02	3.6E-01	**52%**
Vinyl Chloride	0.086	NA	1.04E+03	1	250	1	8	70	365	6.5E-06	2.9E-02	2.3E-04	0%
Xylenes (total)	160	NA	6.10E+03	1	250	1	8	70	365	2.1E-03	2.9E-02	7.2E-02	**10%**

Hazard Index = 6.9E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable
(4): A subchronic RfD was only available for 1,4-dichlorobenzene, therefore, chronic values were implemented or the remainder of the chemicals.

Future Excavation Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	330	1	250	1	1.0E-06	70	25,550	5.1E-07	NA	NA	0%
1,4-Dichlorobenzene	0.64	330	1	250	1	1.0E-06	70	25,550	3.0E-08	2.4E-02	7.1E-10	0%
Benzene	2.1	330	1	250	1	1.0E-06	70	25,550	9.7E-08	5.5E-02	5.3E-09	0%
Chloroform	0.75	330	1	250	1	1.0E-06	70	25,550	3.5E-08	1.0E-02	3.5E-10	0%
cis-1,2-Dichloroethene	58	330	1	250	1	1.0E-06	70	25,550	2.7E-06	NA	NA	0%
Tetrachloroethene	72	330	1	250	1	1.0E-06	70	25,550	3.3E-06	5.4E-01	1.8E-06	**39%**
Toluene	370	330	1	250	1	1.0E-06	70	25,550	1.7E-05	NA	NA	0%
Trichloroethene	150	330	1	250	1	1.0E-06	70	25,550	6.9E-06	4.0E-01	2.8E-06	**61%**
Vinyl Chloride	0.086	330	1	250	1	1.0E-06	70	25,550	4.0E-09	7.2E-01	2.9E-09	0%
Xylenes (total)	160	330	1	250	1	1.0E-06	70	25,550	7.4E-06	NA	NA	0%

Excess Lifetime Cancer Risk = 4.6E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$

where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$** **Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	3.0E-08	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.64	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.8E-09	8.0E-01	3.0E-02	5.3E-11	0%
Benzene	2.1	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	9.7E-11	8.0E-01	6.9E-02	6.7E-12	0%
Chloroform	0.75	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	3.5E-11	8.0E-01	1.3E-02	4.3E-13	0%
cis-1,2-Dichloroethene	58	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	2.7E-09	8.0E-01	NA	NA	0%
Tetrachloroethene	72	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	2.0E-07	8.0E-01	6.8E-01	1.3E-07	**39%**
Toluene	370	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	1.0E-06	8.0E-01	NA	NA	0%
Trichloroethene	150	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	4.2E-07	8.0E-01	5.0E-01	2.1E-07	**61%**
Vinyl Chloride	0.086	3,300	0.2	0.0005	250	1	1	1.0E-06	70	25,550	4.0E-12	8.0E-01	9.0E-01	3.6E-12	0%
Xylenes (total)	160	3,300	0.2	0.03	250	1	1	1.0E-06	70	25,550	4.4E-07	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 3.4E-07

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Excavation Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	NA	3.91E+03	1	250	1	8	70	25,550	3.1E-06	9.10E-02	2.9E-07	1%
1,4-Dichlorobenzene	0.64	NA	1.29E+04	1	250	1	8	70	25,550	5.5E-08	2.20E-02	1.2E-09	0%
Benzene	2.1	NA	2.73E+03	1	250	1	8	70	25,550	8.6E-07	2.70E-02	2.3E-08	0%
Chloroform	0.75	NA	2.66E+03	1	250	1	8	70	25,550	3.2E-07	8.10E-02	2.6E-08	0%
cis-1,2-Dichloroethene	58	NA	2.90E+03	1	250	1	8	70	25,550	2.2E-05	NA	NA	0%
Tetrachloroethene	72	NA	2.55E+03	1	250	1	8	70	25,550	3.2E-05	2.10E-02	6.6E-07	3%
Toluene	370	NA	3.98E+03	1	250	1	8	70	25,550	1.0E-04	NA	NA	0%
Trichloroethene	150	NA	3.26E+03	1	250	1	8	70	25,550	5.1E-05	3.85E-01	2.0E-05	**95%**
Vinyl Chloride	0.086	NA	1.04E+03	1	250	1	8	70	25,550	9.3E-08	1.54E-02	1.4E-09	0%
Xylenes (total)	160	NA	6.10E+03	1	250	1	8	70	25,550	2.9E-05	NA	NA	0%

Excess Lifetime Cancer Risk = 2.1E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.33
Subsurface Soil
Hot Spot RISB-64
Future Industrial Worker

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-64	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane	NA	NA	7.E-06			7.E-06	NA	NA	3.E-04			3.E-04
			1,4-Dichlorobenzene	3.E-09	1.E-09	3.E-08			3.E-08	1.E-05	5.E-06	2.E-05			3.E-05
			Benzene	2.E-08	2.E-10	6.E-07			6.E-07	3.E-04	2.E-06	7.E-03			7.E-03
			Chloroform	1.E-09	1.E-11	6.E-07			6.E-07	4.E-05	3.E-07	2.E-03			2.E-03
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	3.E-03	2.E-05	3.E-02			3.E-02
			Tetrachloroethene	7.E-06	3.E-06	2.E-05			3.E-05	4.E-03	2.E-03	2.E-01			2.E-01
			Toluene	NA	NA	NA			0.E+00	2.E-03	1.E-03	5.E-03			8.E-03
			Trichloroethene	1.E-05	5.E-06	5.E-04			5.E-04	2.E-01	1.E-01	4.E-01			7.E-01
			Vinyl chloride	1.E-08	9.E-11	4.E-08			5.E-08	1.E-05	1.E-07	2.E-04			2.E-04
			Xylenes	NA	NA	NA			0.E+00	4.E-04	2.E-04	7.E-02			7.E-02
			Chemical Total	2.E-05	9.E-06	5.E-04	0.E+00	0.E+00	5.E-04	3.E-01	1.E-01	7.E-01	0.E+00	0.E+00	1.E+00
		Exposure Point Total							5.E-04						1.E+00
	Exposure Medium Total								5.E-04						1.E+00
Soil Total									5.E-04						1.E+00
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					5.E-03	5.E-03
			1,1,2-Trichloroethane					2.E-08	2.E-08					3.E-04	3.E-04
			1,1-Dichloroethane					NA	0.E+00					2.E-03	2.E-03
			1,1-Dichloroethene					NA	0.E+00					3.E-02	3.E-02
			1,2-Dichlorobenzene					NA	0.E+00					4.E-04	4.E-04
			1,2-Dichloroethane					2.E-05	2.E-05					7.E-04	7.E-04
			1,4-Dichlorobenzene					8.E-08	8.E-08					4.E-05	4.E-05
			2-Chlorophenol					NA	0.E+00					2.E-04	2.E-04
			4-Methyl-2-pentanone					NA	0.E+00					1.E-05	1.E-05
			Benzene					6.E-07	6.E-07					7.E-03	7.E-03
			Bis(2-ethylhexyl)phthalate						0.E+00						0.E+00
			Chlorobenzene					NA	0.E+00					4.E-03	4.E-03
			Chloroethane					3.E-07	3.E-07					1.E-03	1.E-03
			Chloroform					5.E-07	5.E-07					1.E-03	1.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					1.E-02	1.E-02
			Ethylbenzene					NA	0.E+00					5.E-03	5.E-03
			Iron						0.E+00						0.E+00
			Isopropylbenzene					NA	0.E+00					1.E-02	1.E-02
			Manganese						0.E+00						0.E+00
			Methyl tert butyl ether					NA	0.E+00					4.E-06	4.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					7.E-08	7.E-08					4.E-04	4.E-04
			Naphthalene					NA	0.E+00					5.E-04	5.E-04
			Tetrachloroethene					1.E-05	1.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					2.E-03	2.E-03
			Trichloroethene					1.E-04	1.E-04					9.E-02	9.E-02
			Vinyl chloride					3.E-06	3.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					2.E-01	2.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	2.E-04	2.E-04	0.E+00	0.E+00	0.E+00	0.E+00	6.E-01	6.E-01
		Exposure Point Total							2.E-04						6.E-01
	Exposure Medium Total								2.E-04						6.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,1,2-Trichloroethane	2.E-06	2.E-06				5.E-06	3.E-02	3.E-02				6.E-02
			1,1-Dichloroethane	NA	NA				0.E+00	2.E-02	2.E-02				4.E-02
			1,1-Dichloroethene	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	NA	NA				0.E+00
			1,2-Dichloroethane	1.E-03	1.E-03				3.E-03	NA	NA				0.E+00
			1,4-Dichlorobenzene	4.E-06	4.E-06				7.E-06	1.E-02	1.E-02				3.E-02
			2-Chlorophenol	NA	NA				0.E+00	5.E-02	5.E-02				1.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	9.E-02	9.E-02				2.E-01
			Benzene	2.E-05	2.E-05				3.E-05	2.E-01	2.E-01				4.E-01
			Bis(2-ethylhexyl)phthalate	3.E-07	3.E-07				6.E-07	3.E-03	3.E-03				6.E-03
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			Chloroethane	2.E-06	2.E-06				4.E-06	5.E-03	5.E-03				9.E-03
			Chloroform	1.E-06	1.E-06				3.E-06	4.E-02	4.E-02				7.E-02
			cis-1,2-Dichloroethene	NA	NA				0.E+00	1.E+00	1.E+00				3.E+00
			Ethylbenzene	NA	NA				0.E+00	2.E-01	2.E-01				4.E-01
			Iron	NA	NA				0.E+00	1.E-01	1.E-01				2.E-01
			Isopropylbenzene	NA	NA				0.E+00	1.E-01	1.E-01				3.E-01
			Manganese	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Industrial Worker
Receptor:	Adult

Medium	Exposure Medium	Exposure Point	COPC	Cancer Ingestion	Cancer Dermal	Cancer Inhalation of Dust and Vapors	Cancer Inhalation Ambient Air	Cancer Inhalation Indoor Air	Cancer Exposure Route Total	Non-Carcinogenic Hazard Quotient Ingestion	Non-Carcinogenic Hazard Quotient Dermal	Non-Carcinogenic Hazard Quotient Inhalation of Dust and Vapors	Non-Carcinogenic Hazard Quotient Inhalation Ambient Air	Non-Carcinogenic Hazard Quotient Inhalation Indoor Air	Non-Carcinogenic Hazard Quotient Exposure Route Total
			Methyl tert butyl ether	6.E-07	6.E-07				1.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	1.E-05	1.E-05				2.E-05	7.E-02	7.E-02				1.E-01
			Naphthalene	NA	NA				0.E+00	4.E-03	4.E-03				9.E-03
			Tetrachloroethene	2.E-03	2.E-03				4.E-03	9.E-01	9.E-01				2.E+00
			Toluene	NA	NA				0.E+00	6.E-01	6.E-01				1.E+00
			Trichloroethene	1.E-03	1.E-03				2.E-03	3.E+01	3.E+01				5.E+01
			Vinyl chloride	3.E-04	3.E-04				6.E-04	4.E-01	4.E-01				8.E-01
			Xylenes (Total)	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Chemical Total	5.E-03	5.E-03	0.E+00	0.E+00	0.E+00	9.E-03	3.E+01	3.E+01	0.E+00	0.E+00	0.E+00	6.E+01
		Exposure Point Total							9.E-03						6.E+01
	Exposure Medium Total								9.E-03						6.E+01
Groundwater Total									9.E-03						6.E+01

Total Risk Across All Media = 1.E-02

Total Hazard Across All Media = 63

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	50	1	250	25	1.0E-06	70	9125	5.4E-06	NA	NA	0%
1,4-Dichlorobenzene	0.64	50	1	250	25	1.0E-06	70	9125	3.1E-07	3.0E-02	1.0E-05	0%
Benzene	2.1	50	1	250	25	1.0E-06	70	9125	1.0E-06	4.0E-03	2.6E-04	0%
Chloroform	0.75	50	1	250	25	1.0E-06	70	9125	3.7E-07	1.0E-02	3.7E-05	0%
cis-1,2-Dichloroethene	58	50	1	250	25	1.0E-06	70	9125	2.8E-05	1.0E-02	2.8E-03	1%
Tetrachloroethene	72	50	1	250	25	1.0E-06	70	9125	3.5E-05	1.0E-02	3.5E-03	1%
Toluene	370	50	1	250	25	1.0E-06	70	9125	1.8E-04	8.0E-02	2.3E-03	1%
Trichloroethene	150	50	1	250	25	1.0E-06	70	9125	7.3E-05	3.0E-04	2.4E-01	**96%**
Vinyl Chloride	0.086	50	1	250	25	1.0E-06	70	9125	4.2E-08	3.0E-03	1.4E-05	0%
Xylenes (total)	160	50	1	250	25	1.0E-06	70	9125	7.8E-05	2.0E-01	3.9E-04	0%

Hazard Index = 2.5E-01

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	2.1E-06	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.64	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	1.2E-07	8.0E-01	2.4E-02	5.2E-06	0%
Benzene	2.1	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	6.8E-09	8.0E-01	3.2E-03	2.1E-06	0%
Chloroform	0.75	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	2.4E-09	8.0E-01	8.0E-03	3.0E-07	0%
cis-1,2-Dichloroethene	58	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	1.9E-07	8.0E-01	8.0E-03	2.3E-05	0%
Tetrachloroethene	72	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	1.4E-05	8.0E-01	8.0E-03	1.7E-03	1%
Toluene	370	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	7.2E-05	8.0E-01	6.4E-02	1.1E-03	1%
Trichloroethene	150	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	2.9E-05	8.0E-01	2.4E-04	1.2E-01	**98%**
Vinyl Chloride	0.086	3,300	0.2	0.0005	250	25	1	1.0E-06	70	9125	2.8E-10	8.0E-01	2.4E-03	1.2E-07	0%
Xylenes (total)	160	3,300	0.2	0.03	250	25	1	1.0E-06	70	9125	3.1E-05	8.0E-01	1.6E-01	1.9E-04	0%

Hazard Index = 1.2E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**PEF** Particulate Emission Factor[2] (m^3/kg)	**VF** Volatilization Factor[3] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**RfD_i** **Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	NA	3.91E+03	1	250	25	8	70	9125	2.2E-04	7.00E-01	3.1E-04	0%
1,4-Dichlorobenzene	0.64	NA	1.29E+04	1	250	25	8	70	9125	3.9E-06	2.29E-01	1.7E-05	0%
Benzene	2.1	NA	2.73E+03	1	250	25	8	70	9125	6.0E-05	8.57E-03	7.0E-03	1%
Chloroform	0.75	NA	2.66E+03	1	250	25	8	70	9125	2.2E-05	1.40E-02	1.6E-03	0%
cis-1,2-Dichloroethene	58	NA	2.90E+03	1	250	25	8	70	9125	1.6E-03	5.71E-02	2.7E-02	4%
Tetrachloroethene	72	NA	2.55E+03	1	250	25	8	70	9125	2.2E-03	1.00E-02	2.2E-01	**32%**
Toluene	370	NA	3.98E+03	1	250	25	8	70	9125	7.3E-03	1.43E+00	5.1E-03	1%
Trichloroethene	150	NA	3.26E+03	1	250	25	8	70	9125	3.6E-03	1.0E-02	3.6E-01	**52%**
Vinyl Chloride	0.086	NA	1.04E+03	1	250	25	8	70	9125	6.5E-06	2.9E-02	2.3E-04	0%
Xylenes (total)	160	NA	6.10E+03	1	250	25	8	70	9125	2.1E-03	2.9E-02	7.2E-02	**10%**

Hazard Index = 6.9E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	50	1	250	25	1.0E-06	70	25,550	1.9E-06	9.1E-02	NA	0%
1,4-Dichlorobenzene	0.64	50	1	250	25	1.0E-06	70	25,550	1.1E-07	2.4E-02	2.7E-09	0%
Benzene	2.1	50	1	250	25	1.0E-06	70	25,550	3.7E-07	5.5E-02	2.0E-08	0%
Chloroform	0.75	50	1	250	25	1.0E-06	70	25,550	1.3E-07	1.0E-02	1.3E-09	0%
cis-1,2-Dichloroethene	58	50	1	250	25	1.0E-06	70	25,550	1.0E-05	NA	NA	0%
Tetrachloroethene	72	50	1	250	25	1.0E-06	70	25,550	1.3E-05	5.4E-01	6.8E-06	**39%**
Toluene	370	50	1	250	25	1.0E-06	70	25,550	6.5E-05	NA	NA	0%
Trichloroethene	150	50	1	250	25	1.0E-06	70	25,550	2.6E-05	4.0E-01	1.0E-05	**61%**
Vinyl Chloride	0.086	50	1	250	25	1.0E-06	70	25,550	1.5E-08	7.2E-01	1.1E-08	0%
Xylenes (total)	160	50	1	250	25	1.0E-06	70	25,550	2.8E-05	NA	NA	0%

Excess Lifetime Cancer Risk = 1.7E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$

where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	7.6E-07	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.64	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	4.4E-08	8.0E-01	3.0E-02	1.3E-09	0%
Benzene	2.1	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	2.4E-09	8.0E-01	6.9E-02	1.7E-10	0%
Chloroform	0.75	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	8.6E-10	8.0E-01	1.3E-02	1.1E-11	0%
cis-1,2-Dichloroethene	58	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	6.7E-08	8.0E-01	NA	NA	0%
Tetrachloroethene	72	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	5.0E-06	8.0E-01	6.8E-01	3.4E-06	**39%**
Toluene	370	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	2.6E-05	8.0E-01	NA	NA	0%
Trichloroethene	150	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.0E-05	8.0E-01	5.0E-01	5.2E-06	**61%**
Vinyl Chloride	0.086	3,300	0.2	0.0005	250	25	1	1.0E-06	70	25,550	9.9E-11	8.0E-01	9.0E-01	8.9E-11	0%
Xylenes (total)	160	3,300	0.2	0.03	250	25	1	1.0E-06	70	25,550	1.1E-05	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 8.6E-06

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online
"NA" = Not applicable

Future Industrial Worker Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - Hot Spot RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = (C_s / PEF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (non-VOCs)
$ADD_{inhal\ lung} = (Cs / VF) * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$ (VOCs)
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**PEF** Particulate Emission Factor[(2)] (m^3/kg)	**VF** Volatilization Factor[(3)] (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	NA	3.91E+03	1	250	25	8	70	25,550	7.9E-05	9.10E-02	7.2E-06	1%
1,4-Dichlorobenzene	0.64	NA	1.29E+04	1	250	25	8	70	25,550	1.4E-06	2.20E-02	3.0E-08	0%
Benzene	2.1	NA	2.73E+03	1	250	25	8	70	25,550	2.1E-05	2.70E-02	5.8E-07	0%
Chloroform	0.75	NA	2.66E+03	1	250	25	8	70	25,550	7.9E-06	8.10E-02	6.4E-07	0%
cis-1,2-Dichloroethene	58	NA	2.90E+03	1	250	25	8	70	25,550	5.6E-04	NA	NA	0%
Tetrachloroethene	72	NA	2.55E+03	1	250	25	8	70	25,550	7.9E-04	2.10E-02	1.7E-05	3%
Toluene	370	NA	3.98E+03	1	250	25	8	70	25,550	2.6E-03	NA	NA	0%
Trichloroethene	150	NA	3.26E+03	1	250	25	8	70	25,550	1.3E-03	3.85E-01	5.0E-04	**95%**
Vinyl Chloride	0.086	NA	1.04E+03	1	250	25	8	70	25,550	2.3E-06	1.54E-02	3.6E-08	0%
Xylenes (total)	160	NA	6.10E+03	1	250	25	8	70	25,550	7.3E-04	NA	NA	0%

Excess Lifetime Cancer Risk = 5.2E-04

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Appendix H-5.34
Subsurface Soil
Hot Spot RISB-64
Future Resident

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
Soil	Subsurface Soil	Hot Spot - RISB-64	Arsenic						0.E+00						0.E+00
			Iron						0.E+00						0.E+00
			Manganese						0.E+00						0.E+00
			Thallium						0.E+00						0.E+00
			Vanadium						0.E+00						0.E+00
			1,2-Dichloroethane	8.E-06	2.E-05	6.E-05			8.E-05	NA	NA	1.E-03			1.E-03
			1,4-Dichlorobenzene	2.E-08	3.E-09	1.E-07			1.E-07	3.E-04	3.E-05	6.E-05			4.E-04
			Benzene	2.E-07	4.E-10	2.E-06			2.E-06	7.E-03	1.E-05	2.E-02			3.E-02
			Chloroform	1.E-08	2.E-11	2.E-06			2.E-06	1.E-03	2.E-06	5.E-03			6.E-03
			cis-1,2-Dichloroethene	NA	NA	NA			0.E+00	7.E-02	1.E-04	9.E-02			2.E-01
			Tetrachloroethene	6.E-05	7.E-06	6.E-05			1.E-04	9.E-02	1.E-02	8.E-01			9.E-01
			Toluene	NA	NA	NA			0.E+00	6.E-02	6.E-03	2.E-02			8.E-02
			Trichloroethene	9.E-05	1.E-05	2.E-03			2.E-03	6.E+00	7.E-01	1.E+00			8.E+00
			Vinyl chloride	2.E-07	5.E-07	9.E-06			1.E-05	4.E-04	6.E-07	8.E-04			1.E-03
			Xylenes	NA	NA	NA			0.E+00	1.E-02	1.E-03	2.E-01			3.E-01
			Chemical Total	2.E-04	4.E-05	2.E-03	0.E+00	0.E+00	2.E-03	7.E+00	7.E-01	2.E+00	0.E+00	0.E+00	1.E+01
		Exposure Point Total							2.E-03						1.E+01
	Exposure Medium Total								2.E-03						1.E+01
Soil Total									2.E-03						1.E+01
Groundwater	Shallow	Air	1,1,1-Trichloroethane					NA	0.E+00					6.E-03	6.E-03
			1,1,2-Trichloroethane					4.E-08	4.E-08					4.E-04	4.E-04
			1,1-Dichloroethane					NA	0.E+00					3.E-03	3.E-03
			1,1-Dichloroethene					NA	0.E+00					5.E-02	5.E-02
			1,2-Dichlorobenzene					NA	0.E+00					5.E-04	5.E-04
			1,2-Dichloroethane					3.E-05	3.E-05					1.E-03	1.E-03
			1,4-Dichlorobenzene					1.E-07	1.E-07					6.E-05	6.E-05
			2-Chlorophenol					NA	0.E+00					3.E-04	3.E-04
			4-Methyl-2-pentanone					NA	0.E+00					2.E-05	2.E-05
			Benzene					1.E-06	1.E-06					1.E-02	1.E-02
			Bis(2-ethylhexyl)phthalate					0.E+00	0.E+00					0.E+00	0.E+00
			Chlorobenzene					NA	0.E+00					6.E-03	6.E-03
			Chloroethane					5.E-07	5.E-07					1.E-03	1.E-03
			Chloroform					9.E-07	9.E-07					2.E-03	2.E-03
			cis-1,2-Dichloroethene					NA	0.E+00					2.E-02	2.E-02
			Ethylbenzene					NA	0.E+00					8.E-03	8.E-03
			Iron					0.E+00	0.E+00					0.E+00	0.E+00
			Isopropylbenzene					NA	0.E+00					2.E-02	2.E-02
			Manganese					0.E+00	0.E+00					0.E+00	0.E+00
			Methyl tert butyl ether					NA	0.E+00					6.E-06	6.E-06
			Methylcyclohexane					NA	0.E+00					1.E-02	1.E-02
			Methylene chloride					1.E-07	1.E-07					5.E-04	5.E-04
			Naphthalene					NA	0.E+00					7.E-04	7.E-04
			Tetrachloroethene					2.E-05	2.E-05					2.E-01	2.E-01
			Toluene					NA	0.E+00					3.E-03	3.E-03
			Trichloroethene					2.E-04	2.E-04					1.E-01	1.E-01
			Vinyl chloride					5.E-06	5.E-06					2.E-02	2.E-02
			Xylenes (Total)					NA	0.E+00					3.E-01	3.E-01
			Chemical Total	0.E+00	0.E+00	0.E+00	0.E+00	3.E-04	3.E-04	0.E+00	0.E+00	0.E+00	0.E+00	8.E-01	8.E-01
		Exposure Point Total							3.E-04						8.E-01
	Exposure Medium Total								3.E-04						8.E-01
Groundwater Continued	Shallow and Bedrock	Potable Use	1,1,1-Trichloroethane	NA	NA				0.E+00	4.E-01	4.E-01				8.E-01
			1,1,2-Trichloroethane	4.E-06	4.E-06				7.E-06	1.E-01	1.E-01				2.E-01
			1,1-Dichloroethane	NA	NA				0.E+00	7.E-02	7.E-02				1.E-01
			1,1-Dichloroethene	NA	NA				0.E+00	4.E-01	4.E-01				7.E-01
			1,2,4-Trichlorobenzene	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			1,2-Dichlorobenzene	NA	NA				0.E+00	6.E-02	6.E-02				1.E-01
			1,2-Dichloroethane	1.E-02	1.E-02				2.E-02	NA	NA				0.E+00
			1,4-Dichlorobenzene	6.E-06	6.E-06				1.E-05	9.E-02	9.E-02				2.E-01
			2-Chlorophenol	NA	NA				0.E+00	2.E-01	2.E-01				3.E-01
			4-Methyl-2-pentanone	NA	NA				0.E+00	3.E-01	3.E-01				6.E-01
			Benzene	3.E-05	3.E-05				5.E-05	1.E+00	1.E+00				3.E+00
			Bis(2-ethylhexyl)phthalate	5.E-07	5.E-07				1.E-06	1.E-02	1.E-02				2.E-02
			Bromodichloromethane	0.E+00	0.E+00				0.E+00	0.E+00	0.E+00				0.E+00
			Chlorobenzene	NA	NA				0.E+00	5.E-01	5.E-01				1.E+00
			Chloroethane	3.E-04	3.E-04				7.E-04	3.E-02	3.E-02				6.E-02
			Chloroform	2.E-06	2.E-06				4.E-06	2.E-01	2.E-01				5.E-01
			cis-1,2-Dichloroethene	NA	NA				0.E+00	9.E+00	9.E+00				2.E+01
			Ethylbenzene	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00
			Iron	NA	NA				0.E+00	3.E-01	3.E-01				7.E-01
			Isopropylbenzene	NA	NA				0.E+00	9.E-01	9.E-01				2.E+00
			Manganese	NA	NA				0.E+00	1.E+00	1.E+00				2.E+00

Summary of Receptor Risks and Hazards for COPCs

PSC Site
Rock Hill, South Carolina

Scenario Timeframe:	Future
Receptor Population:	Resident
Receptor:	Adult/Child

Medium	Exposure Medium	Exposure Point	COPC	Cancer						Non-Carcinogenic Hazard Quotient					
				Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total	Ingestion	Dermal	Inhalation of Dust and Vapors	Inhalation Ambient Air	Inhalation Indoor Air	Exposure Route Total
			Methyl tert butyl ether	1.E-06	1.E-06				2.E-06	NA	NA				0.E+00
			Methylcyclohexane	NA	NA				0.E+00	NA	NA				0.E+00
			Methylene chloride	9.E-05	9.E-05				2.E-04	4.E-01	4.E-01				9.E-01
			Naphthalene	NA	NA				0.E+00	1.E-02	1.E-02				3.E-02
			Tetrachloroethene	3.E-03	3.E-03				6.E-03	6.E+00	6.E+00				1.E+01
			Toluene	NA	NA				0.E+00	4.E+00	4.E+00				8.E+00
			Trichloroethene	2.E-03	2.E-03				3.E-03	2.E+02	2.E+02				3.E+02
			Vinyl chloride	1.E-03	1.E-03				2.E-03	3.E+00	3.E+00				5.E+00
			Xylenes (Total)	NA	NA				0.E+00	2.E+00	2.E+00				4.E+00
			Chemical Total	2.E-02	2.E-02	0.E+00	0.E+00	0.E+00	3.E-02	2.E+02	2.E+02	0.E+00	0.E+00	0.E+00	4.E+02
		Exposure Point Total							3.E-02						4.E+02
	Exposure Medium Total								3.E-02						4.E+02
Groundwater Total									3.E-02						4.E+02

Total Risk Across All Media = 4.E-02

Total Hazard Across All Media = 405

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Incidental Ingestion
Subsurface Soil - RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**IR_{soil}** Ingestion Rate (mg/day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	200	1	350	6	1.0E-06	15	2190	1.4E-04	NA	NA	0%
1,4-Dichlorobenzene	0.64	200	1	350	6	1.0E-06	15	2190	8.2E-06	3.0E-02	2.7E-04	0%
Benzene	2.1	200	1	350	6	1.0E-06	15	2190	2.7E-05	4.0E-03	6.7E-03	0%
Chloroform	0.75	200	1	350	6	1.0E-06	15	2190	9.6E-06	1.0E-02	9.6E-04	0%
cis-1,2-Dichloroethene	58	200	1	350	6	1.0E-06	15	2190	7.4E-04	1.0E-02	7.4E-02	1%
Tetrachloroethene	72	200	1	350	6	1.0E-06	15	2190	9.2E-04	1.0E-02	9.2E-02	1%
Toluene	370	200	1	350	6	1.0E-06	15	2190	4.7E-03	8.0E-02	5.9E-02	1%
Trichloroethene	150	200	1	350	6	1.0E-06	15	2190	1.9E-03	3.0E-04	6.4E+00	**96%**
Vinyl chloride	0.086	200	1	350	6	1.0E-06	15	2190	1.1E-06	3.0E-03	3.7E-04	0%
Xylenes	160	200	1	350	6	1.0E-06	15	2190	2.0E-03	2.0E-01	1.0E-02	0%

Hazard Index = 6.6E+00

Notes:
(1): Soil EPCs (see Appendix H-3)

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Dermal Contact
Subsurface Soil - RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_n$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_n	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [(1)] (mg/kg)	**SA** Skin Surface Area Exposed (cm^2)	**AF** Skin-soil Adherence Factor (mg/cm^2-event)	**AE_d** Dermal Absorption Efficiency [(2)] (unitless)	**EF** Exposure Frequency (days/year)	**ED** Exposure Duration (years)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (years)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [(3)] (unitless)	**$RfD_{dermal-adj}$ Chronic Dermal Adj. RfD** (mg/kg-day)	**Hazard Quotient**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.2E-05	8.0E-01	NA	NA	0%
1,4-Dichlorobenzene	0.64	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	6.9E-07	8.0E-01	2.4E-02	2.9E-05	0%
Benzene	2.1	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	3.8E-08	8.0E-01	3.2E-03	1.2E-05	0%
Chloroform	0.75	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	1.3E-08	8.0E-01	8.0E-03	1.7E-06	0%
cis-1,2-Dichloroethene	58	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	1.0E-06	8.0E-01	8.0E-03	1.3E-04	0%
Tetrachloroethene	72	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	7.7E-05	8.0E-01	8.0E-03	9.7E-03	1%
Toluene	370	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	4.0E-04	8.0E-01	6.4E-02	6.2E-03	1%
Trichloroethene	150	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.6E-04	8.0E-01	2.4E-04	6.7E-01	**98%**
Vinyl chloride	0.086	2,800	0.2	0.0005	350	6	1	1.0E-06	15	2190	1.5E-09	8.0E-01	2.4E-03	6.4E-07	0%
Xylenes	160	2,800	0.2	0.03	350	6	1	1.0E-06	15	2190	1.7E-04	8.0E-01	1.6E-01	1.1E-03	0%

Hazard Index = 6.9E-01

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
(3): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004 or
U.S. EPA Region 4 RAGS Supplement, online

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Inhalation Exposure
Subsurface Soil - RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly} * EF * ED * ET_{inh} / BW * AT_n$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_n	= averaging time (days)

Chemical	C_s Conc. in Soil [1] (mg/kg)	PEF Particulate Emission Factor[2] (m^3/kg)	VF Volatilization Factor[3] (m^3/kg)	$IR_{air\text{-}hourly}$ Hourly Inhalation Rate (m^3/hr)	EF Exposure Frequency (day/year)	ED Duration of Exposure (years)	ET_{inh} Exposure Time (hr/day)	BW Body Weight (kg)	AT_n Averaging Time Noncancer (days)	ADD_{inhal} Average Daily Dose (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient	Percent Distribution of Risk (%)
1,2-Dichloroethane	11	NA	3.91E+03	0.26	350	6	16	15	2190	7.5E-04	7.00E-01	1.1E-03	0%
1,4-Dichlorobenzene	0.64	NA	1.29E+04	0.26	350	6	16	15	2190	1.3E-05	2.29E-01	5.7E-05	0%
Benzene	2.1	NA	2.73E+03	0.26	350	6	16	15	2190	2.0E-04	8.57E-03	2.4E-02	1%
Chloroform	0.75	NA	2.66E+03	0.26	350	6	16	15	2190	7.5E-05	1.40E-02	5.4E-03	0%
cis-1,2-Dichloroethene	58	NA	2.90E+03	0.26	350	6	16	15	2190	5.3E-03	5.71E-02	9.3E-02	4%
Tetrachloroethene	72	NA	2.55E+03	0.26	350	6	16	15	2190	7.5E-03	1.00E-02	7.5E-01	**32%**
Toluene	370	NA	3.98E+03	0.26	350	6	16	15	2190	2.5E-02	1.43E+00	1.7E-02	1%
Trichloroethene	150	NA	3.26E+03	0.26	350	6	16	15	2190	1.2E-02	1.0E-02	1.2E+00	**52%**
Vinyl chloride	0.086	NA	1.04E+03	0.26	350	6	16	15	2190	2.2E-05	2.9E-02	7.7E-04	0%
Xylenes	160	NA	6.10E+03	0.26	350	6	16	15	2190	7.0E-03	2.9E-02	2.4E-01	**10%**

Hazard Index = 2.4E+00

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Incidental Ingestion
Subsurface Soil - RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * IR_{soil} * AE_i * EF * ED * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
IR_{soil}	= daily soil ingestion rate on days exposed during the exposure period (mg/day)
AE_i	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**IF_{soil}** Age Adgusted Soil Ingestion Factor (mg-year/kg-day)	**AE_i** Ingestion Absorption Efficiency (unitless)	**EF** Exposure Frequency (day/year)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**SF_o Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11		**chemical is considered mutagenic, see Table xx for risk calculation**						7.88E-06	5%
1,4-Dichlorobenzene	0.64	114	1	350	1.0E-06	25,550	1.0E-06	2.4E-02	2.4E-08	0%
Benzene	2.1	114	1	350	1.0E-06	25,550	3.3E-06	5.5E-02	1.8E-07	0%
Chloroform	0.75	114	1	350	1.0E-06	25,550	1.2E-06	1.0E-02	1.2E-08	0%
cis-1,2-Dichloroethene	58	114	1	350	1.0E-06	25,550	9.1E-05	NA	NA	0%
Tetrachloroethene	72	114	1	350	1.0E-06	25,550	1.1E-04	5.4E-01	6.1E-05	**37%**
Toluene	370	114	1	350	1.0E-06	25,550	5.8E-04	NA	NA	0%
Trichloroethene	150	114	1	350	1.0E-06	25,550	2.3E-04	4.0E-01	9.4E-05	**58%**
Vinyl chloride	0.086		**chemical is considered mutagenic, see Table xx for risk calculation**						2.0E-07	0%
Xylenes	160	114	1	350	1.0E-06	25,550	2.5E-04	NA	NA	0%

Excess Lifetime Cancer Risk = 1.6E-04

Notes:
(1): Soil EPCs (see Appendix H-3)
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Dermal Contact
Subsurface Soil - RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_s * SA * AF * AE_d * EF * ED * EV * C_1 / BW * AT_c$
where:

C_s	= representative concentration of contamination in the soil at the exposure point during the period of exposure (mg/kg)
SA	= skin surface area in contact with soil on days exposed (cm^2)
AF	= mass of soil in contact with the unit surface area of skin (mg/cm^2-event)
AE_d	= absorption efficiency (unitless)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (years)
EV	= event frequency (events/day)
BW	= body weight (kg)
AT_c	= averaging time (days)
C_1	= conversion factor (mass) (kg/mg)

Chemical	**C_s** Conc. in Soil [1] (mg/kg)	**SFS** Age-Adjusted Dermal Factor (mg-year/kg-event)	**AE_d** Dermal Absorption Efficiency [2] (unitless)	**EF** Exposure Frequency (days/year)	**EV** Event Frequency (events/day)	**C_1** Conv. Factor (mass) (kg/mg)	**AT_c** Averaging Time Carcinogens (days)	**ADD_{soil}** Average Daily Dose (mg/kg-day)	**ABS_{GI}** GI Absorption Efficiency [3] (unitless)	**$SF_{dermal-adj}$ Dermal Adj. Cancer Slope Factor** $(mg/kg-day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11		**chemical is considered mutagenic, see Table xx for risk calculation**								1.7E-05	**48%**
1,4-Dichlorobenzene	0.64	360	0.03	350	1	1.0E-06	25,550	9.5E-08	8.0E-01	3.0E-02	2.8E-09	0%
Benzene	2.1	360	0.0005	350	1	1.0E-06	25,550	5.2E-09	8.0E-01	6.9E-02	3.6E-10	0%
Chloroform	0.75	360	0.0005	350	1	1.0E-06	25,550	1.8E-09	8.0E-01	1.3E-02	2.3E-11	0%
cis-1,2-Dichloroethene	58	360	0.0005	350	1	1.0E-06	25,550	1.4E-07	8.0E-01	NA	NA	0%
Tetrachloroethene	72	360	0.03	350	1	1.0E-06	25,550	1.1E-05	8.0E-01	6.8E-01	7.2E-06	**20%**
Toluene	370	360	0.03	350	1	1.0E-06	25,550	5.5E-05	8.0E-01	NA	NA	0%
Trichloroethene	150	360	0.03	350	1	1.0E-06	25,550	2.2E-05	8.0E-01	5.0E-01	1.1E-05	**31%**
Vinyl chloride	0.086		**chemical is considered mutagenic, see Table xx for risk calculation**								5.0E-07	1%
Xylenes	160	360	0.03	350	1	1.0E-06	25,550	2.4E-05	8.0E-01	NA	NA	0%

Excess Lifetime Cancer Risk = 3.6E-05

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment, 2004
"NA" = Not applicable

Future Adult (1-31) Resident Scenario
Estimation of Cancer Risk from Inhalation Exposure
Subsurface Soil - RISB-64

PSC Site
Rock Hill, South Carolina

$ADD_{inhal\ lung} = [(C_s / PEF) + (Cs / VF)] * IR_{air\text{-}hourly=} * EF * ED * ET_{inh} / BW * AT_c$
where:

C_s	= concentration of contaminant in the airborne particulates (mg/kg)
PEF	= particulate emission factor (m^3/kg)
VF	= volatilization factor (m^3/kg)
$IR_{air\text{-}hourly}$	= inhalation rate for the receptor of concern during exposure period (m^3/hr)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure event (year)
ET_{inh}	= exposure time (hr/day)
BW	= body weight (kg)
AT_c	= averaging time (days)

Chemical	**C_s** Conc. in Soil (1) (mg/kg)	**PEF** Particulate Emission Factor(2) (m^3/kg)	**VF** Volatilization Factor(3) (m^3/kg)	**$IR_{air\text{-}hourly}$** Hourly Inhalation Rate (m^3/hr)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure Period (years)	**ET_{inh}** Exposure Time (hr/day)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_{inhal}** Average Daily Dose (mg/kg-day)	**CSF_{inh}** Cancer Slope Factor $(mg/(kg/day))^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
1,2-Dichloroethane	11			**chemical is considered mutagenic, see Table xx for risk calculation**								5.7E-05	3%
1,4-Dichlorobenzene	0.64	NA	1.29E+04	1	350	30	16	70	25,550	4.6E-06	2.20E-02	1.0E-07	0%
Benzene	2.1	NA	2.73E+03	1	350	30	16	70	25,550	7.2E-05	2.70E-02	1.9E-06	0%
Chloroform	0.75	NA	2.66E+03	1	350	30	16	70	25,550	2.6E-05	8.10E-02	2.1E-06	0%
cis-1,2-Dichloroethene	58	NA	2.90E+03	1	350	30	16	70	25,550	1.9E-03	NA	NA	0%
Tetrachloroethene	72	NA	2.55E+03	1	350	30	16	70	25,550	2.7E-03	2.10E-02	5.6E-05	3%
Toluene	370	NA	3.98E+03	1	350	30	16	70	25,550	8.7E-03	NA	NA	0%
Trichloroethene	150	NA	3.26E+03	1	350	30	16	70	25,550	4.3E-03	3.85E-01	1.7E-03	**93%**
Vinyl chloride	0.086			**chemical is considered mutagenic, see Table xx for risk calculation**								9.1E-06	1%
Xylenes	160	NA	6.10E+03	1	350	30	16	70	25,550	2.5E-03	NA	NA	0%
											Excess Lifetime Cancer Risk =	**1.8E-03**	

Notes:
(1): Soil EPCs (see Appendix H-3)
(2): U.S. EPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2002)
(3): U.S. EPA Region 9 PRG Tables (online)
"NA" = Not applicable

Parameter	CS (mg/kg)	0-2 Years Child Mult. (1/day)	2-6 Years Child Mult. (1/day)	6-15 Years Child Mult. (1/day)	15-30 Years Adult Mult. (1/day)	CSF $(mg/kg*day)^{-1}$	CSF adjustment factor 0-2	CSF adjustment factor 2-6	CSF adjustment factor 6-15	CSF adjustment factor 15-30	ED 0-2	ED 2-6	ED 6-15	ED 15-30	EP	Risk 0-2	Risk 2-6	Risk 6-15	Risk 15-30	Total Risk	
1,2-Dichloroethane	11	3.31E-05	2.30E-05	7.06E-06	5.92E-06	9.1E-02	10	3	3	1	2	4	9	15	70	9.47E-06	3.95E-06	2.72E-06	1.27E-06	1.74E-05	**Dermal Risk**
1,2-Dichloroethane	11	1.74E-05	9.59E-06	2.46E-06	1.41E-06	9.1E-02	10	3	3	1	2	4	9	15	70	4.99E-06	1.65E-06	9.49E-07	3.02E-07	7.88E-06	**Ingestion risk**
1,2-Dichloroethane	11	5.36E-05	5.11E-05	5.25E-05	5.79E-05	9.1E-02	10	3	3	1	2	4	9	15	70	1.53E-05	8.78E-06	2.03E-05	1.24E-05	5.68E-05	**inhalation risk**

Parameter	CS (mg/kg)	0-6 Years Child Mult. (1/day)	6-15 Years Child Mult. (1/day)	15-30 Years Adult Mult. (1/day)	Child CSF $(mg/kg*day)^{-1}$	Adult CSF $(mg/kg*day)^{-1}$	ED 0-6	ED 6-15	ED 15-30	EP	Risk 0-6	Risk 6-15	Risk 15-30	Total Risk	
Vinyl chloride	0.086	1.28E-05	2.46E-06	1.41E-06	1.5E+00	7.20E-01	6	9	15	70	1.41E-07	4.08E-08	1.87E-08	2.01E-07	**ingestion**
Vinyl chloride	0.086	2.76E-05	7.06E-06	5.92E-06	1.5E+00	7.20E-01	6	9	15	70	3.05E-07	1.17E-07	7.86E-08	5.00E-07	**dermal**
Vinyl chloride	0.086	2.49E-04	2.05E-04	2.26E-04	1.5E+00	7.20E-01	6	9	15	70	2.76E-06	3.39E-06	2.99E-06	9.14E-06	**dermal**

Appendix H-5.35
Groundwater Inhalation Calculations
Current O&M Worker

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
71556	1.64E+03	1,1,1-Trichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	0.0E+00	5.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,820	1.14E-02	4.79E-01	1.77E-04	4.50E-03	1.38E-04	4.67E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	7.88E+05	0.10	1.55E+00	4.50E-03	4.00E+02	5.53E+03	4.18E-05	3.29E+01	NA	5.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.33E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.7E-03

MESSAGE SUMMARY BELOW:

END

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)
C	0.61
CL	0.34
L	0.50
LS	4.38
S	26.78
SC	0.47
SCL	0.55
SI	1.82
SIC	0.40
SICL	0.46
SIL	0.76
SL	1.60

Chemical Properties Lookup Table

CAS No.	Chemical	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	URF extrapolated (X)	RfC extrapolated (X)
56235	Carbon tetrachloride	1.5E-05	0.0E+00		
57749	Chlordane	1.0E-04	7.0E-04		
58899	gamma-HCH (Lindane)	3.7E-04	1.1E-03	X	X
60297	Ethyl ether	0.0E+00	7.0E-01		X
60571	Dieldrin	4.6E-03	1.8E-04		X
67641	Acetone	0.0E+00	3.5E-01		X
67663	Chloroform	2.3E-05	4.9E-02		
67721	Hexachloroethane	4.0E-06	3.5E-03		X
71432	Benzene	7.8E-06	3.0E-02		
71556	1,1,1-Trichloroethane	0.0E+00	5.0E+00		
72435	Methoxychlor	0.0E+00	1.8E-02		X
72559	DDE	9.7E-05	0.0E+00	X	
74839	Methyl bromide	0.0E+00	5.0E-03		
74873	Methyl chloride (chloromethane)	1.0E-06	9.0E-02		
74908	Hydrogen cyanide	0.0E+00	3.0E-03		
74953	Methylene bromide	0.0E+00	3.5E-02		X
75003	Chloroethane (ethyl chloride)	8.3E-07	1.0E+00	X	
75014	Vinyl chloride (chloroethene)	4.4E-06	1.0E-01		
75058	Acetonitrile	0.0E+00	6.0E-02		
75070	Acetaldehyde	2.2E-06	9.0E-03		
75092	Methylene chloride	4.7E-07	1.1E+00		
75150	Carbon disulfide	0.0E+00	7.0E-01		
75218	Ethylene oxide	1.0E-04	0.0E+00		
75252	Bromoform	1.1E-06	7.0E-02		X
75274	Bromodichloromethane	1.8E-05	7.0E-02	X	X
75296	2-Chloropropane	0.0E+00	1.0E-01		
75343	1,1-Dichloroethane	0.0E+00	4.9E-01		
75354	1,1-Dichloroethylene	0.0E+00	2.0E-01		
75456	Chlorodifluoromethane	0.0E+00	5.0E+01		
75694	Trichlorofluoromethane	0.0E+00	7.0E-01		
75718	Dichlorodifluoromethane	0.0E+00	2.0E-01		
76131	1,1,2-Trichloro-1,2,2-trifluoroethan	0.0E+00	3.0E+01		
76448	Heptachlor	1.3E-03	1.8E-03		X
77474	Hexachlorocyclopentadiene	0.0E+00	2.0E-04		
78831	Isobutanol	0.0E+00	1.1E+00		X
78875	1,2-Dichloropropane	1.9E-05	4.0E-03	X	
78933	Methylethylketone (2-butanone)	0.0E+00	5.0E+00		
79005	1,1,2-Trichloroethane	1.6E-05	1.4E-02		X
79016	Trichloroethylene	1.1E-04	3.5E-02	X	
79209	Methyl acetate	0.0E+00	3.5E+00		X
79345	1,1,2,2-Tetrachloroethane	5.8E-05	2.1E-01		X
79469	2-Nitropropane	2.7E-03	2.0E-02		
80626	Methylmethacrylate	0.0E+00	7.0E-01		
83329	Acenaphthene	0.0E+00	2.1E-01		X
86737	Fluorene	0.0E+00	1.4E-01		X
87683	Hexachloro-1,3-butadiene	2.2E-05	7.0E-04		X
88722	o-Nitrotoluene	0.0E+00	3.5E-02		X
91203	Naphthalene	0.0E+00	3.0E-03		

91576	2-Methylnaphthalene	0.0E+00	7.0E-02		X
92524	Biphenyl	0.0E+00	1.8E-01		X
95476	o-Xylene	0.0E+00	1.0E-01		
95501	1,2-Dichlorobenzene	0.0E+00	1.4E-01		
95578	2-Chlorophenol	0.0E+00	1.8E-02		X
95636	1,2,4-Trimethylbenzene	0.0E+00	6.0E-03		
96184	1,2,3-Trichloropropane	5.7E-04	4.9E-03	X	
96333	Methyl acrylate	0.0E+00	1.1E-01		X
97632	Ethylmethacrylate	0.0E+00	3.2E-01		X
98066	tert-Butylbenzene	0.0E+00	1.4E-01		X
98828	Cumene	0.0E+00	4.0E-01		
98862	Acetophenone	0.0E+00	3.5E-01		X
98953	Nitrobenzene	0.0E+00	2.0E-03		
100414	Ethylbenzene	0.0E+00	1.0E+00		
100425	Styrene	0.0E+00	1.0E+00		
100447	Benzylchloride	4.9E-05	0.0E+00	X	
100527	Benzaldehyde	0.0E+00	3.5E-01		X
103651	n-Propylbenzene	0.0E+00	1.4E-01		X
104518	n-Butylbenzene	0.0E+00	1.4E-01		X
106423	p-Xylene	0.0E+00	1.0E-01		
106467	1,4-Dichlorobenzene	6.3E-06	8.0E-01		
106934	1,2-Dibromoethane (ethylene dibr	2.2E-04	2.0E-04		
106990	1,3-Butadiene	3.0E-02	2.0E-03		
107028	Acrolein	0.0E+00	2.0E-05		
107062	1,2-Dichloroethane	2.6E-05	2.5E+00		
107131	Acrylonitrile	6.8E-05	2.0E-03		
108054	Vinyl acetate	0.0E+00	2.0E-01		
108101	Methylisobutylketone (4-methyl-2-	0.0E+00	3.0E+00		
108383	m-Xylene	0.0E+00	1.0E-01		
108678	1,3,5-Trimethylbenzene	0.0E+00	6.0E-03		
108872	Methylcyclohexane	0.0E+00	3.0E+00		
108883	Toluene	0.0E+00	5.0E+00		
108907	Chlorobenzene	0.0E+00	4.9E-02		
109693	1-Chlorobutane	0.0E+00	1.4E+00		X
110009	Furan	0.0E+00	3.5E-03		X
110543	Hexane	0.0E+00	2.0E-01		
111444	Bis(2-chloroethyl)ether	3.3E-04	0.0E+00		
115297	Endosulfan	0.0E+00	2.1E-02		X
118741	Hexachlorobenzene	4.6E-04	2.8E-03		X
120821	1,2,4-Trichlorobenzene	0.0E+00	4.0E-03		
123739	Crotonaldehyde (2-butenal)	5.4E-04	0.0E+00	X	
124481	Chlorodibromomethane	2.4E-05	7.0E-02	X	X
126987	Methacrylonitrile	0.0E+00	7.0E-04		
126998	2-Chloro-1,3-butadiene (chloropre	0.0E+00	7.0E-03		
127184	Tetrachloroethylene	6.0E-06	3.5E-02		
129000	Pyrene	0.0E+00	1.1E-01		X
132649	Dibenzofuran	0.0E+00	1.4E-02		X
135988	sec-Butylbenzene	0.0E+00	1.4E-01		X
141786	Ethylacetate	0.0E+00	3.2E+00		X
156592	cis-1,2-Dichloroethylene	0.0E+00	2.0E-01		X
156605	trans-1,2-Dichloroethylene	0.0E+00	7.0E-02		X
205992	Benzo(b)fluoranthene	2.1E-04	0.0E+00	X	
218019	Chrysene	2.1E-06	0.0E+00	X	
309002	Aldrin	4.9E-03	1.1E-04		X
319846	alpha-HCH (alpha-BHC)	1.8E-03	0.0E+00		
541731	1,3-Dichlorobenzene	0.0E+00	1.1E-01		X
542756	1,3-Dichloropropene	4.0E-06	2.0E-02		
630206	1,1,1,2-Tetrachloroethane	7.4E-06	1.1E-01		X
1634044	MTBE	0.0E+00	3.0E+00		
7439976	Mercury (elemental)	0.0E+00	3.0E-04		

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
79005	6.00E+00	1,1,2-Trichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.80E-02	8.80E-06	9.11E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	1.4E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,507	5.53E-04	2.33E-02	1.77E-04	4.51E-03	1.94E-04	6.37E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.40E+02	0.10	1.55E+00	4.51E-03	4.00E+02	5.46E+03	4.56E-05	6.38E-03	1.6E-05	1.4E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	4.42E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.5E-08	1.9E-04

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75343	2.16E+02	1,1-Dichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type Lookup Soil Parameters	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil	OR		sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	0.0E+00	4.9E-01

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,384	3.80E-03	1.60E-01	1.77E-04	4.28E-03	1.38E-04	4.67E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	3.46E+04	0.10	1.55E+00	4.28E-03	4.00E+02	8.58E+03	4.18E-05	1.45E+00	NA	4.9E-01

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.06E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.2E-03

MESSAGE SUMMARY BELOW:

END

]

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75354	2.89E+02	1,1-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

VLOOKUP TABLES

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
9.00E-02	1.04E-05	2.60E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	0.0E+00	2.0E-01

END

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	6,353	1.86E-02	7.86E-01	1.77E-04	5.20E-03	1.58E-04	5.35E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.27E+05	0.10	1.55E+00	5.20E-03	4.00E+02	1.75E+03	4.35E-05	9.89E+00	NA	2.0E-01

VLOOKUP TABLES

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	2.25E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.0E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial groundwater conc., C_W (μg/L)	Chemical
107062	2.07E+03	1,2-Dichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to water table, L_{WT} (cm)	**ENTER** SCS soil type directly above water table	**ENTER** Average soil/ groundwater temperature, T_S (^oC)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vandose zone soil vapor permeability, k_v (cm^2)	**ENTER** Vadose zone SCS soil type	**ENTER** Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)	**ENTER** Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
1.04E-01	9.90E-06	9.77E-04	25	7,643	356.65	561.00	1.74E+01	8.52E+03	2.6E-05	2.5E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,457	6.26E-04	2.64E-02	1.77E-04	6.01E-03	2.38E-04	7.89E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	5.46E+04	0.10	1.55E+00	6.01E-03	4.00E+02	6.37E+02	4.80E-05	2.62E+00	2.6E-05	2.5E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	8.52E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.0E-05	4.4E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
95501	4.30E+01	1,2-Dichlorobenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.90E-02	7.90E-06	1.90E-03	25	9,700	453.57	705.00	6.17E+02	1.56E+02	0.0E+00	1.4E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	11,627	1.03E-03	4.34E-02	1.77E-04	3.99E-03	1.48E-04	4.92E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.86E+03	0.10	1.55E+00	3.99E-03	4.00E+02	1.69E+04	4.25E-05	7.92E-02	NA	1.4E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.56E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.3E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
106467	2.20E+01	1,4-Dichlorobenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
6.90E-02	7.90E-06	2.39E-03	25	9,271	447.21	684.75	6.17E+02	7.90E+01	6.3E-06	8.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	11,181	1.33E-03	5.61E-02	1.77E-04	3.99E-03	1.41E-04	4.73E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.23E+03	0.10	1.55E+00	3.99E-03	4.00E+02	1.69E+04	4.19E-05	5.17E-02	6.3E-06	8.0E-01

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	7.90E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
4.8E-08	2.7E-05

MESSAGE SUMMARY BELOW:

END

]

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95578	1.30E+01	2-Chlorophenol

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

END

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
5.01E-02	9.46E-06	3.90E-04	25	9,572	447.53	675.00	3.88E+02	2.20E+04	0.0E+00	1.8E-02

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	11,667	2.11E-04	8.90E-03	1.77E-04	2.91E-03	2.52E-04	7.50E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.16E+02	0.10	1.55E+00	2.91E-03	4.00E+02	6.17E+05	4.74E-05	5.49E-03	NA	1.8E-02

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	2.20E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.3E-04

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

]

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
71432	4.50E+01	Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	5.89E+01	1.79E+03	7.8E-06	3.0E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,061	3.62E-03	1.53E-01	1.77E-04	5.08E-03	1.62E-04	5.48E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	6.87E+03	0.10	1.55E+00	5.08E-03	4.00E+02	2.07E+03	4.38E-05	3.01E-01	7.8E-06	3.0E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.79E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
3.4E-07	4.1E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES |

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES | X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108907	7.60E+01	Chlorobenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.30E-02	8.70E-06	3.69E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	0.0E+00	4.9E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,743	2.21E-03	9.32E-02	1.77E-04	4.22E-03	1.41E-04	4.74E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	7.09E+03	0.10	1.55E+00	4.22E-03	4.00E+02	9.94E+03	4.20E-05	2.97E-01	NA	4.9E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	4.72E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.5E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75003	9.60E+01	Chloroethane (ethyl chloride)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
2.71E-01	1.15E-05	8.80E-03	25	5,879	285.30	460.40	4.40E+00	5.68E+03	8.3E-07	1.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	5,835	6.48E-03	2.73E-01	1.77E-04	1.56E-02	4.75E-04	1.61E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.62E+04	0.10	1.55E+00	1.56E-02	4.00E+02	1.19E+01	5.82E-05	1.52E+00	8.3E-07	1.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.68E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.9E-07	6.3E-04

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
67663	1.90E+01	Chloroform

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type Lookup Soil Parameters	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	4.9E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,492	2.47E-03	1.04E-01	1.77E-04	6.00E-03	1.95E-04	6.57E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.98E+03	0.10	1.55E+00	6.00E-03	4.00E+02	6.40E+02	4.60E-05	9.10E-02	2.3E-05	4.9E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	7.92E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
3.1E-07	7.6E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
156592	7.03E+02	cis-1,2-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	0.0E+00	2.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,674	2.72E-03	1.15E-01	1.77E-04	4.25E-03	1.43E-04	4.80E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	8.06E+04	0.10	1.55E+00	4.25E-03	4.00E+02	9.22E+03	4.21E-05	3.39E+00	NA	2.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	3.50E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	7.0E-03

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
100414	9.72E+02	Ethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	0.0E+00	1.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	10,087	4.63E-03	1.95E-01	1.77E-04	4.33E-03	1.36E-04	4.60E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.90E+05	0.10	1.55E+00	4.33E-03	4.00E+02	7.80E+03	4.16E-05	7.88E+00	NA	1.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.69E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	3.2E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
98828	6.81E+02	Cumene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
6.50E-02	7.10E-06	1.46E-02	25	10,335	425.56	631.10	4.89E+02	6.13E+01	0.0E+00	4.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	12,560	7.55E-03	3.18E-01	1.77E-04	3.75E-03	1.16E-04	3.92E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.17E+05	0.10	1.55E+00	3.75E-03	4.00E+02	3.10E+04	3.94E-05	8.54E+00	NA	4.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	6.13E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	8.8E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108872	4.03E+02	Methylcyclohexane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.35E-02	8.52E-06	1.03E-01	25	7,474	373.90	572.20	7.85E+01	1.40E+01	0.0E+00	3.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,518	6.57E-02	2.77E+00	1.77E-04	4.24E-03	1.28E-04	4.33E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.12E+06	0.10	1.55E+00	4.24E-03	4.00E+02	9.37E+03	4.08E-05	4.55E+01	NA	3.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.40E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	6.2E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial groundwater conc., C_W (μg/L)	Chemical
75092	2.02E+02	Methylene chloride

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to water table, L_{WT} (cm)	**ENTER** SCS soil type directly above water table	**ENTER** Average soil/ groundwater temperature, T_S (^oC)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vandose zone soil vapor permeability, k_v (cm^2)	**ENTER** Vadose zone SCS soil type	**ENTER** Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)	**ENTER** Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
1.01E-01	1.17E-05	2.18E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	1.1E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	6,970	1.51E-03	6.38E-02	1.77E-04	5.83E-03	2.03E-04	6.81E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.29E+04	0.10	1.55E+00	5.83E-03	4.00E+02	7.74E+02	4.64E-05	5.99E-01	4.7E-07	1.1E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.30E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
4.1E-08	2.3E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108101	3.51E+02	Methylisobutylketone (4-methyl-2-

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	1.38E-04	25	8,243	389.50	571.00	9.06E+00	1.90E+04	0.0E+00	3.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,781	8.23E-05	3.47E-03	1.77E-04	4.37E-03	4.79E-04	1.36E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.22E+03	0.10	1.55E+00	4.37E-03	4.00E+02	7.21E+03	5.27E-05	6.42E-02	NA	3.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.90E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	8.8E-06

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
1634044	2.20E+01	MTBE

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
1.02E-01	1.05E-05	6.23E-04	25	6,678	328.30	497.10	7.26E+00	5.10E+04	0.0E+00	3.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,218	4.27E-04	1.80E-02	1.77E-04	5.92E-03	2.68E-04	8.76E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	3.96E+02	0.10	1.55E+00	5.92E-03	4.00E+02	7.02E+02	4.91E-05	1.94E-02	NA	3.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.10E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.7E-06

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
91203	4.40E+00	Naphthalene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
5.90E-02	7.50E-06	4.82E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	0.0E+00	3.0E-03

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	12,851	2.45E-04	1.03E-02	1.77E-04	3.42E-03	2.15E-04	6.74E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	4.55E+01	0.10	1.55E+00	3.42E-03	4.00E+02	8.51E+04	4.63E-05	2.10E-03	NA	3.0E-03

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	3.10E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.9E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
127184	4.75E+02	Tetrachloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	6.0E-06	3.5E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, $D^{eff}{}_V$ (cm^2/s)	Capillary zone effective diffusion coefficient, $D^{eff}{}_{cz}$ (cm^2/s)	Total overall effective diffusion coefficient, $D^{eff}{}_T$ (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,492	1.11E-02	4.70E-01	1.77E-04	4.16E-03	1.27E-04	4.31E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.23E+05	0.10	1.55E+00	4.16E-03	4.00E+02	1.13E+04	4.07E-05	9.08E+00	6.0E-06	3.5E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	2.00E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
8.0E-06	1.1E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
79016	3.89E+02	Trichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.47E+03	1.1E-04	3.5E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,483	6.58E-03	2.77E-01	1.77E-04	4.56E-03	1.42E-04	4.80E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.08E+05	0.10	1.55E+00	4.56E-03	4.00E+02	4.95E+03	4.21E-05	4.55E+00	1.1E-04	3.5E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.47E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
7.3E-05	5.3E-02

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108883	2.40E+03	Toluene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	0.0E+00	5.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,089	4.11E-03	1.73E-01	1.77E-04	5.02E-03	1.58E-04	5.35E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	4.15E+05	0.10	1.55E+00	5.02E-03	4.00E+02	2.26E+03	4.35E-05	1.81E+01	NA	5.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.26E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.5E-03

MESSAGE SUMMARY BELOW:

END

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75014	6.30E+01	Vinyl chloride (chloroethene)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
1.06E-01	1.23E-05	2.69E-02	25	5,250	259.25	432.00	1.86E+01	8.80E+03	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	4,933	2.08E-02	8.76E-01	1.77E-04	6.12E-03	1.85E-04	6.29E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	5.52E+04	0.10	1.55E+00	6.12E-03	4.00E+02	5.68E+02	4.55E-05	2.51E+00	4.4E-06	1.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	8.80E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.6E-06	1.0E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
106423	3.34E+03	p-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	150

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.69E-02	8.44E-06	7.64E-03	25	8,525	411.52	616.20	3.89E+02	1.85E+02	0.0E+00	1.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	10,178	4.48E-03	1.89E-01	1.77E-04	4.44E-03	1.40E-04	4.73E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	6.30E+05	0.10	1.55E+00	4.44E-03	4.00E+02	6.25E+03	4.20E-05	2.64E+01	NA	1.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.85E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.1E-01

MESSAGE SUMMARY BELOW:

END

Appendix H-5.36
Groundwater Inhalation Calculations
Future Industrial Worker

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
71556	1.64E+03	1,1,1-Trichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	0.0E+00	5.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,820	1.14E-02	4.79E-01	1.77E-04	4.50E-03	1.38E-04	4.67E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	7.88E+05	0.10	1.55E+00	4.50E-03	4.00E+02	5.53E+03	4.18E-05	3.29E+01	NA	5.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.33E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.5E-03

MESSAGE SUMMARY BELOW:

END

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)
C	0.61
CL	0.34
L	0.50
LS	4.38
S	26.78
SC	0.47
SCL	0.55
SI	1.82
SIC	0.40
SICL	0.46
SIL	0.76
SL	1.60

Chemical Properties Lookup Table

CAS No.	Chemical	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	URF extrapolated (X)	RfC extrapolated (X)
56235	Carbon tetrachloride	1.5E-05	0.0E+00		
57749	Chlordane	1.0E-04	7.0E-04		
58899	gamma-HCH (Lindane)	3.7E-04	1.1E-03	X	X
60297	Ethyl ether	0.0E+00	7.0E-01		X
60571	Dieldrin	4.6E-03	1.8E-04		X
67641	Acetone	0.0E+00	3.5E-01		X
67663	Chloroform	2.3E-05	4.9E-02		
67721	Hexachloroethane	4.0E-06	3.5E-03		X
71432	Benzene	7.8E-06	3.0E-02		
71556	1,1,1-Trichloroethane	0.0E+00	5.0E+00		
72435	Methoxychlor	0.0E+00	1.8E-02		X
72559	DDE	9.7E-05	0.0E+00	X	
74839	Methyl bromide	0.0E+00	5.0E-03		
74873	Methyl chloride (chloromethane)	1.0E-06	9.0E-02		
74908	Hydrogen cyanide	0.0E+00	3.0E-03		
74953	Methylene bromide	0.0E+00	3.5E-02		X
75003	Chloroethane (ethyl chloride)	8.3E-07	1.0E+00	X	
75014	Vinyl chloride (chloroethene)	4.4E-06	1.0E-01		
75058	Acetonitrile	0.0E+00	6.0E-02		
75070	Acetaldehyde	2.2E-06	9.0E-03		
75092	Methylene chloride	4.7E-07	1.1E+00		
75150	Carbon disulfide	0.0E+00	7.0E-01		
75218	Ethylene oxide	1.0E-04	0.0E+00		
75252	Bromoform	1.1E-06	7.0E-02		X
75274	Bromodichloromethane	1.8E-05	7.0E-02	X	X
75296	2-Chloropropane	0.0E+00	1.0E-01		
75343	1,1-Dichloroethane	0.0E+00	4.9E-01		
75354	1,1-Dichloroethylene	0.0E+00	2.0E-01		
75456	Chlorodifluoromethane	0.0E+00	5.0E+01		
75694	Trichlorofluoromethane	0.0E+00	7.0E-01		
75718	Dichlorodifluoromethane	0.0E+00	2.0E-01		

76131	1,1,2-Trichloro-1,2,2-trifluoroetha	0.0E+00	3.0E+01		
76448	Heptachlor	1.3E-03	1.8E-03		X
77474	Hexachlorocyclopentadiene	0.0E+00	2.0E-04		
78831	Isobutanol	0.0E+00	1.1E+00		X
78875	1,2-Dichloropropane	1.9E-05	4.0E-03	X	
78933	Methylethylketone (2-butanone)	0.0E+00	5.0E+00		
79005	1,1,2-Trichloroethane	1.6E-05	1.4E-02		X
79016	Trichloroethylene	1.1E-04	3.5E-02	X	
79209	Methyl acetate	0.0E+00	3.5E+00		X
79345	1,1,2,2-Tetrachloroethane	5.8E-05	2.1E-01		X
79469	2-Nitropropane	2.7E-03	2.0E-02		
80626	Methylmethacrylate	0.0E+00	7.0E-01		
83329	Acenaphthene	0.0E+00	2.1E-01		X
86737	Fluorene	0.0E+00	1.4E-01		X
87683	Hexachloro-1,3-butadiene	2.2E-05	7.0E-04		X
88722	o-Nitrotoluene	0.0E+00	3.5E-02		X
91203	Naphthalene	0.0E+00	3.0E-03		
91576	2-Methylnaphthalene	0.0E+00	7.0E-02		X
92524	Biphenyl	0.0E+00	1.8E-01		X
95476	o-Xylene	0.0E+00	1.0E-01		
95501	1,2-Dichlorobenzene	0.0E+00	1.4E-01		
95578	2-Chlorophenol	0.0E+00	1.8E-02		X
95636	1,2,4-Trimethylbenzene	0.0E+00	6.0E-03		
96184	1,2,3-Trichloropropane	5.7E-04	4.9E-03	X	
96333	Methyl acrylate	0.0E+00	1.1E-01		X
97632	Ethylmethacrylate	0.0E+00	3.2E-01		X
98066	tert-Butylbenzene	0.0E+00	1.4E-01		X
98828	Cumene	0.0E+00	4.0E-01		
98862	Acetophenone	0.0E+00	3.5E-01		X
98953	Nitrobenzene	0.0E+00	2.0E-03		
100414	Ethylbenzene	0.0E+00	1.0E+00		
100425	Styrene	0.0E+00	1.0E+00		
100447	Benzylchloride	4.9E-05	0.0E+00	X	
100527	Benzaldehyde	0.0E+00	3.5E-01		X
103651	n-Propylbenzene	0.0E+00	1.4E-01		X
104518	n-Butylbenzene	0.0E+00	1.4E-01		X
106423	p-Xylene	0.0E+00	1.0E-01		
106467	1,4-Dichlorobenzene	6.3E-06	8.0E-01		
106934	1,2-Dibromoethane (ethylene dib	2.2E-04	2.0E-04		
106990	1,3-Butadiene	3.0E-02	2.0E-03		
107028	Acrolein	0.0E+00	2.0E-05		
107062	1,2-Dichloroethane	2.6E-05	2.5E+00		
107131	Acrylonitrile	6.8E-05	2.0E-03		
108054	Vinyl acetate	0.0E+00	2.0E-01		
108101	Methylisobutylketone (4-methyl-2	0.0E+00	3.0E+00		
108383	m-Xylene	0.0E+00	1.0E-01		
108678	1,3,5-Trimethylbenzene	0.0E+00	6.0E-03		
108872	Methylcyclohexane	0.0E+00	3.0E+00		
108883	Toluene	0.0E+00	5.0E+00		
108907	Chlorobenzene	0.0E+00	4.9E-02		
109693	1-Chlorobutane	0.0E+00	1.4E+00		X
110009	Furan	0.0E+00	3.5E-03		X
110543	Hexane	0.0E+00	2.0E-01		
111444	Bis(2-chloroethyl)ether	3.3E-04	0.0E+00		
115297	Endosulfan	0.0E+00	2.1E-02		X
118741	Hexachlorobenzene	4.6E-04	2.8E-03		X

120821	1,2,4-Trichlorobenzene	0.0E+00	4.0E-03		
123739	Crotonaldehyde (2-butenal)	5.4E-04	0.0E+00	X	
124481	Chlorodibromomethane	2.4E-05	7.0E-02	X	X
126987	Methacrylonitrile	0.0E+00	7.0E-04		
126998	2-Chloro-1,3-butadiene (chloropr	0.0E+00	7.0E-03		
127184	Tetrachloroethylene	6.0E-06	3.5E-02		
129000	Pyrene	0.0E+00	1.1E-01		X
132649	Dibenzofuran	0.0E+00	1.4E-02		X
135988	sec-Butylbenzene	0.0E+00	1.4E-01		X
141786	Ethylacetate	0.0E+00	3.2E+00		X
156592	cis-1,2-Dichloroethylene	0.0E+00	2.0E-01		X
156605	trans-1,2-Dichloroethylene	0.0E+00	7.0E-02		X
205992	Benzo(b)fluoranthene	2.1E-04	0.0E+00	X	
218019	Chrysene	2.1E-06	0.0E+00	X	
309002	Aldrin	4.9E-03	1.1E-04		X
319846	alpha-HCH (alpha-BHC)	1.8E-03	0.0E+00		
541731	1,3-Dichlorobenzene	0.0E+00	1.1E-01		X
542756	1,3-Dichloropropene	4.0E-06	2.0E-02		
630206	1,1,1,2-Tetrachloroethane	7.4E-06	1.1E-01		X
1634044	MTBE	0.0E+00	3.0E+00		
7439976	Mercury (elemental)	0.0E+00	3.0E-04		

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
79005	6.00E+00	1,1,2-Trichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.80E-02	8.80E-06	9.11E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	1.4E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,507	5.53E-04	2.33E-02	1.77E-04	4.51E-03	1.94E-04	6.37E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.40E+02	0.10	1.55E+00	4.51E-03	4.00E+02	5.46E+03	4.56E-05	6.38E-03	1.6E-05	1.4E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	4.42E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.5E-08	3.1E-04

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75343	2.16E+02	1,1-Dichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	0.0E+00	4.9E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,384	3.80E-03	1.60E-01	1.77E-04	4.28E-03	1.38E-04	4.67E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	3.46E+04	0.10	1.55E+00	4.28E-03	4.00E+02	8.58E+03	4.18E-05	1.45E+00	NA	4.9E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.06E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.0E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75354	2.89E+02	1,1-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
9.00E-02	1.04E-05	2.60E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	0.0E+00	2.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	6,353	1.86E-02	7.86E-01	1.77E-04	5.20E-03	1.58E-04	5.35E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.27E+05	0.10	1.55E+00	5.20E-03	4.00E+02	1.75E+03	4.35E-05	9.89E+00	NA	2.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	2.25E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	3.4E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
107062	2.07E+03	1,2-Dichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil	OR		sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
1.04E-01	9.90E-06	9.77E-04	25	7,643	356.65	561.00	1.74E+01	8.52E+03	2.6E-05	2.5E+00

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,457	6.26E-04	2.64E-02	1.77E-04	6.01E-03	2.38E-04	7.89E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	5.46E+04	0.10	1.55E+00	6.01E-03	4.00E+02	6.37E+02	4.80E-05	2.62E+00	2.6E-05	2.5E+00

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	8.52E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.7E-05	7.3E-04

MESSAGE SUMMARY BELOW:

END

]

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
95501	4.30E+01	1,2-Dichlorobenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
6.90E-02	7.90E-06	1.90E-03	25	9,700	453.57	705.00	6.17E+02	1.56E+02	0.0E+00	1.4E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	11,627	1.03E-03	4.34E-02	1.77E-04	3.99E-03	1.48E-04	4.92E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.86E+03	0.10	1.55E+00	3.99E-03	4.00E+02	1.69E+04	4.25E-05	7.92E-02	NA	1.4E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.56E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	3.9E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
106467	2.20E+01	1,4-Dichlorobenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	11,181	1.33E-03	5.61E-02	1.77E-04	3.99E-03	1.41E-04	4.73E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.23E+03	0.10	1.55E+00	3.99E-03	4.00E+02	1.69E+04	4.19E-05	5.17E-02	6.3E-06	8.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	7.90E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
8.0E-08	4.4E-05

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
95578	1.30E+01	2-Chlorophenol

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
5.01E-02	9.46E-06	3.90E-04	25	9,572	447.53	675.00	3.88E+02	2.20E+04	0.0E+00	1.8E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm³/cm³)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm³/cm³)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm³/cm³)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm³/s)	Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm²/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm²/s)
2.54E+04	1.80E+06	2.22E-04	200	11,667	2.11E-04	8.90E-03	1.77E-04	2.91E-03	2.52E-04	7.50E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m³)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m³)
250	200	1.16E+02	0.10	1.55E+00	2.91E-03	4.00E+02	6.17E+05	4.74E-05	5.49E-03	NA	1.8E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	2.20E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.1E-04

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
71432	4.50E+01	Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	5.89E+01	1.79E+03	7.8E-06	3.0E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,061	3.62E-03	1.53E-01	1.77E-04	5.08E-03	1.62E-04	5.48E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	6.87E+03	0.10	1.55E+00	5.08E-03	4.00E+02	2.07E+03	4.38E-05	3.01E-01	7.8E-06	3.0E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.79E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
5.7E-07	6.9E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108907	7.60E+01	Chlorobenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.30E-02	8.70E-06	3.69E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	0.0E+00	4.9E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,743	2.21E-03	9.32E-02	1.77E-04	4.22E-03	1.41E-04	4.74E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	7.09E+03	0.10	1.55E+00	4.22E-03	4.00E+02	9.94E+03	4.20E-05	2.97E-01	NA	4.9E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	4.72E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.2E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75003	9.60E+01	Chloroethane (ethyl chloride)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
2.71E-01	1.15E-05	8.80E-03	25	5,879	285.30	460.40	4.40E+00	5.68E+03	8.3E-07	1.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	5,835	6.48E-03	2.73E-01	1.77E-04	1.56E-02	4.75E-04	1.61E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.62E+04	0.10	1.55E+00	1.56E-02	4.00E+02	1.19E+01	5.82E-05	1.52E+00	8.3E-07	1.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.68E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
3.1E-07	1.0E-03

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
67663	1.90E+01	Chloroform

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type Lookup Soil Parameters	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	4.9E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,492	2.47E-03	1.04E-01	1.77E-04	6.00E-03	1.95E-04	6.57E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.98E+03	0.10	1.55E+00	6.00E-03	4.00E+02	6.40E+02	4.60E-05	9.10E-02	2.3E-05	4.9E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	7.92E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
5.1E-07	1.3E-03

MESSAGE SUMMARY BELOW:

END

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
156592	7.03E+02	cis-1,2-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	0.0E+00	2.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,674	2.72E-03	1.15E-01	1.77E-04	4.25E-03	1.43E-04	4.80E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	8.06E+04	0.10	1.55E+00	4.25E-03	4.00E+02	9.22E+03	4.21E-05	3.39E+00	NA	2.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	3.50E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.2E-02

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
100414	9.72E+02	Ethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	0.0E+00	1.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	10,087	4.63E-03	1.95E-01	1.77E-04	4.33E-03	1.36E-04	4.60E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.90E+05	0.10	1.55E+00	4.33E-03	4.00E+02	7.80E+03	4.16E-05	7.88E+00	NA	1.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.69E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	5.4E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES | |

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES | X |

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
98828	6.81E+02	Cumene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
6.50E-02	7.10E-06	1.46E-02	25	10,335	425.56	631.10	4.89E+02	6.13E+01	0.0E+00	4.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	12,560	7.55E-03	3.18E-01	1.77E-04	3.75E-03	1.16E-04	3.92E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.17E+05	0.10	1.55E+00	3.75E-03	4.00E+02	3.10E+04	3.94E-05	8.54E+00	NA	4.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	6.13E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.5E-02

MESSAGE SUMMARY BELOW:

END

CHEMICAL PROPERTIES SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108872	4.03E+02	Methylcyclohexane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.35E-02	8.52E-06	1.03E-01	25	7,474	373.90	572.20	7.85E+01	1.40E+01	0.0E+00	3.0E+00

END

CHEMICAL PROPERTIES SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,518	6.57E-02	2.77E+00	1.77E-04	4.24E-03	1.28E-04	4.33E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.12E+06	0.10	1.55E+00	4.24E-03	4.00E+02	9.37E+03	4.08E-05	4.55E+01	NA	3.0E+00

CHEMICAL PROPERTIES SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.40E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.0E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75092	2.02E+02	Methylene chloride

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type Lookup Soil Parameters	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.01E-01	1.17E-05	2.18E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	1.1E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	6,970	1.51E-03	6.38E-02	1.77E-04	5.83E-03	2.03E-04	6.81E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.29E+04	0.10	1.55E+00	5.83E-03	4.00E+02	7.74E+02	4.64E-05	5.99E-01	4.7E-07	1.1E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.30E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
6.9E-08	3.9E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108101	3.51E+02	Methylisobutylketone (4-methyl-2-

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type Lookup Soil Parameters	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil	OR		sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	1.38E-04	25	8,243	389.50	571.00	9.06E+00	1.90E+04	0.0E+00	3.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,781	8.23E-05	3.47E-03	1.77E-04	4.37E-03	4.79E-04	1.36E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.22E+03	0.10	1.55E+00	4.37E-03	4.00E+02	7.21E+03	5.27E-05	6.42E-02	NA	3.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.90E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.5E-05

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
1634044	2.20E+01	MTBE

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.02E-01	1.05E-05	6.23E-04	25	6,678	328.30	497.10	7.26E+00	5.10E+04	0.0E+00	3.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,218	4.27E-04	1.80E-02	1.77E-04	5.92E-03	2.68E-04	8.76E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	3.96E+02	0.10	1.55E+00	5.92E-03	4.00E+02	7.02E+02	4.91E-05	1.94E-02	NA	3.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.10E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.4E-06

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
91203	4.40E+00	Naphthalene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
5.90E-02	7.50E-06	4.82E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	0.0E+00	3.0E-03

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	12,851	2.45E-04	1.03E-02	1.77E-04	3.42E-03	2.15E-04	6.74E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	4.55E+01	0.10	1.55E+00	3.42E-03	4.00E+02	8.51E+04	4.63E-05	2.10E-03	NA	3.0E-03

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	3.10E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.8E-04

MESSAGE SUMMARY BELOW:

END

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
127184	4.75E+02	Tetrachloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16		

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	6.0E-06	3.5E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,492	1.11E-02	4.70E-01	1.77E-04	4.16E-03	1.27E-04	4.31E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.23E+05	0.10	1.55E+00	4.16E-03	4.00E+02	1.13E+04	4.07E-05	9.08E+00	6.0E-06	3.5E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	2.00E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.3E-05	1.8E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
79016	3.89E+02	Trichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.47E+03	1.1E-04	3.5E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,483	6.58E-03	2.77E-01	1.77E-04	4.56E-03	1.42E-04	4.80E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.08E+05	0.10	1.55E+00	4.56E-03	4.00E+02	4.95E+03	4.21E-05	4.55E+00	1.1E-04	3.5E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	1.47E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.2E-04	8.9E-02

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108883	2.40E+03	Toluene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	0.0E+00	5.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, $D^{eff}{}_V$ (cm^2/s)	Capillary zone effective diffusion coefficient, $D^{eff}{}_{cz}$ (cm^2/s)	Total overall effective diffusion coefficient, $D^{eff}{}_T$ (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,089	4.11E-03	1.73E-01	1.77E-04	5.02E-03	1.58E-04	5.35E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	4.15E+05	0.10	1.55E+00	5.02E-03	4.00E+02	2.26E+03	4.35E-05	1.81E+01	NA	5.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.26E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.5E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75014	6.30E+01	Vinyl chloride (chloroethene)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
1.06E-01	1.23E-05	2.69E-02	25	5,250	259.25	432.00	1.86E+01	8.80E+03	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	4,933	2.08E-02	8.76E-01	1.77E-04	6.12E-03	1.85E-04	6.29E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	5.52E+04	0.10	1.55E+00	6.12E-03	4.00E+02	5.68E+02	4.55E-05	2.51E+00	4.4E-06	1.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	8.80E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.7E-06	1.7E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
106423	3.34E+03	p-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.69E-02	8.44E-06	7.64E-03	25	8,525	411.52	616.20	3.89E+02	1.85E+02	0.0E+00	1.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	10,178	4.48E-03	1.89E-01	1.77E-04	4.44E-03	1.40E-04	4.73E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	6.30E+05	0.10	1.55E+00	4.44E-03	4.00E+02	6.25E+03	4.20E-05	2.64E+01	NA	1.0E-01

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.85E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.8E-01

MESSAGE SUMMARY BELOW:

END

]

Appendix H-5.37
Groundwater Inhalation Calculations
Future Excavation Worker

Future Construction Worker Scenario
Estimation of Noncancer Hazard from Inhalation of Groundwater Vapors in Ambient Air
from On-site Shallow Groundwater in a Trench

PSC Site
Rock Hill, South Carolina

$ADD_w = C_w * VF * IR_a * EF * ED / BW * AT_n$
where:

C_w	= representative concentration of contaminant in groundwater at the exposure point (mg/L)
VF	= volatilizartion factor((mg/m^3-air / mg/L-H_2O))
IR_a	= daily groundwater ingestion rate (L/day)
EF	= exposure frequency: the number of days per year exposure occurs (day/year)
ED	= exposure duration: the typical duration of each exposure (years)
BW	= body weight (kg)
AT_n	= averaging Time (days)

Chemical	**C_w** Conc. in Water [(1)] (mg/L)	**VF** Volatilization Factor (mg/m^3-air mg/L-H_2O)	**IR_a** Inhalation Rate (m^3/day)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_w** Average Daily Dose (mg/kg-day)	**Chronic Inhalation RfD** (mg/kg-day)	**Hazard Quotient** (unitless)	**Percent Distribution of Risk** (%)
Iron	1.60	NA	20	250	1	70	365	NA	NA	NA	0.0%
Manganese	2.10	NA	20	250	1	70	365	NA	NA	NA	0.0%
2-Chlorophenol	0.013	NA	20	250	1	70	365	NA	NA	NA	0.0%
Bis(2-ethylhexyl)phthalate	0.003	NA	20	250	1	70	365	NA	NA	NA	0.0%
Naphthalene	0.004	8.69E-06	20	250	1	70	365	7.5E-09	9.00E-04	8.3E-06	0.0%
1,1,1-Trichloroethane	1.64	4.02E-04	20	250	1	70	365	1.3E-04	1.43E+00	9.1E-05	0.2%
1,1,2-Trichloroethane	0.006	2.15E-05	20	250	1	70	365	2.5E-08	4.00E-03	6.3E-06	0.0%
1,1-Dichloroethane	0.22	1.25E-04	20	250	1	70	365	5.3E-06	5.00E+00	1.1E-06	0.0%
1,1-Dichloroethene	0.29	7.07E-04	20	250	1	70	365	4.0E-05	5.70E-02	7.0E-04	1.8%
1,2-Dichlorobenzene	0.043	3.95E-05	20	250	1	70	365	3.3E-07	4.00E-02	8.3E-06	0.0%
1,2-Dichloroethane	2.07	3.08E-05	20	250	1	70	365	1.2E-05	7.00E-01	1.8E-05	0.0%
1,4-Dichlorobenzene	0.02	4.98E-05	20	250	1	70	365	2.1E-07	7.14E-01	3.0E-07	0.0%
4-Methyl-2-pentanone	0.35	3.22E-06	20	250	1	70	365	2.2E-07	8.57E-01	2.6E-07	0.0%
Benzene	0.045	1.47E-04	20	250	1	70	365	1.3E-06	8.57E-03	1.5E-04	0.4%
Chlorobenzene	0.076	8.15E-05	20	250	1	70	365	1.2E-06	1.40E-02	8.7E-05	0.2%
Chloroethane	0.10	7.18E-04	20	250	1	70	365	1.3E-05	2.90E+00	4.6E-06	0.0%
Chloroform	0.019	1.15E-04	20	250	1	70	365	4.3E-07	1.40E-02	3.0E-05	0.1%
cis-1,2-Dichloroethene	0.70	9.04E-05	20	250	1	70	365	1.2E-05	5.71E-02	2.2E-04	0.6%
Ethylbenzene	0.97	1.77E-04	20	250	1	70	365	3.4E-05	2.90E-01	1.2E-04	0.3%
Isopropylbenzene	0.68	2.26E-02	20	250	1	70	365	3.0E-03	1.10E-01	2.7E-02	70.4%
Methyl tert butyl ether	0.022	1.93E-05	20	250	1	70	365	8.3E-08	8.57E-01	NA	0.0%
Methylcyclohexane	0.40	2.28E-03	20	250	1	70	365	1.8E-04	8.57E-01	NA	0.0%
Methylene chloride	0.20	6.67E-05	20	250	1	70	365	2.6E-06	8.57E-01	3.1E-06	0.0%
Tetrachloroethene	0.48	3.98E-04	20	250	1	70	365	3.7E-05	1.00E-02	3.7E-03	9.5%
Toluene	2.40	1.74E-04	20	250	1	70	365	8.1E-05	1.43E+00	5.7E-05	0.1%
Trichloroethene	0.39	2.45E-04	20	250	1	70	365	1.9E-05	1.00E-02	1.9E-03	4.8%
Vinyl chloride	0.063	8.63E-04	20	250	1	70	365	1.1E-05	2.86E-02	3.7E-04	1.0%
Xylenes (Total)	3.34	1.77E-04	20	250	1	70	365	1.2E-04	2.86E-02	4.1E-03	10.4%

Hazard Index = 3.9E-02

Notes:
(1): Groundwater EPCs are the maximum observed concentration (see Table 5-3)
"NA" = Not applicable.

Future Construction Worker Scenario
Estimation of Cancer Risk from Inhalation of Vapors in Ambient Air
from On-Site Shallow Groundwater in a Trench

PSC Site
Rock Hill, South Carolina

$ADD_w = C_w * VF * IR_a * EF * ED / BW * AT_c$
where:

C_w	= representative concentration of contaminant in groundwater at the exposure point (mg/L)
VF	= volatilizartion factor((mg/m^3-air / mg/L-H_2O))
IR_a	= daily inhalation rate (m^3/day)
EF	= exposure frequency: the number of days per year exposure occurs (day/year)
ED	= exposure duration: the typical duration of each exposure (years)
BW	= body weight (kg)
AT_c	= averaging Time (days)

Chemical	**C_w** Conc. in Water (1) (mg/L)	**VF** Volatilization Factor (mg/m^3-air mg/L-H_2O)	**IR_a** Inhalation Rate (m^3/day)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_w** Average Daily Dose (mg/kg-day)	**CSF_i** **Inhalation Cancer Slope Factor** (mg/kg-day)$^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Iron	1.60	NA	20	250	1	70	25550	NA	NA	NA	0.0%
Manganese	2.10	NA	20	250	1	70	25550	NA	NA	NA	0.0%
2-Chlorophenol	0.013	NA	20	250	1	70	25550	NA	NA	NA	0.0%
Bis(2-ethylhexyl)phthalate	0.003	NA	20	250	1	70	25550	NA	NA	NA	0.0%
Naphthalene	0.004	8.69E-06	20	250	1	70	25550	1.1E-10	NA	NA	0.0%
1,1,1-Trichloroethane	1.64	4.02E-04	20	250	1	70	25550	1.8E-06	NA	NA	0.0%
1,1,2-Trichloroethane	0.006	2.15E-05	20	250	1	70	25550	3.6E-10	5.60E-02	2.0E-11	0.0%
1,1-Dichloroethane	0.22	1.25E-04	20	250	1	70	25550	7.6E-08	NA	NA	0.0%
1,1-Dichloroethene	0.29	7.07E-04	20	250	1	70	25550	5.7E-07	NA	NA	0.0%
1,2-Dichlorobenzene	0.043	3.95E-05	20	250	1	70	25550	4.7E-09	NA	NA	0.0%
1,2-Dichloroethane	2.07	3.08E-05	20	250	1	70	25550	1.8E-07	9.10E-02	NA	0.0%
1,4-Dichlorobenzene	0.022	4.98E-05	20	250	1	70	25550	3.1E-09	2.20E-02	6.7E-11	0.1%
4-Methyl-2-pentanone	0.35	3.22E-06	20	250	1	70	25550	3.2E-09	NA	NA	0.0%
Benzene	0.045	1.47E-04	20	250	1	70	25550	1.9E-08	2.70E-02	5.0E-10	0.4%
Chlorobenzene	0.076	8.15E-05	20	250	1	70	25550	1.7E-08	NA	NA	0.0%
Chloroethane	0.10	7.18E-04	20	250	1	70	25550	1.9E-07	NA	NA	0.0%
Chloroform	0.019	1.15E-04	20	250	1	70	25550	6.1E-09	8.10E-02	4.9E-10	0.4%
cis-1,2-Dichloroethene	0.70	9.04E-05	20	250	1	70	25550	1.8E-07	NA	NA	0.0%
Ethylbenzene	0.97	1.77E-04	20	250	1	70	25550	4.8E-07	NA	NA	0.0%
Isopropylbenzene	0.68	2.26E-02	20	250	1	70	25550	4.3E-05	NA	NA	0.0%
Methyl tert butyl ether	0.022	1.93E-05	20	250	1	70	25550	1.2E-09	NA	NA	0.0%
Methylcyclohexane	0.40	2.28E-03	20	250	1	70	25550	2.6E-06	NA	NA	0.0%
Methylene chloride	0.20	6.67E-05	20	250	1	70	25550	3.8E-08	1.65E-03	NA	0.0%
Tetrachloroethene	0.48	3.98E-04	20	250	1	70	25550	5.3E-07	2.10E-02	1.1E-08	9.7%
Toluene	2.40	1.74E-04	20	250	1	70	25550	1.2E-06	NA	NA	0.0%
Trichloroethene	0.39	2.45E-04	20	250	1	70	25550	2.7E-07	3.85E-01	1.0E-07	89.4%
Vinyl chloride	0.063	8.63E-04	20	250	1	70	25550	1.5E-07	1.54E-02	NA	0.0%
Xylenes (Total)	3.34	1.77E-04	20	250	1	70	25550	1.7E-06	NA	NA	0.0%

Excess Lifetime Cancer Risk = 1.1E-07

Notes:
(1): Groundwater EPCs are the maximum observed concentration (see Table 5-3)
"NA" = Not applicable.

Volatilization Calculation for Groundwater to Ambient Air for Construction Workers in a Trench
PCS Site
Rock Hill, SC

VF_{wamb} = $H*1000/(1+(U_{air}*\ dair\ *L_{GW}/(W*D_{ws}^{eff})))$
D_{ws}^{eff} = $(h_{cap}+h_v)/(h_{cap}/D_{cap}^{eff}+h_v/D_s^{eff})$
D_{cap}^{eff} = $(D^{air}*q_{acap}\hat{}3.33/q_T\hat{}2)+(D^{wat}*q_{wcap}\hat{}3.33/q_T\hat{}2/H)$
D_s^{eff} = $(D^{air}*q_{as}\hat{}3.33/q_T\hat{}2)+(D^{wat}*q_{ws}\hat{}3.33/q_T\hat{}2/H)$

Parameter	*Definition*	*Units*	*Source*	*Benzene*	*Chlorobenzene*	*Chloroethane*	*Chloroform*	*1,2-Dichlorobenzene*	*1,4-Dichlorobenzene*	*1,1-Dichloroethane*	*1,2-Dichloroethane*	*1,1-Dichloroethene*	*cis-1,2-Dichloroethene*	*Ethylbenzene*	*Isopropylbenzene (Cumene)*	*Methylcyclohexane*	*Methylene Chloride*
VF_{wamb}	Groundwater ® ambient (outdoor) vapors	**(mg/m^3-air) / (mg/L-H_2O)**	Calculated	1.473E-04	8.154E-05	7.178E-04	1.146E-04	3.946E-05	4.984E-05	1.254E-04	3.076E-05	7.065E-04	9.035E-05	1.773E-04	2.260E-02	2.275E-03	6.673E-05
D_{ws}^{eff}	Effective diffusion coefficient between groundwater and soil surface	**cm^2/s**	Calculated	6.500E-03	5.396E-03	2.000E-02	7.684E-03	5.108E-03	5.105E-03	5.482E-03	7.716E-03	6.642E-03	5.442E-03	5.537E-03	4.795E-03	5.423E-03	7.474E-03
D_{cap}^{eff}	Effective diffusion coefficient through capillary fringe	**cm^2/s**	Calculated	4.549E-04	3.787E-04	1.395E-03	5.386E-04	3.607E-04	3.594E-04	3.842E-04	5.491E-04	4.633E-04	3.824E-04	3.870E-04	3.342E-04	3.780E-04	5.269E-04
D_s^{eff}	Effective diffusion coefficient in soil based on vapor-phase concentration	**cm^2/s**	Calculated	8.087E-03	6.709E-03	2.490E-02	9.557E-03	6.341E-03	6.341E-03	6.819E-03	9.559E-03	8.271E-03	6.764E-03	6.892E-03	5.973E-03	6.754E-03	9.282E-03
D^{air}	diffusion coefficient in air	**cm^2/s**	EPA 2004	8.80E-02	7.30E-02	2.71E-01	1.04E-01	6.90E-02	6.90E-02	7.42E-02	1.04E-01	9.00E-02	7.36E-02	7.50E-02	6.50E-02	7.35E-02	1.01E-01
D^{wat}	diffusion coefficient in water	**cm^2/s**	EPA 2004	9.80E-06	8.70E-06	1.15E-05	1.00E-05	7.90E-06	7.90E-06	1.05E-05	9.90E-06	1.04E-05	1.13E-05	7.80E-06	7.10E-06	8.52E-06	1.17E-05
f_{oc}	fraction of organic carbon in soil	**g-C/g-soil**	EPA, 2004	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060
H	Henry's law constant	**cm^3-H_20/cm^3-air**	Chemical Specific, EPA 2004	2.28E-01	1.52E-01	3.61E-01	1.50E-01	7.77E-02	9.82E-02	2.30E-01	4.01E-02	1.07E+00	1.67E-01	3.22E-01	4.74E+01	4.22E+00	8.98E-02
h_{cap}	thickness of capillary fringe	**cm**	Site Specific	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
h_v	thickness of vadose zone	**cm**	Site Specific	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4
k_{oc}	carbon-water sorption coefficient	**cm^3-H_20/g-C**	EPA 2004	5.89E+01	2.19E+02	4.40E+00	3.98E+01	6.17E+02	6.17E+02	3.16E+01	1.74E+01	5.89E+01	3.55E+01	3.63E+02	4.89E+02	7.85E+01	1.17E+01
k_s	soil-water sorption coefficient = f_{oc} ´ k_{oc}	**cm^3-H_20/g-soil**	Calculated	0.35	1.31	0.03	0.24				0.10						0.07
L_{GW}	depth to groundwater = h_{cap} + h_v	**cm**	Site Specific	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28
U_{air}	wind speed above ground surface in ambient mixing zone	**cm/s**	Professional Judgment	45	45	45	45	45	45	45	45	45	45	45	45	45	45
W	width of source area parallel to wind, or groundwater flow direction	**cm**	Site Specific	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2
d_{air}	ambient air mixing zone height	**cm**	Site Specific	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8
q_{acap}	volumetric air content in capillary fringe soils	**cm^3-air/cm^3-soil**	EPA 2004	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122
q_{as}	volumetric air content in vadose zone soils	**cm^3-air/cm^3-soil**	EPA 2004	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
q_T	total soil porosity	**cm^3/cm^3-soil**	EPA 2004	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
q_{wcap}	volumetric water content in capillary fringe soils	**cm^3-H_20/cm^3-soil**	EPA 2004	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253
q_{ws}	volumetric water content in vadose zone soils	**cm^3-H_20/cm^3-soil**	EPA 2004	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
r_B	soil bulk density	**g-soil/cm^3-soil**	EPA 2004	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66

Notes:
EPA 2004. User's Guide for Evaluating Subsurface Vapor Intrusion Into Buildings.

Volatilization Calculation for Groundwater to Ambient Air for Construction Workers in a Trench
PCS Site
Rock Hill, SC

VF_{wamb} = H*1000/(1+(U_{air}* dair *L_{GW}/(W*D_{ws}^{eff})))
D_{ws}^{eff} = (h_{cap}+h_v)/(h_{cap}/D_{cap}^{eff}+h_v/D_s^{eff})
D_{cap}^{eff} = (D^{air}*q_{acap}^3.33/q_T^2)+(D^{wat}*q_{wcap}^3.33/q_T^2/H)
D_s^{eff} = (D^{air}*q_{as}^3.33/q_T^2)+(D^{wat}*q_{ws}^3.33/q_T^2/H)

Parameter	*Definition*	*Units*	*Source*	*4-Methyl-2-pentanone*	*Methyl-tert-butylether*	*Naphthalene*	*Tetrachloroethene*	*Toluene*	*1,1,1-Trichloroethane*	*1,1,2-Trichloroethane*	*Trichloroethylene*	*Vinyl Chloride*	*Total Xylenes*
VF_{wamb}	Groundwater ® ambient (outdoor) vapors	**(mg/m^3-air) / (mg/L-H_2O)**	Calculated	3.222E-06	1.933E-05	8.695E-06	3.983E-04	1.737E-04	4.023E-04	2.149E-05	2.447E-04	8.632E-04	1.773E-04
D_{ws}^{eff}	Effective diffusion coefficient between groundwater and soil surface	**cm^2/s**	Calculated	5.747E-03	7.596E-03	4.417E-03	5.314E-03	6.424E-03	5.757E-03	5.796E-03	5.832E-03	7.822E-03	5.678E-03
D_{cap}^{eff}	Effective diffusion coefficient through capillary fringe	**cm^2/s**	Calculated	4.663E-04	5.483E-04	3.254E-04	3.708E-04	4.491E-04	4.018E-04	4.148E-04	4.074E-04	5.456E-04	3.969E-04
D_s^{eff}	Effective diffusion coefficient in soil based on vapor-phase concentration	**cm^2/s**	Calculated	6.901E-03	9.376E-03	5.424E-03	6.616E-03	7.995E-03	7.168E-03	7.169E-03	7.260E-03	9.741E-03	7.067E-03
D^{air}	diffusion coefficient in air	**cm^2/s**	EPA 2004	7.50E-02	1.02E-01	5.90E-02	7.20E-02	8.70E-02	7.80E-02	7.80E-02	7.90E-02	1.06E-01	7.69E-02
D^{wat}	diffusion coefficient in water	**cm^2/s**	EPA 2004	7.80E-06	1.05E-05	7.50E-06	8.20E-06	8.60E-06	8.80E-06	8.80E-06	9.10E-06	1.23E-05	8.44E-06
f_{oc}	fraction of organic carbon in soil	**g-C/g-soil**	EPA, 2004	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060
H	Henry's law constant	**cm^3-$H_2$0/cm^3-air**	Chemical Specific, EPA 2004	5.64E-03	2.56E-02	1.98E-02	7.54E-01	2.72E-01	7.03E-01	3.73E-02	4.22E-01	1.11E+00	3.14E-01
h_{cap}	thickness of capillary fringe	**cm**	Site Specific	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
h_v	thickness of vadose zone	**cm**	Site Specific	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4	330.4
k_{oc}	carbon-water sorption coefficient	**cm^3-$H_2$0/g-C**	EPA 2004	9.06E+00	7.26E+00	2.00E+03	1.55E+02	1.82E+02	1.10E+02	5.01E+01	1.66E+02	1.86E+01	3.89E+02
k_s	soil-water sorption coefficient = f_{oc} ´ k_{oc}	**cm^3-$H_2$0/g-soil**	Calculated				0.93	1.09			1.00	0.11	2.33
L_{GW}	depth to groundwater = h_{cap} + h_v	**cm**	Site Specific	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28	335.28
U_{air}	wind speed above ground surface in ambient mixing zone	**cm/s**	Professional Judgment	45	45	45	45	45	45	45	45	45	45
W	width of source area parallel to wind, or groundwater flow direction	**cm**	Site Specific	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2	457.2
d_{air}	ambient air mixing zone height	**cm**	Site Specific	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8	304.8
q_{acap}	volumetric air content in capillary fringe soils	**cm^3-air/cm^3-soil**	EPA 2004	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122
q_{as}	volumetric air content in vadose zone soils	**cm^3-air/cm^3-soil**	EPA 2004	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
q_T	total soil porosity	**cm^3/cm^3-soil**	EPA 2004	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
q_{wcap}	volumetric water content in capillary fringe soils	**cm^3-$H_2$0/cm^3-soil**	EPA 2004	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253	0.253
q_{ws}	volumetric water content in vadose zone soils	**cm^3-$H_2$0/cm^3-soil**	EPA 2004	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
r_B	soil bulk density	**g-soil/cm^3-soil**	EPA 2004	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66

Notes:
EPA 2004. User's Guide for Evaluating Subsurface Vapor Intrusion Into Buildings.

Appendix H-5.38
Groundwater Inhalation Calculations
Future Resident

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
95578	1.30E+01	2-Chlorophenol

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
5.01E-02	9.46E-06	3.90E-04	25	9,572	447.53	675.00	3.88E+02	2.20E+04	0.0E+00	1.8E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	11,667	2.11E-04	8.90E-03	1.77E-04	2.91E-03	2.52E-04	7.50E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.16E+02	0.10	1.55E+00	2.91E-03	4.00E+02	6.17E+05	4.74E-05	5.49E-03	NA	1.8E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	2.20E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	3.0E-04

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)
C	0.61
CL	0.34
L	0.50
LS	4.38
S	26.78
SC	0.47
SCL	0.55
SI	1.82
SIC	0.40
SICL	0.46
SIL	0.76
SL	1.60

Chemical Properties Lookup Table

CAS No.	Chemical	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	URF extrapolated (X)	RfC extrapolated (X)
56235	Carbon tetrachloride	1.5E-05	0.0E+00		
57749	Chlordane	1.0E-04	7.0E-04		
58899	gamma-HCH (Lindane)	3.7E-04	1.1E-03	X	X
60297	Ethyl ether	0.0E+00	7.0E-01		X
60571	Dieldrin	4.6E-03	1.8E-04		X
67641	Acetone	0.0E+00	3.5E-01		X
67663	Chloroform	2.3E-05	4.9E-02		
67721	Hexachloroethane	4.0E-06	3.5E-03		X
71432	Benzene	7.8E-06	3.0E-02		
71556	1,1,1-Trichloroethane	0.0E+00	5.0E+00		
72435	Methoxychlor	0.0E+00	1.8E-02		X
72559	DDE	9.7E-05	0.0E+00	X	
74839	Methyl bromide	0.0E+00	5.0E-03		
74873	Methyl chloride (chloromethane)	1.0E-06	9.0E-02		
74908	Hydrogen cyanide	0.0E+00	3.0E-03		
74953	Methylene bromide	0.0E+00	3.5E-02		X
75003	Chloroethane (ethyl chloride)	8.3E-07	1.0E+00	X	
75014	Vinyl chloride (chloroethene)	4.4E-06	1.0E-01		
75058	Acetonitrile	0.0E+00	6.0E-02		
75070	Acetaldehyde	2.2E-06	9.0E-03		
75092	Methylene chloride	4.7E-07	1.1E+00		
75150	Carbon disulfide	0.0E+00	7.0E-01		
75218	Ethylene oxide	1.0E-04	0.0E+00		
75252	Bromoform	1.1E-06	7.0E-02		X
75274	Bromodichloromethane	1.8E-05	7.0E-02	X	X
75296	2-Chloropropane	0.0E+00	1.0E-01		
75343	1,1-Dichloroethane	0.0E+00	4.9E-01		
75354	1,1-Dichloroethylene	0.0E+00	2.0E-01		
75456	Chlorodifluoromethane	0.0E+00	5.0E+01		
75694	Trichlorofluoromethane	0.0E+00	7.0E-01		

75718	Dichlorodifluoromethane	0.0E+00	2.0E-01		
76131	1,1,2-Trichloro-1,2,2-trifluoroetha	0.0E+00	3.0E+01		
76448	Heptachlor	1.3E-03	1.8E-03		X
77474	Hexachlorocyclopentadiene	0.0E+00	2.0E-04		
78831	Isobutanol	0.0E+00	1.1E+00		X
78875	1,2-Dichloropropane	1.9E-05	4.0E-03	X	
78933	Methylethylketone (2-butanone)	0.0E+00	5.0E+00		
79005	1,1,2-Trichloroethane	1.6E-05	1.4E-02		X
79016	Trichloroethylene	1.1E-04	3.5E-02	X	
79209	Methyl acetate	0.0E+00	3.5E+00		X
79345	1,1,2,2-Tetrachloroethane	5.8E-05	2.1E-01		X
79469	2-Nitropropane	2.7E-03	2.0E-02		
80626	Methylmethacrylate	0.0E+00	7.0E-01		
83329	Acenaphthene	0.0E+00	2.1E-01		X
86737	Fluorene	0.0E+00	1.4E-01		X
87683	Hexachloro-1,3-butadiene	2.2E-05	7.0E-04		X
88722	o-Nitrotoluene	0.0E+00	3.5E-02		X
91203	Naphthalene	0.0E+00	3.0E-03		
91576	2-Methylnaphthalene	0.0E+00	7.0E-02		X
92524	Biphenyl	0.0E+00	1.8E-01		X
95476	o-Xylene	0.0E+00	1.0E-01		
95501	1,2-Dichlorobenzene	0.0E+00	1.4E-01		
95578	2-Chlorophenol	0.0E+00	1.8E-02		X
95636	1,2,4-Trimethylbenzene	0.0E+00	6.0E-03		
96184	1,2,3-Trichloropropane	5.7E-04	4.9E-03	X	
96333	Methyl acrylate	0.0E+00	1.1E-01		X
97632	Ethylmethacrylate	0.0E+00	3.2E-01		X
98066	tert-Butylbenzene	0.0E+00	1.4E-01		X
98828	Cumene	0.0E+00	4.0E-01		
98862	Acetophenone	0.0E+00	3.5E-01		X
98953	Nitrobenzene	0.0E+00	2.0E-03		
100414	Ethylbenzene	0.0E+00	1.0E+00		
100425	Styrene	0.0E+00	1.0E+00		
100447	Benzylchloride	4.9E-05	0.0E+00	X	
100527	Benzaldehyde	0.0E+00	3.5E-01		X
103651	n-Propylbenzene	0.0E+00	1.4E-01		X
104518	n-Butylbenzene	0.0E+00	1.4E-01		X
106423	p-Xylene	0.0E+00	1.0E-01		
106467	1,4-Dichlorobenzene	6.3E-06	8.0E-01		
106934	1,2-Dibromoethane (ethylene dib	2.2E-04	2.0E-04		
106990	1,3-Butadiene	3.0E-02	2.0E-03		
107028	Acrolein	0.0E+00	2.0E-05		
107062	1,2-Dichloroethane	2.6E-05	2.5E+00		
107131	Acrylonitrile	6.8E-05	2.0E-03		
108054	Vinyl acetate	0.0E+00	2.0E-01		
108101	Methylisobutylketone (4-methyl-2	0.0E+00	3.0E+00		
108383	m-Xylene	0.0E+00	1.0E-01		
108678	1,3,5-Trimethylbenzene	0.0E+00	6.0E-03		
108872	Methylcyclohexane	0.0E+00	3.0E+00		
108883	Toluene	0.0E+00	5.0E+00		
108907	Chlorobenzene	0.0E+00	4.9E-02		
109693	1-Chlorobutane	0.0E+00	1.4E+00		X
110009	Furan	0.0E+00	3.5E-03		X
110543	Hexane	0.0E+00	2.0E-01		
111444	Bis(2-chloroethyl)ether	3.3E-04	0.0E+00		

115297	Endosulfan	0.0E+00	2.1E-02		X
118741	Hexachlorobenzene	4.6E-04	2.8E-03		X
120821	1,2,4-Trichlorobenzene	0.0E+00	4.0E-03		
123739	Crotonaldehyde (2-butenal)	5.4E-04	0.0E+00	X	
124481	Chlorodibromomethane	2.4E-05	7.0E-02	X	X
126987	Methacrylonitrile	0.0E+00	7.0E-04		
126998	2-Chloro-1,3-butadiene (chloropr	0.0E+00	7.0E-03		
127184	Tetrachloroethylene	6.0E-06	3.5E-02		
129000	Pyrene	0.0E+00	1.1E-01		X
132649	Dibenzofuran	0.0E+00	1.4E-02		X
135988	sec-Butylbenzene	0.0E+00	1.4E-01		X
141786	Ethylacetate	0.0E+00	3.2E+00		X
156592	cis-1,2-Dichloroethylene	0.0E+00	2.0E-01		X
156605	trans-1,2-Dichloroethylene	0.0E+00	7.0E-02		X
205992	Benzo(b)fluoranthene	2.1E-04	0.0E+00	X	
218019	Chrysene	2.1E-06	0.0E+00	X	
309002	Aldrin	4.9E-03	1.1E-04		X
319846	alpha-HCH (alpha-BHC)	1.8E-03	0.0E+00		
541731	1,3-Dichlorobenzene	0.0E+00	1.1E-01		X
542756	1,3-Dichloropropene	4.0E-06	2.0E-02		
630206	1,1,1,2-Tetrachloroethane	7.4E-06	1.1E-01		X
1634044	MTBE	0.0E+00	3.0E+00		
7439976	Mercury (elemental)	0.0E+00	3.0E-04		

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
71556	1.64E+03	1,1,1-Trichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	0.0E+00	5.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,820	1.14E-02	4.79E-01	1.77E-04	4.50E-03	1.38E-04	4.67E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	7.88E+05	0.10	1.55E+00	4.50E-03	4.00E+02	5.53E+03	4.18E-05	3.29E+01	NA	5.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.33E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	6.3E-03

MESSAGE SUMMARY BELOW:

END

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
79005	6.00E+00	1,1,2-Trichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.80E-02	8.80E-06	9.11E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	1.4E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,507	5.53E-04	2.33E-02	1.77E-04	4.51E-03	1.94E-04	6.37E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.40E+02	0.10	1.55E+00	4.51E-03	4.00E+02	5.46E+03	4.56E-05	6.38E-03	1.6E-05	1.4E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	4.42E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
4.2E-08	4.4E-04

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75343	2.16E+02	1,1-Dichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	0.0E+00	4.9E-01

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,384	3.80E-03	1.60E-01	1.77E-04	4.28E-03	1.38E-04	4.67E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	3.46E+04	0.10	1.55E+00	4.28E-03	4.00E+02	8.58E+03	4.18E-05	1.45E+00	NA	4.9E-01

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.06E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.8E-03

MESSAGE SUMMARY BELOW:

END

]

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75354	2.89E+02	1,1-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
9.00E-02	1.04E-05	2.60E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	0.0E+00	2.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	6,353	1.86E-02	7.86E-01	1.77E-04	5.20E-03	1.58E-04	5.35E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.27E+05	0.10	1.55E+00	5.20E-03	4.00E+02	1.75E+03	4.35E-05	9.89E+00	NA	2.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	2.25E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.7E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
107062	2.07E+03	1,2-Dichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
1.04E-01	9.90E-06	9.77E-04	25	7,643	356.65	561.00	1.74E+01	8.52E+03	2.6E-05	2.5E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,457	6.26E-04	2.64E-02	1.77E-04	6.01E-03	2.38E-04	7.89E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	5.46E+04	0.10	1.55E+00	6.01E-03	4.00E+02	6.37E+02	4.80E-05	2.62E+00	2.6E-05	2.5E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	8.52E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.8E-05	1.0E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
95501	4.30E+01	1,2-Dichlorobenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type Lookup Soil Parameters	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
6.90E-02	7.90E-06	1.90E-03	25	9,700	453.57	705.00	6.17E+02	1.56E+02	0.0E+00	1.4E-01

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	11,627	1.03E-03	4.34E-02	1.77E-04	3.99E-03	1.48E-04	4.92E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.86E+03	0.10	1.55E+00	3.99E-03	4.00E+02	1.69E+04	4.25E-05	7.92E-02	NA	1.4E-01

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.56E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	5.4E-04

MESSAGE SUMMARY BELOW:

END

]

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
106467	2.20E+01	1,4-Dichlorobenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.90E-02	7.90E-06	2.39E-03	25	9,271	447.21	684.75	6.17E+02	7.90E+01	6.3E-06	8.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	11,181	1.33E-03	5.61E-02	1.77E-04	3.99E-03	1.41E-04	4.73E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.23E+03	0.10	1.55E+00	3.99E-03	4.00E+02	1.69E+04	4.19E-05	5.17E-02	6.3E-06	8.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	7.90E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.3E-07	6.2E-05

MESSAGE SUMMARY BELOW:

END

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	4.50E+01	Benzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type Lookup Soil Parameters	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil	OR		sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	5.89E+01	1.79E+03	7.8E-06	3.0E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,061	3.62E-03	1.53E-01	1.77E-04	5.08E-03	1.62E-04	5.48E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	6.87E+03	0.10	1.55E+00	5.08E-03	4.00E+02	2.07E+03	4.38E-05	3.01E-01	7.8E-06	3.0E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.79E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
9.7E-07	9.6E-03

MESSAGE SUMMARY BELOW:

END

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial groundwater conc., C_W (μg/L)	Chemical
108907	7.60E+01	Chlorobenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to water table, L_{WT} (cm)	**ENTER** SCS soil type directly above water table	**ENTER** Average soil/ groundwater temperature, T_S (°C)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vandose zone soil vapor permeability, k_v (cm^2)	**ENTER** Vadose zone SCS soil type (Lookup Soil Parameters)	**ENTER** Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)	**ENTER** Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.30E-02	8.70E-06	3.69E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	0.0E+00	4.9E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,743	2.21E-03	9.32E-02	1.77E-04	4.22E-03	1.41E-04	4.74E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	7.09E+03	0.10	1.55E+00	4.22E-03	4.00E+02	9.94E+03	4.20E-05	2.97E-01	NA	4.9E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	4.72E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	5.8E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75003	9.60E+01	Chloroethane (ethyl chloride)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.71E-01	1.15E-05	8.80E-03	25	5,879	285.30	460.40	4.40E+00	5.68E+03	8.3E-07	1.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	5,835	6.48E-03	2.73E-01	1.77E-04	1.56E-02	4.75E-04	1.61E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.62E+04	0.10	1.55E+00	1.56E-02	4.00E+02	1.19E+01	5.82E-05	1.52E+00	8.3E-07	1.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.68E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
5.2E-07	1.5E-03

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial groundwater conc., C_W (μg/L)	Chemical
67663	1.90E+01	Chloroform

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to water table, L_{WT} (cm)	**ENTER** SCS soil type directly above water table	**ENTER** Average soil/ groundwater temperature, T_S (^oC)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vandose zone soil vapor permeability, k_v (cm^2)	**ENTER** Vadose zone SCS soil type	**ENTER** Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)	**ENTER** Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	4.9E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,492	2.47E-03	1.04E-01	1.77E-04	6.00E-03	1.95E-04	6.57E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.98E+03	0.10	1.55E+00	6.00E-03	4.00E+02	6.40E+02	4.60E-05	9.10E-02	2.3E-05	4.9E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	7.92E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
8.6E-07	1.8E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
156592	7.03E+02	cis-1,2-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	0.0E+00	2.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,674	2.72E-03	1.15E-01	1.77E-04	4.25E-03	1.43E-04	4.80E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	8.06E+04	0.10	1.55E+00	4.25E-03	4.00E+02	9.22E+03	4.21E-05	3.39E+00	NA	2.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	3.50E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.6E-02

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial groundwater conc., C_W (μg/L)	Chemical
100414	9.72E+02	Ethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to water table, L_{WT} (cm)	**ENTER** SCS soil type directly above water table	**ENTER** Average soil/ groundwater temperature, T_S (^oC)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vandose zone soil vapor permeability, k_v (cm^2)	**ENTER** Vadose zone SCS soil type (Lookup Soil Parameters)	**ENTER** Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)	**ENTER** Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	0.0E+00	1.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	10,087	4.63E-03	1.95E-01	1.77E-04	4.33E-03	1.36E-04	4.60E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.90E+05	0.10	1.55E+00	4.33E-03	4.00E+02	7.80E+03	4.16E-05	7.88E+00	NA	1.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.69E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	7.6E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
98828	6.81E+02	Cumene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
6.50E-02	7.10E-06	1.46E-02	25	10,335	425.56	631.10	4.89E+02	6.13E+01	0.0E+00	4.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	12,560	7.55E-03	3.18E-01	1.77E-04	3.75E-03	1.16E-04	3.92E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.17E+05	0.10	1.55E+00	3.75E-03	4.00E+02	3.10E+04	3.94E-05	8.54E+00	NA	4.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	6.13E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.0E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108872	4.03E+02	Methylcyclohexane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.35E-02	8.52E-06	1.03E-01	25	7,474	373.90	572.20	7.85E+01	1.40E+01	0.0E+00	3.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,518	6.57E-02	2.77E+00	1.77E-04	4.24E-03	1.28E-04	4.33E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.12E+06	0.10	1.55E+00	4.24E-03	4.00E+02	9.37E+03	4.08E-05	4.55E+01	NA	3.0E+00

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.40E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.4E-02

MESSAGE SUMMARY BELOW:

END

]

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75092	2.02E+02	Methylene chloride

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type Lookup Soil Parameters	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
1.01E-01	1.17E-05	2.18E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	1.1E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	6,970	1.51E-03	6.38E-02	1.77E-04	5.83E-03	2.03E-04	6.81E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.29E+04	0.10	1.55E+00	5.83E-03	4.00E+02	7.74E+02	4.64E-05	5.99E-01	4.7E-07	1.1E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.30E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.2E-07	5.5E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108101	3.51E+02	Methylisobutylketone (4-methyl-2-

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	1.38E-04	25	8,243	389.50	571.00	9.06E+00	1.90E+04	0.0E+00	3.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,781	8.23E-05	3.47E-03	1.77E-04	4.37E-03	4.79E-04	1.36E-03

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.22E+03	0.10	1.55E+00	4.37E-03	4.00E+02	7.21E+03	5.27E-05	6.42E-02	NA	3.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.90E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.1E-05

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial groundwater conc., C_W (μg/L)	Chemical
1634044	2.20E+01	MTBE

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to water table, L_{WT} (cm)	**ENTER** SCS soil type directly above water table	**ENTER** Average soil/ groundwater temperature, T_S (^oC)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vandose zone soil vapor permeability, k_v (cm^2)	**ENTER** Vadose zone SCS soil type (Lookup Soil Parameters)	**ENTER** Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)	**ENTER** Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.02E-01	1.05E-05	6.23E-04	25	6,678	328.30	497.10	7.26E+00	5.10E+04	0.0E+00	3.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	7,218	4.27E-04	1.80E-02	1.77E-04	5.92E-03	2.68E-04	8.76E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	3.96E+02	0.10	1.55E+00	5.92E-03	4.00E+02	7.02E+02	4.91E-05	1.94E-02	NA	3.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.10E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	6.2E-06

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
91203	4.40E+00	Naphthalene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
5.90E-02	7.50E-06	4.82E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	0.0E+00	3.0E-03

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	12,851	2.45E-04	1.03E-02	1.77E-04	3.42E-03	2.15E-04	6.74E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	4.55E+01	0.10	1.55E+00	3.42E-03	4.00E+02	8.51E+04	4.63E-05	2.10E-03	NA	3.0E-03

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	3.10E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	6.7E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial groundwater conc., C_W (μg/L)	Chemical
127184	4.75E+02	Tetrachloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to water table, L_{WT} (cm)	**ENTER** SCS soil type directly above water table	**ENTER** Average soil/ groundwater temperature, T_S (^oC)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vandose zone soil vapor permeability, k_v (cm^2)	**ENTER** Vadose zone SCS soil type (Lookup Soil Parameters)	**ENTER** Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)	**ENTER** Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	6.0E-06	3.5E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,492	1.11E-02	4.70E-01	1.77E-04	4.16E-03	1.27E-04	4.31E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	2.23E+05	0.10	1.55E+00	4.16E-03	4.00E+02	1.13E+04	4.07E-05	9.08E+00	6.0E-06	3.5E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	2.00E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.2E-05	2.5E-01

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
79016	3.89E+02	Trichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.47E+03	1.1E-04	3.5E-02

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	8,483	6.58E-03	2.77E-01	1.77E-04	4.56E-03	1.42E-04	4.80E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	1.08E+05	0.10	1.55E+00	4.56E-03	4.00E+02	4.95E+03	4.21E-05	4.55E+00	1.1E-04	3.5E-02

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.47E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.1E-04	1.2E-01

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108883	2.40E+03	Toluene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

DATA ENTRY SHEET

ABC

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	0.0E+00	5.0E+00

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	9,089	4.11E-03	1.73E-01	1.77E-04	5.02E-03	1.58E-04	5.35E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
250	200	4.15E+05	0.10	1.55E+00	5.02E-03	4.00E+02	2.26E+03	4.35E-05	1.81E+01	NA	5.0E+00

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	5.26E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	3.5E-03

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
75014	6.30E+01	Vinyl chloride (chloroethene)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.06E-01	1.23E-05	2.69E-02	25	5,250	259.25	432.00	1.86E+01	8.80E+03	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	4,933	2.08E-02	8.76E-01	1.77E-04	6.12E-03	1.85E-04	6.29E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	5.52E+04	0.10	1.55E+00	6.12E-03	4.00E+02	5.68E+02	4.55E-05	2.51E+00	4.4E-06	1.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	8.80E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
4.5E-06	2.4E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

GW-SCREEN
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	**ENTER** Initial groundwater conc., C_W (μg/L)	Chemical
106423	3.34E+03	p-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	**ENTER** Depth below grade to water table, L_{WT} (cm)	**ENTER** SCS soil type directly above water table	**ENTER** Average soil/ groundwater temperature, T_S (^oC)	**ENTER** Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
200	450	sil	16	

MORE ↓

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	**ENTER** User-defined vandose zone soil vapor permeability, k_v (cm^2)	**ENTER** Vadose zone SCS soil type	**ENTER** Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	**ENTER** Vadose zone soil total porosity, n^V (unitless)	**ENTER** Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
sil			sil	1.49	0.439	0.18

Lookup Soil Parameters

MORE ↓

ENTER Target risk for carcinogens, TR (unitless)	**ENTER** Target hazard quotient for noncarcinogens, THQ (unitless)	**ENTER** Averaging time for carcinogens, AT_C (yrs)	**ENTER** Averaging time for noncarcinogens, AT_{NC} (yrs)	**ENTER** Exposure duration, ED (yrs)	**ENTER** Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

ABC

DATA ENTRY SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.69E-02	8.44E-06	7.64E-03	25	8,525	411.52	616.20	3.89E+02	1.85E+02	0.0E+00	1.0E-01

END

DATA ENTRY SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
250	0.259	0.307	2.85E-09	0.798	2.27E-09	68.18	0.439	0.090	0.349	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)
2.54E+04	1.80E+06	2.22E-04	200	10,178	4.48E-03	1.89E-01	1.77E-04	4.44E-03	1.40E-04	4.73E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
250	200	6.30E+05	0.10	1.55E+00	4.44E-03	4.00E+02	6.25E+03	4.20E-05	2.64E+01	NA	1.0E-01

DATA ENTRY SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	NA	NA	1.85E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.5E-01

MESSAGE SUMMARY BELOW:

END

Appendix H-5.39
Groundwater Ingestion Calculations
Future Industrial Worker

Future Industrial Worker Scenario
Estimation of Noncancer Hazard from Ingestion of
On-site Groundwater

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_w * IR_w * EF * ED / BW * AT_n$
where:

C_w	= representative concentration of contaminant in groundwater at the exposure point during the period of exposure (mg/kg)
IR_w	= daily groundwater ingestion rate on days exposed during the exposure period (mg/day)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure (years)
BW	= body weight (kg)
AT_n	= averaging Time (years)

Chemical	**C_w** Conc. in Water (1) (mg/L)	**IR_w** Ingestion Rate (L/day)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_w** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient** (unitless)	**Percent Distribution of Risk** (%)
Iron	1.6	2	250	25	70	9125	3.1E-02	3.00E-01	1.0E-01	0%
Manganese	2.1	2	250	25	70	9125	4.1E-02	1.40E-01	2.9E-01	1%
2-Chlorophenol	0.013	2	250	25	70	9125	2.5E-04	5.00E-03	5.1E-02	0%
Bis(2-ethylhexyl)phthalate	0.0032	2	250	25	70	9125	6.3E-05	2.00E-02	3.1E-03	0%
Naphthalene	0.0044	2	250	25	70	9125	8.6E-05	2.00E-02	4.3E-03	0%
1,1,1-Trichloroethane	1.6	2	250	25	70	9125	3.2E-02	2.80E-01	1.1E-01	0%
1,1,2-Trichloroethane	0.0060	2	250	25	70	9125	1.2E-04	4.00E-03	2.9E-02	0%
1,1-Dichloroethane	0.22	2	250	25	70	9125	4.2E-03	2.00E-01	2.1E-02	0%
1,1-Dichloroethene	0.29	2	250	25	70	9125	5.7E-03	5.00E-02	1.1E-01	0%
1,2-Dichlorobenzene	0.043	2	250	25	70	9125	8.4E-04	9.00E-02	9.3E-03	0%
1,2-Dichloroethane	2.1	2	250	25	70	9125	4.0E-02	NA	NA	0%
1,4-Dichlorobenzene	0.022	2	250	25	70	9125	4.3E-04	3.00E-02	1.4E-02	0%
4-Methyl-2-pentanone	0.35	2	250	25	70	9125	6.9E-03	8.00E-02	8.6E-02	0%
Benzene	0.045	2	250	25	70	9125	8.8E-04	4.00E-03	2.2E-01	1%
Chlorobenzene	0.076	2	250	25	70	9125	1.5E-03	2.00E-02	7.4E-02	0%
Chloroethane	0.10	2	250	25	70	9125	1.9E-03	4.00E-01	4.7E-03	0%
Chloroform	0.019	2	250	25	70	9125	3.7E-04	1.00E-02	3.7E-02	0%
cis-1,2-Dichloroethene	0.70	2	250	25	70	9125	1.4E-02	1.00E-02	1.4E+00	4%
Ethylbenzene	0.97	2	250	25	70	9125	1.9E-02	1.00E-01	1.9E-01	1%
Isopropylbenzene	0.68	2	250	25	70	9125	1.3E-02	1.00E-01	1.3E-01	0%
Methyl tert butyl ether	0.022	2	250	25	70	9125	4.3E-04	NA	NA	0%
Methylcyclohexane	0.40	2	250	25	70	9125	7.9E-03	NA	NA	0%
Methylene chloride	0.20	2	250	25	70	9125	4.0E-03	6.00E-02	6.6E-02	0%
Tetrachloroethene	0.48	2	250	25	70	9125	9.3E-03	1.00E-02	9.3E-01	3%
Toluene	2.4	2	250	25	70	9125	4.7E-02	8.00E-02	5.9E-01	2%
Trichloroethene	0.39	2	250	25	70	9125	7.6E-03	3.00E-04	2.5E+01	**83%**
Vinyl chloride	0.063	2	250	25	70	9125	1.2E-03	3.00E-03	4.1E-01	1%
Xylenes (Total)	3.3	2	250	25	70	9,125	6.5E-02	2.00E-01	3.3E-01	1%

Hazard Index = 3.1E+01

Notes:
(1): Groundwater EPCs are the maximum observed concentration (see Table 5-3)
"NA" = Not applicable.

Future Industrial Worker Scenario
Estimation of Cancer Risk from Ingestion of
On-site Groundwater

PSC Site
Rock Hill, South Carolina

$ADD_w = C_w * IR_w * EF * ED / BW * AT_c$
where:

C_w	= representative concentration of contaminant in groundwater at the exposure point during the period of exposure (mg/kg)
IR_w	= daily groundwater ingestion rate on days exposed during the exposure period (mg/day)
EF	= exposure frequency: the number of exposure events during the exposure period divided by the number of days in the exposure period (day/year)
ED	= exposure duration: the typical duration of each exposure (years)
BW	= body weight (kg)
AT_c	= averaging Time (years)

Chemical	**C_w** Conc. in Water [(1)] (mg/L)	**IR_w** Ingestion Rate (L/day)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**BW** Body Weight (kg)	**AT_c** Averaging Time Cancer (days)	**ADD_w** Average Daily Dose (mg/kg-day)	**CSF** **Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Iron	1.6	2	250	25	70	25550	1.1E-02	NA	NA	0%
Manganese	2.1	2	250	25	70	25550	1.5E-02	NA	NA	0%
2-Chlorophenol	0.013	2	250	25	70	25550	9.1E-05	NA	NA	0%
Bis(2-ethylhexyl)phthalate	0.0032	2	250	25	70	25550	2.2E-05	1.40E-02	3.1E-07	0%
Naphthalene	0.0044	2	250	25	70	25550	3.1E-05	NA	NA	0%
1,1,1-Trichloroethane	1.6	2	250	25	70	25550	1.1E-02	NA	NA	0%
1,1,2-Trichloroethane	0.0060	2	250	25	70	25550	4.2E-05	5.70E-02	2.4E-06	0%
1,1-Dichloroethane	0.22	2	250	25	70	25550	1.5E-03	NA	NA	0%
1,1-Dichloroethene	0.29	2	250	25	70	25550	2.0E-03	NA	NA	0%
1,2-Dichlorobenzene	0.043	2	250	25	70	25550	3.0E-04	NA	NA	0%
1,2-Dichloroethane	2.1	2	250	25	70	25550	1.4E-02	9.10E-02	1.3E-03	**29%**
1,4-Dichlorobenzene	0.022	2	250	25	70	25550	1.5E-04	2.40E-02	3.7E-06	0%
4-Methyl-2-pentanone	0.35	2	250	25	70	25550	2.5E-03	NA	NA	0%
Benzene	0.045	2	250	25	70	25550	3.1E-04	5.50E-02	1.7E-05	0%
Chlorobenzene	0.076	2	250	25	70	25550	5.3E-04	NA	NA	0%
Chloroethane	0.10	2	250	25	70	25550	6.7E-04	2.90E-03	1.9E-06	0%
Chloroform	0.019	2	250	25	70	25550	1.3E-04	1.00E-02	1.3E-06	0%
cis-1,2-Dichloroethene	0.70	2	250	25	70	25550	4.9E-03	NA	NA	0%
Ethylbenzene	0.97	2	250	25	70	25550	6.8E-03	NA	NA	0%
Isopropylbenzene	0.68	2	250	25	70	25550	4.8E-03	NA	NA	0%
Methyl tert butyl ether	0.022	2	250	25	70	25550	1.5E-04	4.00E-03	6.2E-07	0%
Methylcyclohexane	0.40	2	250	25	70	25550	2.8E-03	NA	NA	0%
Methylene chloride	0.20	2	250	25	70	25550	1.4E-03	7.50E-03	1.1E-05	0%
Tetrachloroethene	0.48	2	250	25	70	25550	3.3E-03	5.40E-01	1.8E-03	**39%**
Toluene	2.4	2	250	25	70	25550	1.7E-02	NA	NA	0%
Trichloroethene	0.39	2	250	25	70	25550	2.7E-03	4.00E-01	1.1E-03	**24%**
Vinyl chloride	0.063	2	250	25	70	25,550	4.4E-04	7.20E-01	3.2E-04	7%
Xylenes (Total)	3.3	2	250	25	70	25,550	2.3E-02	NA	NA	0%

Excess Lifetime Cancer Risk = 4.6E-03

Notes:
(1): Groundwater EPCs are the maximum observed concentration (see Table 5-3)
"NA" = Not applicable.

Appendix H-5.40
Groundwater Ingestion Calculations
Future Resident

Future Child Resident (1-6) Scenario
Estimation of Noncancer Hazard from Ingestion of
On-site Groundwater

PSC Site
Rock Hill, South Carolina

$ADD_{soil} = C_w * IR_w * EF * ED / BW * AT_n$
where:

C_w	= representative concentration of contaminant in groundwater at the exposure point (mg/L)
IR_w	= daily groundwater ingestion rate (L/day)
EF	= exposure frequency: the number of days per year exposure occurs (day/year)
ED	= exposure duration: the typical duration of each exposure (years)
BW	= body weight (kg)
AT_n	= averaging Time (days)

Chemical	**C_w** Conc. in Water (1) (mg/L)	**IR_w** Ingestion Rate (L/day)	**EF** Exposure Frequency (day/year)	**ED** Duration of Exposure (years)	**BW** Body Weight (kg)	**AT_n** Averaging Time Noncancer (days)	**ADD_w** Average Daily Dose (mg/kg-day)	**Chronic Oral RfD** (mg/kg-day)	**Hazard Quotient** (unitless)	**Percent Distribution of Risk** (%)
Iron	1.6	1	350	6	15	2190	1.0E-01	3.00E-01	3.4E-01	0%
Manganese	2.1	1	350	6	15	2190	1.3E-01	1.40E-01	9.6E-01	0%
2-Chlorophenol	0.013	1	350	6	15	2190	8.3E-04	5.00E-03	1.7E-01	0%
Bis(2-ethylhexyl)phthalate	0.0032	1	350	6	15	2190	2.0E-04	2.00E-02	1.0E-02	0%
Naphthalene	0.0044	1	350	6	15	2190	2.8E-04	2.00E-02	1.4E-02	0%
1,1,1-Trichloroethane	1.6	1	350	6	15	2190	1.1E-01	2.80E-01	3.8E-01	0%
1,1,2-Trichloroethane	0.0060	1	350	6	15	2190	3.8E-04	4.00E-03	9.6E-02	0%
1,1-Dichloroethane	0.22	1	350	6	15	2190	1.4E-02	2.00E-01	6.9E-02	0%
1,1-Dichloroethene	0.29	1	350	6	15	2190	1.8E-02	5.00E-02	3.7E-01	0%
1,2-Dichlorobenzene	0.043	2	350	6	15	2190	5.5E-03	9.00E-02	6.1E-02	0%
1,2-Dichloroethane	2.1	2	350	6	15	2190	2.6E-01	NA	NA	0%
1,4-Dichlorobenzene	0.022	2	350	6	15	2190	2.8E-03	3.00E-02	9.4E-02	0%
4-Methyl-2-pentanone	0.35	1	350	6	15	2190	2.2E-02	8.00E-02	2.8E-01	0%
Benzene	0.045	2	350	6	15	2190	5.8E-03	4.00E-03	1.4E+00	1%
Chlorobenzene	0.076	2	350	6	15	2190	9.7E-03	2.00E-02	4.9E-01	0%
Chloroethane	0.10	2	350	6	15	2190	1.2E-02	4.00E-01	3.1E-02	0%
Chloroform	0.019	2	350	6	15	2190	2.4E-03	1.00E-02	2.4E-01	0%
cis-1,2-Dichloroethene	0.70	2	350	6	15	2190	9.0E-02	1.00E-02	9.0E+00	5%
Ethylbenzene	0.97	2	350	6	15	2190	1.2E-01	1.00E-01	1.2E+00	1%
Isopropylbenzene	0.68	2	350	6	15	2190	8.7E-02	1.00E-01	8.7E-01	0%
Methyl tert butyl ether	0.022	2	350	6	15	2190	2.8E-03	NA	NA	0%
Methylcyclohexane	0.40	2	350	6	15	2190	5.2E-02	NA	NA	0%
Methylene chloride	0.20	2	350	6	15	2190	2.6E-02	6.00E-02	4.3E-01	0%
Tetrachloroethene	0.48	2	350	6	15	2190	6.1E-02	1.00E-02	6.1E+00	3%
Toluene	2.4	2	350	6	15	2190	3.1E-01	8.00E-02	3.8E+00	2%
Trichloroethene	0.39	2	350	6	15	2190	5.0E-02	3.00E-04	1.7E+02	**84%**
Vinyl chloride	0.063	2	350	6	15	2190	8.1E-03	3.00E-03	2.7E+00	1%
Xylenes (Total)	3.3	2	350	6	15	2190	4.3E-01	2.00E-01	2.1E+00	1%

Hazard Index = 2.0E+02

Notes:
(1): Groundwater EPCs are the maximum observed concentration (see Table 5-3)
"NA" = Not applicable.

Future Adult Resident (1-31) Scenario
Estimation of Cancer Risk from Ingestion of
On-site Groundwater

PSC Site
Rock Hill, South Carolina

$ADD_w = C_w * IR_w * EF * ED / BW * AT_c$
where:

C_w	= representative concentration of contaminant in groundwater at the exposure point (mg/L)
IR_w	= daily groundwater ingestion rate (L/day)
EF	= exposure frequency: the number of days per year exposure occurs (day/year)
ED	= exposure duration: the typical duration of each exposure (years)
BW	= body weight (kg)
AT_c	= averaging Time (days)

Chemical	C_w Conc. in Water (1) (mg/L)	IR_w Ingestion Rate (L/day)	EF Exposure Frequency (day/year)	ED Duration of Exposure (years)	BW Body Weight (kg)	AT_c Averaging Time Cancer (days)	ADD_w Average Daily Dose (mg/kg-day)	**CSF Oral Cancer Slope Factor** $(mg/kg\text{-}day)^{-1}$	**Chemical Specific Cancer Risk**	**Percent Distribution of Risk** (%)
Iron	1.6	2	350	6	15	25550	1.8E-02	NA	NA	0%
Manganese	2.1	2	350	6	15	25550	2.3E-02	NA	NA	0%
2-Chlorophenol	0.013	2	350	6	15	25550	1.4E-04	NA	NA	0%
Bis(2-ethylhexyl)phthalate	0.0032	2	350	6	15	25550	3.5E-05	1.40E-02	4.9E-07	0%
Naphthalene	0.0044	2	350	6	15	25550	4.8E-05	NA	NA	0%
1,1,1-Trichloroethane	1.6	2	350	6	15	25550	1.8E-02	NA	NA	0%
1,1,2-Trichloroethane	0.0060	2	350	6	15	25550	6.6E-05	5.70E-02	3.7E-06	0%
1,1-Dichloroethane	0.22	2	350	6	15	25550	2.4E-03	NA	NA	0%
1,1-Dichloroethene	0.29	2	350	6	15	25550	3.2E-03	NA	NA	0%
1,2-Dichlorobenzene	0.043	2	350	6	15	25550	4.7E-04	NA	NA	0%
1,2-Dichloroethane	2.1		**chemical is considered mutagenic, see Table xx for risk calculation**						1.1E-02	**64%**
1,4-Dichlorobenzene	0.022	2	350	6	15	25550	2.4E-04	2.40E-02	5.8E-06	0%
4-Methyl-2-pentanone	0.35	2	350	6	15	25550	3.8E-03	NA	NA	0%
Benzene	0.045	2	350	6	15	25550	4.9E-04	5.50E-02	2.7E-05	0%
Chlorobenzene	0.076	2	350	6	15	25550	8.3E-04	NA	NA	0%
Chloroethane	0.10		**chemical is considered mutagenic, see Table xx for risk calculation**						3.5E-04	2%
Chloroform	0.019	2	350	6	15	25550	2.1E-04	1.00E-02	2.1E-06	0%
cis-1,2-Dichloroethene	0.70	2	350	6	15	25550	7.7E-03	NA	NA	0%
Ethylbenzene	0.97	2	350	6	15	25550	1.1E-02	NA	NA	0%
Isopropylbenzene	0.68	2	350	6	15	25550	7.5E-03	NA	NA	0%
Methyl tert butyl ether	0.022	2	350	6	15	25550	2.4E-04	4.00E-03	9.6E-07	0%
Methylcyclohexane	0.40	2	350	6	15	25550	4.4E-03	NA	NA	0%
Methylene chloride	0.20		**chemical is considered mutagenic, see Table xx for risk calculation**						8.8E-05	1%
Tetrachloroethene	0.48	2	350	6	15	25550	5.2E-03	5.40E-01	2.8E-03	**17%**
Toluene	2.4	2	350	6	15	25550	2.6E-02	NA	NA	0%
Trichloroethene	0.39	2	350	6	15	25550	4.3E-03	4.00E-01	1.7E-03	**10%**
Vinyl chloride	0.063		**chemical is considered mutagenic, see Table xx for risk calculation**						1.1E-03	6%
Xylenes (Total)	3.3	2	350	6	15	25550	3.7E-02	NA	NA	0%

Excess Lifetime Cancer Risk = 1.7E-02

Notes:
(1): Groundwater EPCs are the maximum observed concentration (see Table 5-3)
"NA" = Not applicable.

Appendix I
Surface Contour Maps

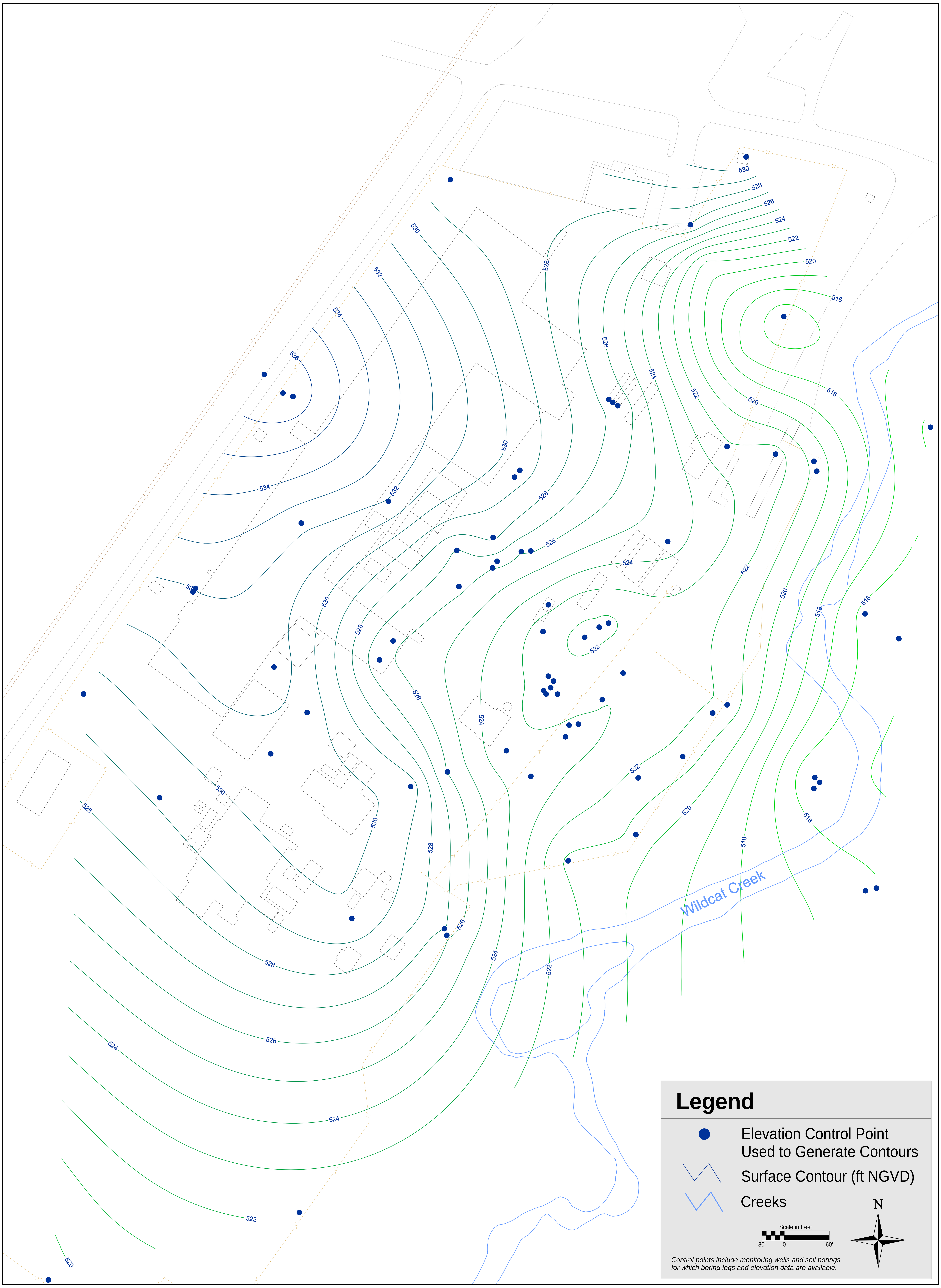


Figure I-1
Ground Surface Contour Map

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

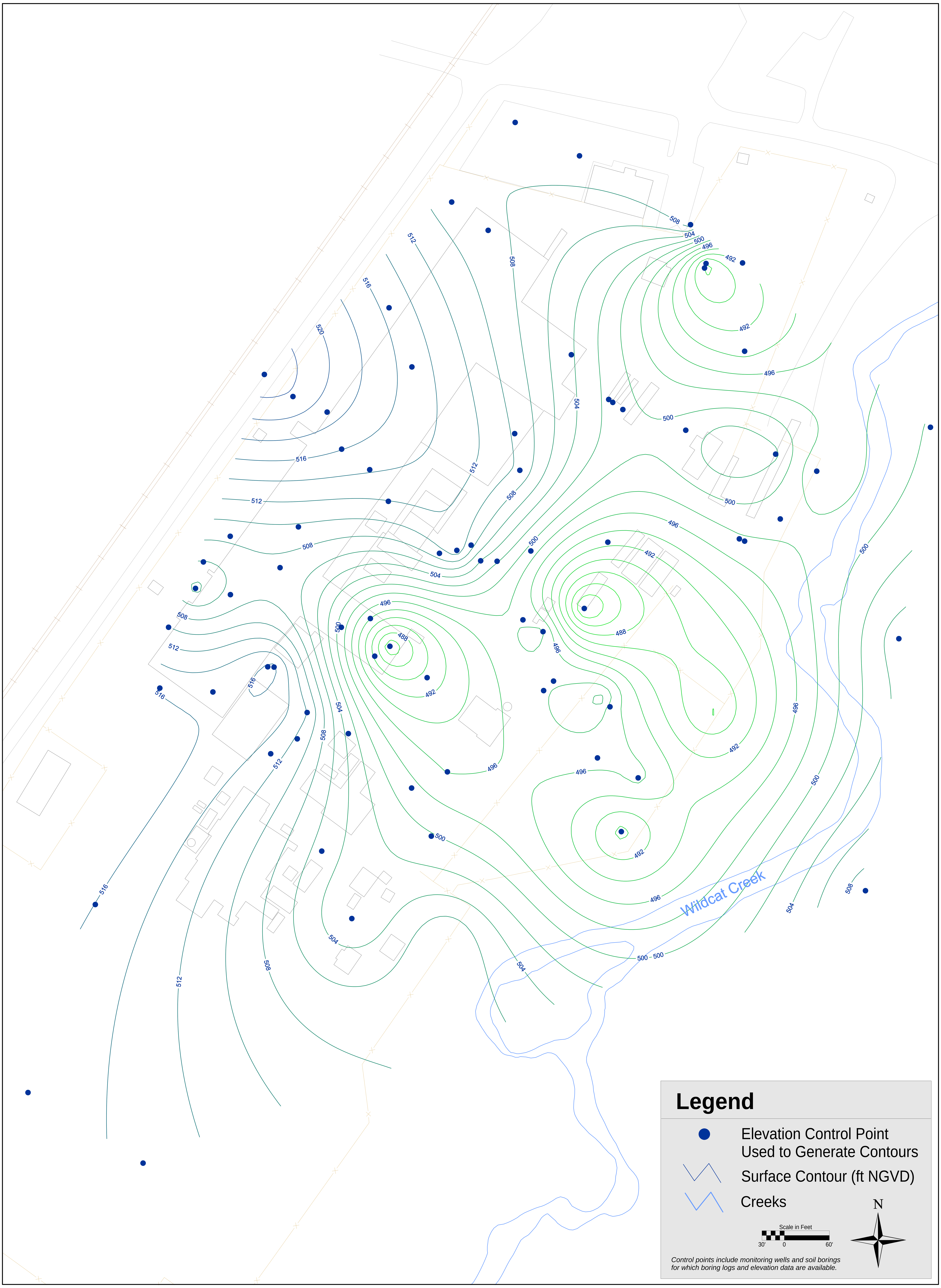


Figure I-2
Partially Weathered Rock Surface Contour Map

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

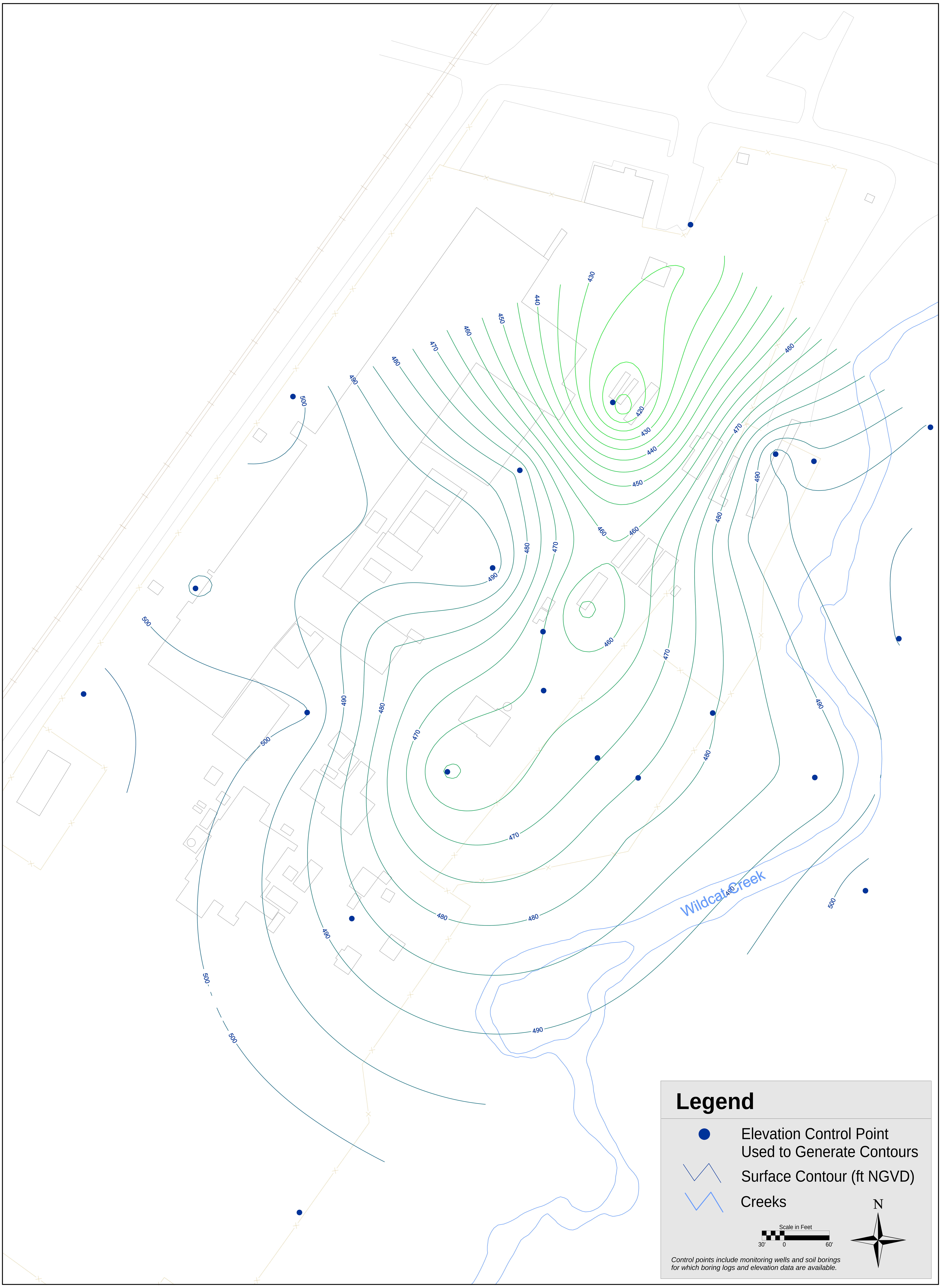


Figure I-3
Bedrock Surface Contour Map

Remedial Investigation Report
September 2008
Former PSC Site, Rock Hill, South Carolina

CDM

CD-ROM

Analytical Laboratory Reports

Data Validation Form I's