Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061
USA

SCDHEC, BLWM
Kim Kuhn
2600 Bull Street
Columbia, SC 29201

Direct tel: 803.647.1920
Direct fax: 803.695.3964
e-mail: joynerdp@westinghouse.com
Your ref:
Our ref: LTR-RAC-21-56

August 11, 2021

Subject: **July** 2021 CA Progress Report

Ms. Kuhn:

In accordance with Item 19 of Consent Agreement (CA) 19-02-HW, this progress report is being submitted to you, including the following requested information:

(a) a brief description of the actions which Westinghouse has taken toward achieving compliance with the Consent Agreement during the previous month;
(b) results of sampling and tests, in tabular summary format received by Westinghouse during the reporting period;
(c) a brief description of all actions which are scheduled for the next month to achieve compliance with the Consent Agreement, and other information relating to the progress of the work as deemed necessary or requested by the Department; and
(d) information regarding the percentage of work completed and any delays encountered or anticipated that may affect the approved schedule for implementation of the terms of the Consent Agreement, and a description of efforts made to mitigate delays or avoid anticipated delays.

In response to the above requirements, the following is being reported to the Department since the last progress report submitted on **July 13, 2021.** The following progress report is for work occurring from **July 1- 31, 2021**:

(a) Actions during the previous month:
Westinghouse began implementation of the Final Remedial Investigation (RI) Work Plan on 6/10/19. To comply with **Item 4** of the CA, the following actions were completed this month.

- Completed the following activities to support the **Southern Storage Area (SSA)** Operable Unit (OU) Work Plan:
    - Conducted soil sampling in the former footprint of 5 sheds (S-22 through S-26).
- Completed the following to support the **Phase II RI** Work Plan:
    - Conducted underground utility surveys in the monitoring well and piezometer installation areas.
    - Installed new groundwater monitoring wells W-113 through W-126.
    - Properly abandoned existing monitoring well W-4 and installed new well W-4R.
    - Installed piezometer, PZ-1 adjacent to W-96.
    - Developed the newly installed monitoring wells and began groundwater sampling.
    - Installed five additional pressure transducers in W-4R, W-124, W-125, W-126, and PZ-1.
    - Submitted a plan to conduct a Cultural Resources Survey of Westinghouse property to the State Historic Preservation Officer on July 9.
- Completed the following to support **East Lagoon Closure** Activities:
    - Hosted a site visit with DHEC on July 19 to observe East Lagoon closure activities.
    - Initiated backfilling and compaction of clean restoration soil into the former East Lagoon footprint.
    - East Lagoon Metrics:
        - Sludge waste shipments = 100% complete (17/17 Rail Shipments).
        - Soil and liner shipments = 50% complete (4/8 Rail Shipments).
        - Restoration backfill = 74% complete (3017/4100 $yd^3$).

(b) Results of sampling and tests:

- **Soil Sampling Results Underneath East Lagoon Concrete Sump**
  On June 28, 2021 a soil sample was collected underneath the concrete sump that was removed from the northwest corner (plan view) of the East Lagoon. The results are included as **Attachment A** of this monthly report.

- **Technical Basis Document: Sediment Sampling and Sediment Transect Interim Evaluation**
  The Technical Basis Document (TBD) included as **Attachment B** provides an interim evaluation of the sediment data collected under the RI. This assessment will be included as part of the Final Remedial Investigation report that WCFFF will issue once the remaining scope of RI fieldwork is complete. Remedial alternatives will be evaluated in the Feasibility Study, which is the next step after submittal of the RI Report.

- **Sanitary Lagoon Sludge Sampling Results**
  Sludge samples were collected from the Sanitary Lagoon in 25 locations as identified in the approved Sanitary Lagoon Sludge Characterization Work Plan (LTR-RAC-21-12 dated January 28, 2021). Three additional samples were collected at the request of the Department (approval letter dated May 28, 2021), which included an additional sampling point in grid one near the input pipe (SLS-B1) and two duplicate samples. The two duplicate samples were

collected from sample locations within the grid where the extensive sample analysis was being completed. The duplicates were labeled as follows for analysis by the laboratory:

- SLS-B2: collected as the blind field duplicate for SLS-1.
- SLS-B3: collected as the blind field duplicate for SLS-19.

The sampling results were tabulated and are included as **Attachment C** along with a graphic to illustrate the location of each sampling point. The radionuclide sum of fractions was calculated and is also included in **Attachment C**.

- **Grain Size Analysis**

  The Nuclear Regulatory Commission requested soil property data on the surface and shallow subsurface (up to 5 feet below land surface) soils in the developed site area, undeveloped area above the bluff, and the floodplain. Soil samples were collected at eight locations within these areas, with some locations being sampled at multiple depths. The samples were submitted to a laboratory for grain size analyses with hydrometer to assess the percentage of sand, silt, and clay within each sample. The results of the grain size analysis as well as a map identifying the sample locations are included as **Attachment D**.

(c) Brief description of all actions which are scheduled for the next month:

In accordance with **Item 4** of the CA, Westinghouse will continue to implement the Work Plan to include the following actions:

- Submit soil sampling results from the former footprint of 5 sheds (S-22 through S-26).
- Complete the remainder of Phase II groundwater sampling.
- Conduct slug testing.
- Survey the following locations:
  - Resurvey the Entrance and Upper 2 staff gages, whose elevations were not able to be surveyed to the desired accuracy during the April 2021 survey campaign (tree canopies were obstructing the instrument's ability to view and connect to satellites);
  - Chlorinated volatile organics soil sampling locations SS-18 through SS-29;
  - Groundwater screening borings installed after the April 2021 survey campaign (L-59 through L-62;
  - Top of casing of the new monitoring wells, piezometer and associated ground surfaces;
  - Tops of both the Lower Sunset Lake spillway and the spillway at the western end of the canal; and
  - Deeply incised portions of the site ditches.
- Review Phase II analytical results and prepare for the September meetings with third party technical consultants and DHEC.
- Begin preparations to submit the annual Groundwater Monitoring Report to DHEC on or before September 28, 2021 in accordance with NPDES Permit SC00001848.
- Cultural Resources Survey of Westinghouse property.

(d) Percentage of work completed and any delays encountered or anticipated:

- 85% of Phase II **field** work scope completed.
- Currently there are no anticipated delays.

Respectfully,

Diana P. Joyner
Principal Environmental Engineer
Westinghouse Electric Company, CFFF
803.497.7062 (m)

cc: N. Parr, Environmental Manager
J. Ferguson, EH&S Manager
J. Grant, AECOM Project Manager
ENOVIA Records

**Attachment A:** Soil Sampling Results Underneath East Lagoon Concrete Sump
**Attachment B:** Technical Basis Document: Sediment Sampling and Sediment Transect Interim Evaluation
**Attachment C:** Sanitary Lagoon Sludge Sampling Results
**Attachment D:** Grain Size Analysis for Site Soils

# Attachment A

**Soil Sampling Results Underneath East Lagoon Concrete Sump**

## Attachment A

**Soil Sampling Results Underneath East Lagoon Concrete Sump**

| Sample ID | Analyte (pCi/g) | | | | | | | | SOF Resid. | SOF Ind. |
|---|---|---|---|---|---|---|---|---|---|---|
| | U-234 DL | U-234 | U-235 DL | U-235 | U-238 | Sum U | Tc-99 DL | Tc-99 | | |
| EL-SUMP-4.5' | = 0.216 | 19.8 | = 0.134 | 0.990 | 4.46 | 25.25 | = 0.602 | 0.170 | 1.97 | 0.06 |

| Residential Limits in Soil (per RA-433) | | |
|---|---|---|
| U234 | 13 | pCi/g |
| U235 | 8 | pCi/g |
| U238 | 14 | pCi/g |
| Tc-99 | 19 | pCi/g |
| | exceeds screening value or SOF | |

GEL Laboratories LLC
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July 07, 2021

Ms. Cynthia Teague
Westinghouse Electric Company, LLC
PO Drawer R
Columbia, South Carolina 29205

Re: East Lagoon Remediation Project
Work Order: 548612

Dear Ms. Teague:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on June 30, 2021. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4523.

Sincerely,

Nina Gampe for
Samuel Hogan
Project Manager

Purchase Order: 4500822910 Line 1
Enclosures

**GEL LABORATORIES LLC**
2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

# Certificate of Analysis Report
for

WNUC010 Westinghouse Electric Company PO (4500822910)

Client SDG: 548612 GEL Work Order: 548612

**The Qualifiers in this report are defined as follows:**

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a Tracer compound

** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Samuel Hogan.

Reviewed by 

# GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com


# Certificate of Analysis

Company : Westinghouse Electric Company, LLC
Address : PO Drawer R
Columbia, South Carolina 29205
Report Date: July 7, 2021
Contact: Ms. Cynthia Teague
Project: East Lagoon Remediation Project

Client Sample ID: EL-SUMP-4.5'
Sample ID: 548612001
Matrix: Sludge
Collect Date: 28-JUN-21
Receive Date: 30-JUN-21
Collector: Client
Moisture: 22.5%

Project: WNUC01025
Client ID: WNUC010

| Parameter | Qualifier | Result | Uncertainty | MDC | TPU | RL | Units | PF | DF | Analyst | Date | Time | Batch | Mtd. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rad Alpha Spec Analysis** | | | | | | | | | | | | | | |
| *Alphaspec U, Soil "As Received"* | | | | | | | | | | | | | | |
| Uranium-233/234 | | 19.8 | +/-1.19 | 0.216 | +/-2.38 | 0.500 | pCi/g | | | MXS2 | 07/03/21 | 0947 | 2145971 | 1 |
| Uranium-235/236 | | 0.990 | +/-0.301 | 0.134 | +/-0.318 | 0.500 | pCi/g | | | | | | | |
| Uranium-238 | | 4.46 | +/-0.566 | 0.161 | +/-0.730 | 0.500 | pCi/g | | | | | | | |
| **Rad Liquid Scintillation Analysis** | | | | | | | | | | | | | | |
| *Liquid Scint Tc99, Soil "As Received"* | | | | | | | | | | | | | | |
| Technetium-99 | U | 0.170 | +/-0.348 | 0.602 | +/-0.349 | 1.00 | pCi/g | | | JJ3 | 07/07/21 | 0655 | 2145888 | 2 |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| Dry Soil Prep | Dry Soil Prep GL-RAD-A-021 | CXB7 | 06/30/21 | 1759 | 2145898 |

**The following Analytical Methods were performed**

| Method | Description |
|---|---|
| 1 | DOE EML HASL-300, U-02-RC Modified |
| 2 | DOE EML HASL-300, Tc-02-RC Modified |

| Surrogate/Tracer Recovery | Test | Batch ID | Recovery% | Acceptable Limits |
|---|---|---|---|---|
| Uranium-232 Tracer | Alphaspec U, Soil "As Received" | 2145971 | 98.8 | (15%-125%) |
| Technetium-99m Tracer | Liquid Scint Tc99, Soil "As Received" | 2145888 | 94.1 | (15%-125%) |

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# Certificate of Analysis

Company : Westinghouse Electric Company, LLC
Address : PO Drawer R
Columbia, South Carolina 29205

Report Date: July 7, 2021

Contact: Ms. Cynthia Teague
Project: East Lagoon Remediation Project

Client Sample ID: EL-SUMP-4.5'
Sample ID: 548612001

Project: WNUC01025
Client ID: WNUC010

| Parameter | Qualifier | Result | Uncertainty | MDC | TPU | RL | Units | PF | DF | Analyst | Date | Time | Batch | Mtd. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Surrogate/Tracer Recovery** | **Test** | | | | | | | **Batch ID** | **Recovery%** | **Acceptable Limits** | | | | |

**Notes:**

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

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# Certificate of Analysis

Company : Westinghouse Electric Company, LLC
Address : PO Drawer R

Columbia, South Carolina 29205

Report Date: July 7, 2021

Contact: Ms. Cynthia Teague

Project: East Lagoon Remediation Project

Client Sample ID: ELE049-0629
Sample ID: 548612002
Matrix: Sludge
Collect Date: 29-JUN-21
Receive Date: 30-JUN-21
Collector: Client
Moisture: 7.84%

Project: WNUC01025
Client ID: WNUC010

| Parameter | Qualifier | Result | Uncertainty | MDC | TPU | RL | Units | PF | DF | Analyst | Date | Time | Batch | Mtd. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rad Alpha Spec Analysis** | | | | | | | | | | | | | | |
| *Alphaspec U, Soil "As Received"* | | | | | | | | | | | | | | |
| Uranium-233/234 | | 17.4 | +/-1.40 | 0.291 | +/-2.34 | 0.500 | pCi/g | | | MXS2 | 07/03/21 | 0947 | 2145971 | 1 |
| Uranium-235/236 | | 0.976 | +/-0.377 | 0.108 | +/-0.391 | 0.500 | pCi/g | | | | | | | |
| Uranium-238 | | 4.12 | +/-0.687 | 0.206 | +/-0.818 | 0.500 | pCi/g | | | | | | | |
| **Rad Liquid Scintillation Analysis** | | | | | | | | | | | | | | |
| *Liquid Scint Tc99, Soil "As Received"* | | | | | | | | | | | | | | |
| Technetium-99 | | 3.09 | +/-0.563 | 0.693 | +/-0.666 | 1.00 | pCi/g | | | JJ3 | 07/07/21 | 0723 | 2145888 | 2 |

**The following Prep Methods were performed**

| Method | Description | Analyst | Date | Time | Prep Batch |
|---|---|---|---|---|---|
| Dry Soil Prep | Dry Soil Prep GL-RAD-A-021 | CXB7 | 06/30/21 | 1759 | 2145898 |

**The following Analytical Methods were performed**

| Method | Description |
|---|---|
| 1 | DOE EML HASL-300, U-02-RC Modified |
| 2 | DOE EML HASL-300, Tc-02-RC Modified |

| Surrogate/Tracer Recovery | Test | Batch ID | Recovery% | Acceptable Limits |
|---|---|---|---|---|
| Uranium-232 Tracer | Alphaspec U, Soil "As Received" | 2145971 | 103 | (15%-125%) |
| Technetium-99m Tracer | Liquid Scint Tc99, Soil "As Received" | 2145888 | 96 | (15%-125%) |

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# Certificate of Analysis

Company : Westinghouse Electric Company, LLC
Address : PO Drawer R
Columbia, South Carolina 29205
Report Date: July 7, 2021
Contact: Ms. Cynthia Teague
Project: East Lagoon Remediation Project
Client Sample ID: ELE049-0629
Sample ID: 548612002
Project: WNUC01025
Client ID: WNUC010

| Parameter | Qualifier | Result | Uncertainty | MDC | TPU | RL | Units | PF | DF | Analyst | Date | Time | Batch | Mtd. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Surrogate/Tracer Recovery** | **Test** | | | | | | | **Batch ID** | **Recovery%** | **Acceptable Limits** | | | | |

**Notes:**

The MDC is a sample specific MDC.
TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
Lc/LC: Critical Level
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Mtd.: Method
PF: Prep Factor
RL: Reporting Limit
TPU: Total Propagated Uncertainty

## QC Summary

**Client :** **Westinghouse Electric Company, LLC**
**PO Drawer R**

**Columbia, South Carolina**
**Contact:** **Ms. Cynthia Teague**
**Workorder:** **548612**

**Report Date: July 7, 2021**


| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Rad Alpha Spec** | | | | | | | | | | |
| Batch 2145971 | | | | | | | | | | |
| QC1204855498 548612001 DUP | | | | | | | | | | |
| Uranium-233/234 | | 19.8 | | 23.7 | pCi/g | 17.8 | | (0%-20%) | MXS2 | 07/03/2109:47 |
| | Uncert: | +/-1.19 | | +/-1.26 | | | | | | |
| | TPU: | +/-2.38 | | +/-2.74 | | | | | | |
| Uranium-235/236 | | 0.990 | | 1.31 | pCi/g | 27.8* | | (0%-20%) | | |
| | Uncert: | +/-0.301 | | +/-0.332 | | | | | | |
| | TPU: | +/-0.318 | | +/-0.359 | | | | | | |
| Uranium-238 | | 4.46 | | 5.45 | pCi/g | 20.1* | | (0%-20%) | | |
| | Uncert: | +/-0.566 | | +/-0.608 | | | | | | |
| | TPU: | +/-0.730 | | +/-0.826 | | | | | | |
| QC1204855499 LCS | | | | | | | | | | |
| Uranium-233/234 | | | | 17.9 | pCi/g | | | | MXS2 | 07/03/2109:47 |
| | Uncert: | | | +/-1.24 | | | | | | |
| | TPU: | | | +/-2.37 | | | | | | |
| Uranium-235/236 | | | | 0.868 | pCi/g | | | | | |
| | Uncert: | | | +/-0.313 | | | | | | |
| | TPU: | | | +/-0.328 | | | | | | |
| Uranium-238 | 16.3 | | | 17.6 | pCi/g | | 108 | (75%-125%) | | |
| | Uncert: | | | +/-1.23 | | | | | | |
| | TPU: | | | +/-2.33 | | | | | | |
| QC1204855497 MB | | | | | | | | | | |
| Uranium-233/234 | | | U | 0.0724 | pCi/g | | | | MXS2 | 07/03/2109:47 |
| | Uncert: | | | +/-0.141 | | | | | | |
| | TPU: | | | +/-0.141 | | | | | | |
| Uranium-235/236 | | | U | 0.0314 | pCi/g | | | | | |
| | Uncert: | | | +/-0.0923 | | | | | | |
| | TPU: | | | +/-0.0924 | | | | | | |
| Uranium-238 | | | U | -0.0131 | pCi/g | | | | | |
| | Uncert: | | | +/-0.0864 | | | | | | |
| | TPU: | | | +/-0.0865 | | | | | | |
| **Rad Liquid Scintillation** | | | | | | | | | | |
| Batch 2145888 | | | | | | | | | | |
| QC1204855340 548612001 DUP | | | | | | | | | | |
| Technetium-99 | U | 0.170 | U | 0.348 | pCi/g | 0 | | N/A | JJ3 | 07/07/2108:18 |
| | Uncert: | +/-0.348 | | +/-0.392 | | | | | | |
| | TPU: | +/-0.349 | | +/-0.394 | | | | | | |
| QC1204855341 LCS | | | | | | | | | | |
| Technetium-99 | 30.0 | | | 27.3 | pCi/g | | 91 | (75%-125%) | JJ3 | 07/06/2118:52 |
| | Uncert: | | | +/-0.719 | | | | | | |
| | TPU: | | | +/-3.22 | | | | | | |
| QC1204855339 MB | | | | | | | | | | |

## QC Summary

**Workorder:** 548612



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date Time |
|---|---|---|---|---|---|---|---|---|---|---|
| **Rad Liquid Scintillation** | | | | | | | | | | |
| Batch 2145888 | | | | | | | | | | |
| Technetium-99 | | | U | 0.280 | pCi/g | | | | JJ3 | 07/06/2116:08 |
| | Uncert: | | | +/-0.355 | | | | | | |
| | TPU: | | | +/-0.356 | | | | | | |

**Notes:**

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

| | |
|---|---|
| ** | Analyte is a Tracer compound |
| < | Result is less than value reported |
| > | Result is greater than value reported |
| BD | Results are either below the MDC or tracer recovery is low |
| FA | Failed analysis. |
| H | Analytical holding time was exceeded |
| J | See case narrative for an explanation |
| J | Value is estimated |
| K | Analyte present. Reported value may be biased high. Actual value is expected to be lower. |
| L | Analyte present. Reported value may be biased low. Actual value is expected to be higher. |
| M | M if above MDC and less than LLD |
| M | REMP Result > MDC/CL and < RDL |
| N/A | RPD or %Recovery limits do not apply. |
| N1 | See case narrative |
| ND | Analyte concentration is not detected above the detection limit |
| NJ | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier |
| Q | One or more quality control criteria have not been met. Refer to the applicable narrative or DER. |
| R | Sample results are rejected |
| U | Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD. |
| UI | Gamma Spectroscopy--Uncertain identification |
| UJ | Gamma Spectroscopy--Uncertain identification |
| UL | Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias. |
| X | Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier |
| Y | Other specific qualifiers were required to properly define the results. Consult case narrative. |
| ^ | RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry. |
| h | Preparation or preservation holding time was exceeded |

# QC Summary

**Workorder:** **548612**



| Parmname | NOM | Sample | Qual | QC | Units | RPD% | REC% | Range | Anlst | Date | Time |
|---|---|---|---|---|---|---|---|---|---|---|---|

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
** Indicates analyte is a surrogate/tracer compound.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

**Radiochemistry**
**Technical Case Narrative**
**Westinghouse Electric Company PO**
**SDG #: 548612**

**Product:** **Alphaspec U, Soil**
**Analytical Method:** DOE EML HASL-300, U-02-RC Modified
**Analytical Procedure:** GL-RAD-A-011 REV# 28
**Analytical Batch:** 2145971

**Preparation Method:** Dry Soil Prep
**Preparation Procedure:** GL-RAD-A-021 REV# 24
**Preparation Batch:** 2145898

The following samples were analyzed using the above methods and analytical procedure(s).

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 548612001 | EL-SUMP-4.5’ |
| 548612002 | ELE049-0629 |
| 1204855497 | Method Blank (MB) |
| 1204855498 | 548612001(EL-SUMP-4.5’) Sample Duplicate (DUP) |
| 1204855499 | Laboratory Control Sample (LCS) |

The samples in this SDG were analyzed on an "as received" basis.

**Data Summary:**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

**Quality Control (QC) Information**

**Duplication Criteria between QC Sample and Duplicate Sample**
The Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

| Sample | Analyte | Value |
|---|---|---|
| 1204855498 (EL-SUMP-4.5’DUP) | Uranium-235/236 | RPD 27.8* (0.00%-20.00%) RER 1.31 (0-3) |
| | Uranium-238 | RPD 20.1* (0.00%-20.00%) RER 1.77 (0-3) |

**Product:** **Dry Weight**
**Preparation Method:** Dry Soil Prep
**Preparation Procedure:** GL-RAD-A-021 REV# 24
**Preparation Batch:** 2145898

The following samples were analyzed using the above methods and analytical procedure(s).

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 548612001 | EL-SUMP-4.5’ |
| 548612002 | ELE049-0629 |

The samples in this SDG were analyzed on an "as received" basis.

**Data Summary:**

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

**Product:** **Liquid Scint Tc99, Soil**
**Analytical Method:** DOE EML HASL-300, Tc-02-RC Modified
**Analytical Procedure:** GL-RAD-A-059 REV# 5
**Analytical Batch:** 2145888

The following samples were analyzed using the above methods and analytical procedure(s).

| GEL Sample ID# | Client Sample Identification |
|---|---|
| 548612001 | EL-SUMP-4.5’ |
| 548612002 | ELE049-0629 |
| 1204855339 | Method Blank (MB) |
| 1204855340 | 548612001(EL-SUMP-4.5’) Sample Duplicate (DUP) |
| 1204855341 | Laboratory Control Sample (LCS) |

The samples in this SDG were analyzed on an "as received" basis.

**Data Summary:**

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

**Technical Information**

**Recounts**
Samples 1204855340 (EL-SUMP-4.5’DUP), 548612001 (EL-SUMP-4.5’) and 548612002 (ELE049-0629) were recounted to verify sample results. Recounts are reported.

**Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Page 1 of 1
Project # PO Line Item 1
GEL Quote #: WNUC010
COC Number (1):
PO#4500822910

Page 1 of 1 SDG 518612

GEL Laboratories LLC 518612
gel.com
Chemistry | Radiochemistry | Radiobioassay | Specialty Analytics

# Chain of Custody and Analytical Request

*GEL Work Order Number:* *GEL Project Manager: Lindsay Fabra*

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: Westinghouse Phone # 803.647.3171
Project/Site Name: East Lagoon Remediation Project Fax #
Address: 5801 Bluff Road, Hopkins, SC 29061
Collected By: Olivia Macecevic Send Results To: teaguecj@westinghouse.com

**Sample Analysis Requested (5)** (Fill in the number of containers for each test)

| Sample ID *For composites - indicate start and stop date/time | *Date Collected (mm-dd-yy) | *Time Collected (Military) (hhmm) | QC Code (2) | Field Filtered (3) | Sample Matrix (4) | Should this sample be considered: Radioactive (If yes, please supply isotopic info.) | Should this sample be considered: (7) Known or possible Hazards | Total number of containers | isotopic uranium (by individual isotope, alpha spec) | Tc-99 | <-- Preservative Type (6) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EL-SUMP-4.5' | 06-28-21 | 12:37 | G | N | SL | | | 1 | X | X | | All samples reported "as found" |
| ELE049-0629 | 06-29-21 | 09:20 | G | N | SL | | | 1 | X | X | | All samples reported "as found" |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Note: extra sample is required for sample specific QC

**Chain of Custody Signatures**

| | Relinquished By (Signed) | Date | Time | Received by (signed) | Date | Time |
|---|---|---|---|---|---|---|
| 1 | Olivia Macecevic | 6/30/21 | 07:50 | Thyssa Justus | 6/30/21 | 1530 |
| 2 | | | | | | |
| 3 | | | | | | |

**TAT Requested: Normal: ____ Rush: X Specify 7 day turnaround(Subject to Surcharge)**

Fax Results: [ ] Yes [ ] No

Select Deliverable: [ ] C of A [ ] QC Summary [ ] level 1 [ ] Level 2 [ ] Level 3 [ ] Level 4

*Additional Remarks:*

*For Lab Receiving Use Only: Custody Seal Intact?* [ ] *Yes* [ ] *No* *Cooler Temp:* ____ *°C*

*> For sample shipping and delivery details, see Sample Receipt & Review form (SRR.)*

*Sample Collection Time Zone*: [ ] Eastern [ ] Pacific [ ] Central [ ] Mountain [ ] Other:

1.) Chain of Custody Number = Client Determined

2.) QC Codes: **N** = Normal Sample, **TB** = Trip Blank, **FD** = Field Duplicate, **EB** = Equipment Blank, **MS** = Matrix Spike Sample, **MSD** = Matrix Spike Duplicate Sample, **G** = Grab, **C** = Composite

3.) Field Filtered: For liquid matrices, indicate with a **- Y -** for yes the sample was field filtered or **- N -** for sample was not field filtered.

4.) Matrix Codes: **DW**=Drinking Water, **GW**=Groundwater, **SW**=Surface Water, **WW**=Waste Water, **W**=Water, **ML**=Misc Liquid, **SO**=Soil, **SD**=Sediment, **SL**=Sludge, **SS**=Solid Waste, **O**=Oil, **F**=Filter, **P**=Wipe, **U**=Urine, **F**=Fecal, **N**=Nasal

5.) Sample Analysis Requested: Analytical method requested (i.e. **8260B, 6010B/7470A**) and number of containers provided for each (i.e. *8260B* - **3**, *6010B/7470A* - **1**).

6.) Preservative Type: **HA** = Hydrochloric Acid, **NI** = Nitric Acid, **SH** = Sodium Hydroxide, **SA** = Sulfuric Acid, **AA** = Ascorbic Acid **HX** = Hexane, **ST** = Sodium Thiosulfate, If no preservative is added = leave field blank

7.) **KNOWN OR POSSIBLE HAZARDS**

**RCRA Metals**
**As** = Arsenic **Hg**= Mercury
**Ba** = Barium **Se**= Selenium
**Cd** = Cadmium **Ag**= Silver
**Cr** = Chromium **MR**= Misc. RCRA metals
**Pb** = Lead

**Characteristic Hazards**
**FL** = Flammable/Ignitable
**CO** = Corrosive
**RE** = Reactive

**TSCA Regulated**
**PCB** = Polychlorinated biphenyls

**Listed Waste**
**LW**= Listed Waste
*(F,K,P and U-listed wastes.)*
***Waste code(s):***

**Other**
**OT**= Other / Unknown
*(i.e.: High/low pH, asbestos, beryllium, irritants, other misc. health hazards, etc.)*
***Description:***

***Please provide any additional details below regarding handling and/or disposal concerns.*** *(i.e.: Origin of sample(s), type of site collected from, odd matrices, etc.)*

GEL Laboratories LLC

# SAMPLE RECEIPT & REVIEW FORM

SH.

| | |
|---|---|
| Client: WMUC | SDG/AR/COC/Work Order: 548612 |
| Received By: TYE | Date Received: 6/30/21 |
| Carrier and Tracking Number | Circle Applicable: FedEx Express FedEx Ground UPS Field Services (Courier) Other |

| Suspected Hazard Information | Yes | No | |
|---|---|---|---|
| | | | *If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation. |
| A)Shipped as a DOT Hazardous? | | ✓ | Hazard Class Shipped: UN#: If UN2910, Is the Radioactive Shipment Survey Compliant? Yes___ No___ |
| B) Did the client designate the samples are to be received as radioactive? | | ✓ | COC notation or radioactive stickers on containers equal client designation. |
| C) Did the RSO classify the samples as radioactive? | ✓ | | Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr Classified as: (Rad 1) Rad 2 Rad 3 |
| D) Did the client designate samples are hazardous? | | ✓ | COC notation or hazard labels on containers equal client designation. |
| E) Did the RSO identify possible hazards? | | ✓ | If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: |

| | Sample Receipt Criteria | Yes | NA | No | Comments/Qualifiers (Required for Non-Conforming Items) |
|---|---|---|---|---|---|
| 1 | Shipping containers received intact and sealed? | ✓ | | | Circle Applicable: Seals broken Damaged container Leaking container Other (describe) |
| 2 | Chain of custody documents included with shipment? | ✓ | | | Circle Applicable: Client contacted and provided COC COC created upon receipt |
| 3 | Samples requiring cold preservation within (0 ≤ 6 deg. C)?* GTB 7/1/21 | | | ✓ | Preservation Method: Wet Ice Ice Packs Dry ice (None) Other: *all temperatures are recorded in Celsius TEMP: 10.1°C |
| 4 | Daily check performed and passed on IR temperature gun? | ✓ | | | Temperature Device Serial #: IR2-20 Secondary Temperature Device Serial # (If Applicable): |
| 5 | Sample containers intact and sealed? | ✓ | | | Circle Applicable: Seals broken Damaged container Leaking container Other (describe) |
| 6 | Samples requiring chemical preservation at proper pH? | | | ✓ | Sample ID's and Containers Affected: If Preservation added, Lot#: |
| 7 | Do any samples require Volatile Analysis? | | | ✓ | If Yes, are Encores or Soil Kits present for solids? Yes___ No___ NA___(If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes___ No___ NA___(If unknown, select No) Are liquid VOA vials free of headspace? Yes___ No___ NA___ Sample ID's and containers affected: |
| 8 | Samples received within holding time? | ✓ | | | ID's and tests affected: |
| 9 | Sample ID's on COC match ID's on bottles? | ✓ | | | ID's and containers affected: |
| 10 | Date & time on COC match date & time on bottles? | ✓ | | | Circle Applicable: No dates on containers No times on containers COC missing info Other (describe) |
| 11 | Number of containers received match number indicated on COC? | ✓ | | | Circle Applicable: No container count on COC Other (describe) |
| 12 | Are sample containers identifiable as GEL provided by use of GEL labels? | ✓ | | | |
| 13 | COC form is properly signed in relinquished/received sections? | ✓ | | | Circle Applicable: Not relinquished Other (describe) |

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials GTB Date 7/1/21 Page 1 of 1

**List of current GEL Certifications as of 07 July 2021**

| State | Certification |
|---|---|
| Alabama | 42200 |
| Alaska | 17−018 |
| Alaska Drinking Water | SC00012 |
| Arkansas | 88−0651 |
| CLIA | 42D0904046 |
| California | 2940 |
| Colorado | SC00012 |
| Connecticut | PH−0169 |
| DoD ELAP/ ISO17025 A2LA | 2567.01 |
| Florida NELAP | E87156 |
| Foreign Soils Permit | P330−15−00283, P330−15−00253 |
| Georgia | SC00012 |
| Georgia SDWA | 967 |
| Hawaii | SC00012 |
| Idaho | SC00012 |
| Illinois NELAP | 200029 |
| Indiana | C−SC−01 |
| Kansas NELAP | E−10332 |
| Kentucky SDWA | 90129 |
| Kentucky Wastewater | 90129 |
| Louisiana Drinking Water | LA024 |
| Louisiana NELAP | 03046 (AI33904) |
| Maine | 2019020 |
| Maryland | 270 |
| Massachusetts | M−SC012 |
| Massachusetts PFAS Approv | Letter |
| Michigan | 9976 |
| Mississippi | SC00012 |
| Nebraska | NE−OS−26−13 |
| Nevada | SC000122021−1 |
| New Hampshire NELAP | 2054 |
| New Jersey NELAP | SC002 |
| New Mexico | SC00012 |
| New York NELAP | 11501 |
| North Carolina | 233 |
| North Carolina SDWA | 45709 |
| North Dakota | R−158 |
| Oklahoma | 2019−165 |
| Pennsylvania NELAP | 68−00485 |
| Puerto Rico | SC00012 |
| S. Carolina Radiochem | 10120002 |
| Sanitation Districts of L | 9255651 |
| South Carolina Chemistry | 10120001 |
| Tennessee | TN 02934 |
| Texas NELAP | T104704235−21−19 |
| Utah NELAP | SC000122021−35 |
| Vermont | VT87156 |
| Virginia NELAP | 460202 |
| Washington | C780 |

# Attachment B

**Technical Basis Document: Sediment Sampling and Sediment Transect Interim Evaluation**

*"Remedial Investigation Phase II Sediment Sampling and Sediment Transect Interim Evaluation for the Westinghouse Columbia Fuel Fabrication Facility (WCFFF)"*

# Technical Basis Document

Remedial Investigation Phase II Sediment Sampling and Sediment Transect Interim Evaluation for the Westinghouse Columbia Fuel Fabrication Facility (WCFFF)

*Prepared for:*

Westinghouse Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061-9121

*Prepared by:*

leidos

13397 Lakefront Drive, Suite 100
Earth City, Missouri 63045

W. Clark Evers, CHP, CSP
Certified Health Physicist

July 28, 2021

## Remedial Investigation Process

The Westinghouse Columbia Fuel Fabrication Facility (WCFFF) is currently in the process of performing a site Remedial Investigation (RI) in accordance with a Consent Agreement with the South Carolina Department of Health and Environmental Control (SCDHEC). Westinghouse and SCDHEC entered into this Consent Agreement in February 2019.

The purpose of the RI is to complete a comprehensive evaluation of groundwater, surface water, sediment and soils at the site to determine the source, nature and extent of impacts from historic activities. Following completion of the RI, the Consent Agreement requires WCFFF to perform a Feasibility Study (FS) to evaluate remedial alternatives. After SCDHEC approval of the FS, the Department will issue a Record of Decision (ROD) specifying the selected remedy or set of remedies for the site. WCFFF will then implement these remedies per a SCDHEC approved Remedial Design/Remedial Action Plan and issue a final report documenting remediation of the site and successful completion of the Consent Agreement.

This Technical Basis Document (TBD) provides an interim evaluation of the sediment data collected under the RI. This assessment will be included as part of the Final Remedial Investigation report that WCFFF will issue once the remaining scope of RI fieldwork is complete. Remedial alternatives will be evaluated in the FS.

For sediment, three significant sampling campaigns have been conducted across the site. Sediment sampling in Phase I of the RI was completed to gain a better understanding of the site conditions; additional sediment sampling was completed in Phase II of the RI to fully characterize sediment impacts; subsequently, an addendum was completed to perform bounding sampling based on the results of the Phase II investigation in the Mill Creek Corridor. The results of these comprehensive sampling campaigns have defined the limited horizontal and vertical extent of sediment impact. There are no current or future concerns for contaminants to potentially move offsite, and the documented impacts pose no potentially significant threat to plant workers, the general public or the environment.

## RI Phase I Assessment

During Phase I of the RI, sediment samples were collected from various areas of the site including the Mill Creek Corridor. Prominent features of the Westinghouse Columbia Site, as well as the Mill Creek Corridor are identified in **Figure 1**. The locations of the RI Phase I sediment transects are shown in **Figure 2**.

**Figure 1 – Mill Creek Corridor**

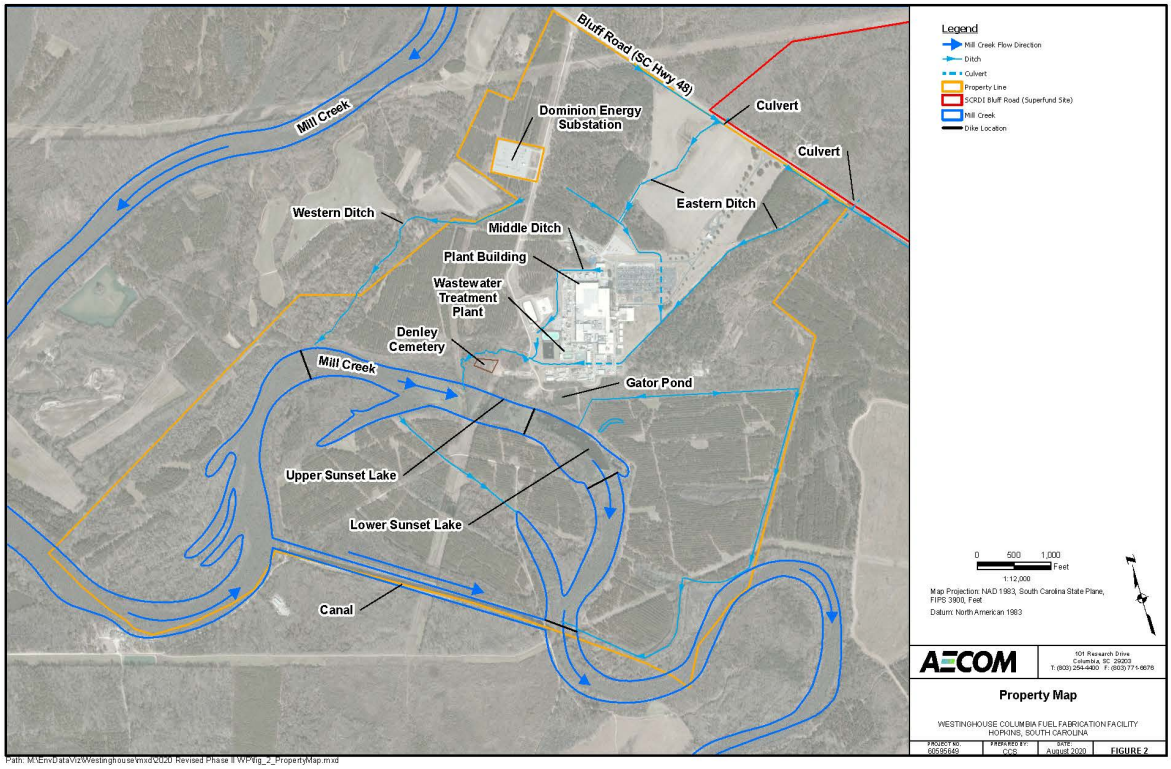
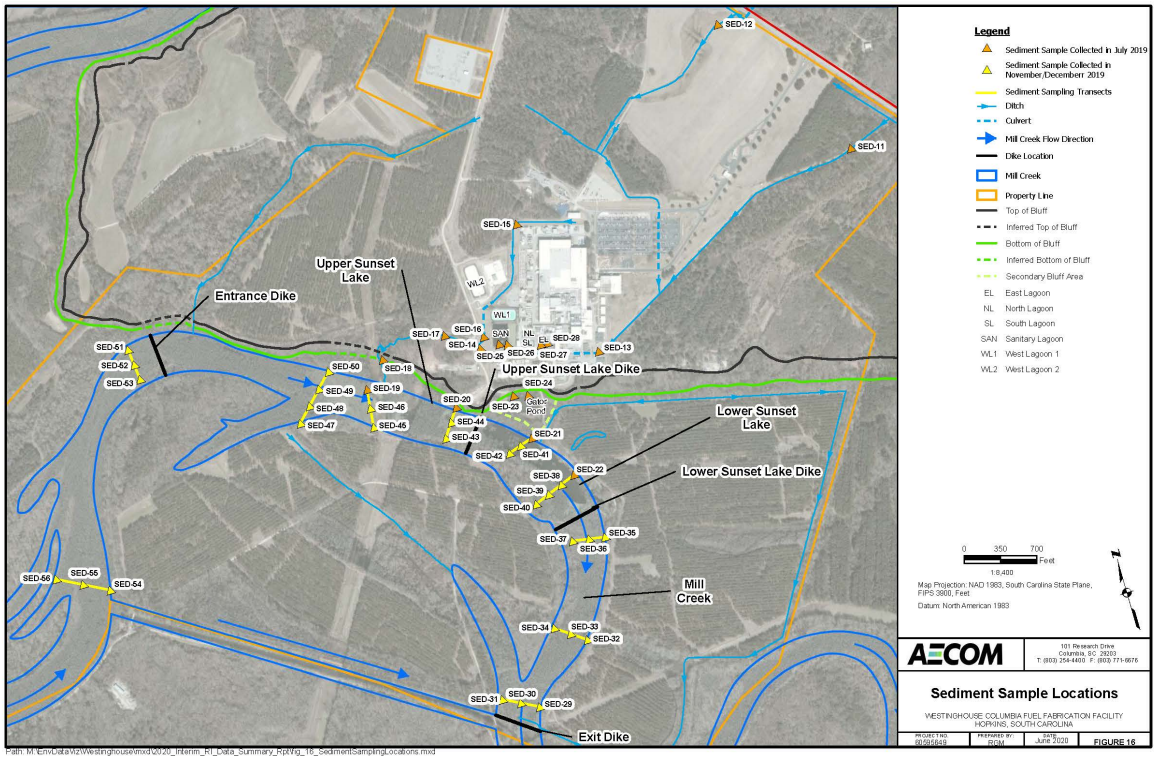


**Figure 2 – RI Phase I Sediment Transects**




Mill Creek is a naturally meandering creek that was dammed to create Upper and Lower Sunset Lake, prior to the establishment of the Westinghouse Columbia site. A diversion canal was also created that redirected a majority of the water flow, limiting the volume of water in Upper and Lower Sunset Lake, and creating nearly stagnant conditions. This low flow of water through the Upper and Lower Sunset Lake, combined with the thick growth of trees and brush has created swamp like conditions.

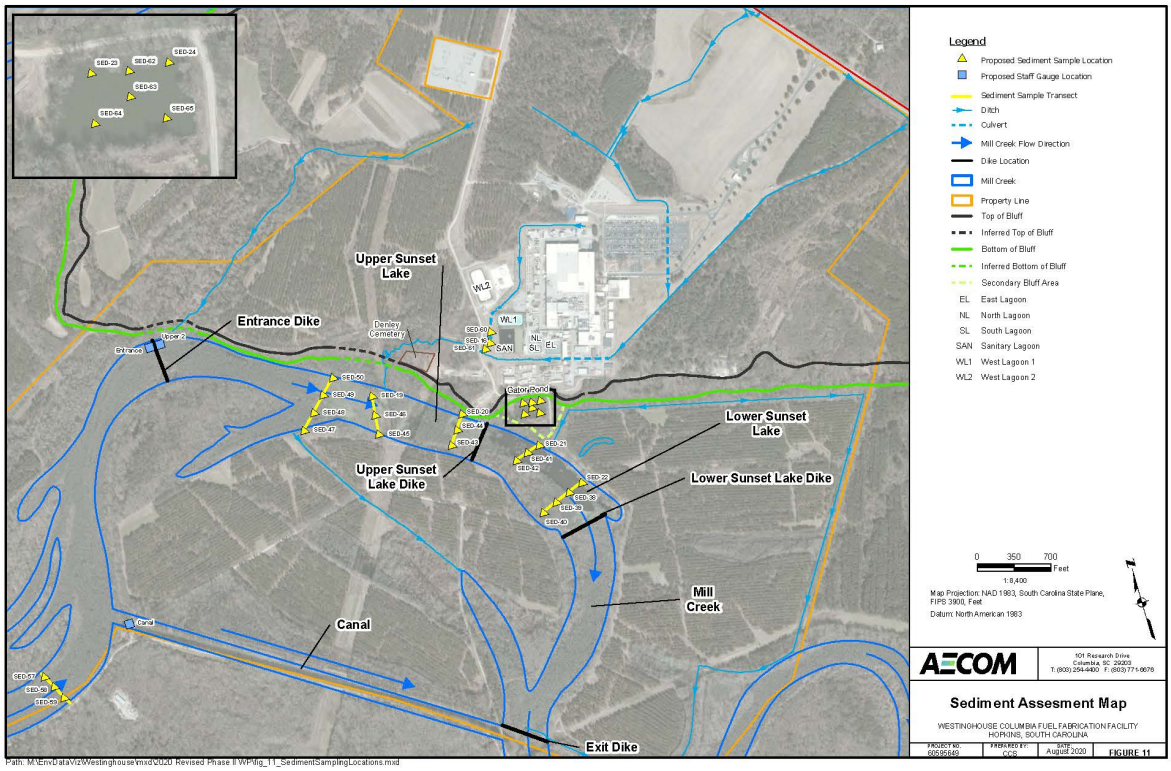
Some of the Phase I sediment sample locations in Upper Sunset Lake and in Lower Sunset Lake were identified to contain Uranium (U) concentrations above the residential use screening level for soils (NUREG 1757, Vol. 2, Rev. 1, Appendix H), but below industrial use screening levels. These samples were collected from locations on the WCFFF property. Assessment of this data was completed in the Final Interim Remedial Investigation Data Summary Report, approved by SCDHEC on July 30, 2020, and concluded that the identification of U concentrations in the sediment does not pose any undue risk to public health and safety, nor does it indicate potential off-site impact. However, additional sampling and investigation to further understand the extent of the potential impact into the Mill Creek Corridor was planned as described in the Phase II RI Work Plan, approved by SCDHEC on October 14, 2020 and in an addendum approved on November 5, 2020.

## RI Phase II Assessment

During Phase II of the RI, sampling was performed to further assess the vertical and horizontal extent of impact on sediment quality in the Mill Creek Corridor surface water body. Westinghouse collected sediment samples from 17 of the original sediment sample locations (SED-19 through SED-22 and SED-38 through SED-50), while also sampling at greater depths than were performed in Phase I. The Phase II sediment sampling began on November 9, 2020 and was completed December 4, 2020. Based on the Phase II results, additional sampling was proposed by WCFFF and approved by SCDHEC on February 22, 2021. This follow up sediment sampling campaign was conducted in March of 2021 and is discussed in the Mill Creek Corridor Bounding Section (beginning on page 14 of this document).

The locations of the RI Phase II sediment transects performed in November and December of 2020 are shown in **Figure 3**.

**Figure 3 – RI Phase II Sediment Transects**




RI Phase II sediment samples were collected from the previous Phase I locations at deeper intervals, and at new locations to bound previously identified areas of elevated residual radioactivity.

***Upstream Areas (Sediment Background)***

Sediment samples were collected at multiple locations to assess background sediment quality. These sediment samples were collected at locations that are upstream of the surface water flow from the site, where only naturally occurring radioactivity is expected to be present in the sediment. Locations SED-11 and SED-12 were each collected from a storm water ditch and are representative of the naturally occurring sediment within the storm water ditches as it enters the WCFFF site boundary.

Locations SED-51, SED-52, and SED-53 were collected just upstream of the site Entrance Dike, locations SED-54, SED-55, and SED-56 were collected well upstream within the flow path of Mill Creek, and SED-57, SED-58, and SED-59 were collected upstream of the diversion canal. The three sediment transects (sediment locations 51-59) are representative of the naturally occurring background sediment within Mill Creek, of which Upper and Lower Sunset Lakes are a part.

***Upper and Lower Sunset Lakes***

Three sediment transects in Upper Sunset Lake, and two sediment transects in Lower Sunset Lake were sampled during Phase I of the RI. These transects were placed to identify potential environmental impacts from historic plant operations. During Phase II, vertical sediment profiling was performed at 17 of the Phase I sediment locations.

***Downstream Areas***

Three of the sediment sampling transects (Figure 2) are downstream of the Lower Sunset Lake dike. This portion of Mill Creek is heavily forested, lowland swamp with minimal flow. The majority of the flow in Mill Creek through the WCFFF property is by way of the diversion canal (Figures 1 and 3) along the southern property boundary.

## RI Phase II Interim Evaluation

All Phase II sediment samples were sent to an off-site laboratory for analysis of U, Technetium-99 (Tc-99), Ammonia, Fluoride, Nitrate, and Volatile Organic Compounds (VOCs). Reported chemical constituent results were below the EPA Regional Screening Levels for residential use, and therefore further comparisons to industrial screening levels of evaluation are not necessary.

The RI Phase II sediment radiological results were evaluated in accordance with WCFFF site procedure RA-433, "Environmental Remediation." The radiological screening levels provided in Table 1 in procedure RA-433 are based on single contaminant concentrations for each isotope. When multiple radionuclides are present, a "sum of fractions" (SOF) approach is used to assess compliance with the concentration limit. The SOF for each unique sample is calculated using the following equation:

$$SOF = \frac{Conc_{U-234}}{SSL_{,U-234}} + \frac{Conc_{U-235}}{SSL_{,U-235}} + \frac{Conc_{U-238}}{SSL_{,U-238}} + \frac{Conc_{Tc-99}}{SSL_{,Tc-99}}$$

The values in Table 1 represent soil concentrations of individual radionuclides, using conservative exposure parameters, that would be deemed in compliance with the dose limits specified in 10 CFR 20.1402 (i.e., equivalent to 25 mrem/year under Residential Use).

**Table 1: Residential and Industrial Use Screening Levels**

| Contaminant | Residential Screening Level | Industrial Screening Level | Basis of Screening Level |
|---|---|---|---|
| Uranium - 234 | 13 pCi/g (0.002 mg/Kg) | 3,310 pCi/g (0.5 mg/kg) | NUREG 1757, Vol. 1-2 , Appendix H[1] |
| Uranium – 235 | 8 pCi/g (3.704 mg/Kg) | 39 pCi/g (18 mg/kg) | NUREG 1757, Vol. 1-2 , Appendix H[1] |
| Uranium – 238 | 14 pCi/g (41.667 mg/Kg) | 179 pCi/g (533 mg/kg) | NUREG 1757, Vol. 1-2 , Appendix H[1] |
| Total Uranium | 12.69 pCi/g (5.320 mg/Kg) | 2,933 pCi/g (1,230 mg/kg) | Calculated based on NUREG 1757, Vol. 2, Rev. 1-2, Appendix H[2] |
| Technetium - 99 | 19 pCi/g (1.110 E -03 mg/Kg) | 89,400 pCi/g (5.2 mg/Kg) | NUREG 1757 Vol. 1-2 , Appendix H[1] |

The Residential Use Screening Levels (RUSLs) were determined using highly conservative assumptions to develop an exposure scenario where it is assumed that a person would construct a house on the property, live on the property, drink the groundwater, and eat produce farmed on the property as well as fish caught on the property.

At the time of facility decommissioning, site specific Exposure Pathway Modeling will be used to develop Derived Concentration Guidance Levels (DCGLs) for the WCFFF following NUREG-1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). This guidance, commonly referred to as MARSSIM is a detailed instruction for planning, implementing, and evaluating environmental and facility radiological surveys conducted to demonstrate compliance with a dose- and risk-based regulation. The DCGL is a radionuclide specific concentration in pCi/g that is equal to the release criteria dose of 25 mRem/yr. While the Residential Screening Levels for soils are based on the most conservative assumptions, site specific DCGLs will generally be higher in most cases. For example, the recently decommissioned Westinghouse Hematite Site site-specific DCGLs for unrestricted release using a Residential Farmer Scenario are provided for reference in Table 2.

**Table 2: Westinghouse Hematite Site Specific DCGLs**

| Contaminant | DCGL for Unrestricted Free Release to the Public | Basis of Screening Level |
|---|---|---|
| Uranium - 234 | 195.4 pCi/g | Hematite Decommissioning Plan (NRC License No SNM-33) |
| Uranium – 235 | 51.6 pCi/g | Hematite Decommissioning Plan (NRC License No SNM-33) |
| Uranium – 238 | 168.8 pCi/g | Hematite Decommissioning Plan (NRC License No SNM-33) |
| Total Uranium | 170.2 pCi/g | Hematite Decommissioning Plan (NRC License No SNM-33) |
| Technetium - 99 | 25.1 pCi/g | Hematite Decommissioning Plan (NRC License No SNM-33) |

Because site specific DCGLs will generally be higher, the RUSLs are provided in RA-433 for reference, and where practical, WCFFF will strive to achieve these values. However, it is appropriate to compare samples collected from within the WCFFF property boundary to the Industrial Use Screening Levels (IUSL) also listed in RA-433, which is representative of the current and future use of the property, until such time as the WCFFF undergoes full site decommissioning.

The IUSLs are also based on conservative assumptions, but these assumptions better represent the current and future use of the WCFFF, as it is assumed that the industrial worker will not live on the property, nor engage in the consumption of any food or water produced on the facility property.

***Sediment Sample Results***

This TBD provides the interim evaluation of sediment data collected to date under the RI. The Phase II radiological results are the focus of this TBD as the sediment sample analytical results from Phase I of the RI have been previously reported and discussed in the Final Interim Remedial Investigation Data Summary Report, approved by DHEC on July 30, 2020 (also known as the RI Phase I Report).

The Phase II data has been submitted to SCDHEC through routine monthly reports required by the Consent Agreement. This interim evaluation will be incorporated into the Final Remedial Investigation report that WCFFF will issue once the RI fieldwork is completed.

The sediment data can be categorized by the area of the site from which it was collected. This includes a new background sediment transect collected upstream of the diversion canal; additional bounding sampling collected in a site drainage ditch; additional sediment characterization performed in the Gator Pond; and additional characterization performed in the Mill Creek Corridor of Upper and Lower Sunset Lake.

***Upstream Areas (Sediment Background)***

In Phase I of the RI, two background sediment transects were collected upstream of the site entrance dike. While these background sediment results appear to reflect the levels of naturally occurring radioactive materials that will be identified in all sediments, an additional background sediment transect (SED-57, SED-58, and SED-59) was collected further upstream of the site diversion canal. The result of this additional background sediment transect are presented in Table 3, along with the original Phase I Transect results for reference.

**Table 3: Background Sediment Sampling Results**

| Sample ID | Gross Analyte Activity (pCi/g) | | | | SOF | SOF |
|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | Residential | Industrial |
| SED-51-0-6 (Phase I) | 2.10 | 0.18 | 1.42 | *0.00* | 0.3 | 0.0 |
| SED-51-6-12 (Phase I) | 1.27 | 0.07 | 1.15 | *4.89* | 0.4 | 0.0 |
| SED-52-0-6 (Phase I) | 1.77 | 0.31 | 1.72 | *0.00* | 0.3 | 0.0 |
| SED-52-6-12 (Phase I) | 1.88 | 0.05 | 1.45 | *0.00* | 0.3 | 0.0 |
| SED-53-0-6 (Phase I) | 2.15 | 0.19 | 1.45 | *0.00* | 0.3 | 0.0 |
| SED-53-6-12 (Phase I) | 2.06 | 0.07 | 2.34 | *0.00* | 0.3 | 0.0 |
| SED-54-0-6 (Phase I) | 1.78 | 0.12 | 1.36 | *1.51* | 0.3 | 0.0 |
| SED-54-6-12 (Phase I) | 1.48 | 0.12 | 1.87 | *0.00* | 0.3 | 0.0 |
| SED-55-0-6 (Phase I) | 2.05 | 0.00 | 1.74 | *6.19* | 0.6 | 0.0 |
| SED-55-6-12 (Phase I) | 1.62 | 0.16 | 1.62 | *0.00* | 0.3 | 0.0 |
| SED-56-0-6 (Phase I) | 2.02 | 0.21 | 1.40 | *2.53* | 0.4 | 0.0 |
| SED-56-6-12 (Phase I) | 1.89 | 0.03 | 1.72 | *0.00* | 0.3 | 0.0 |
| SED-57P2-0-6 (Phase II) | 2.22 | 0.11 | 1.82 | NA | 0.3 | 0.0 |
| SED-57P2-6-12 (Phase II) | 1.63 | 0.10 | 1.74 | NA | 0.3 | 0.0 |
| SED-57P2-12-18 (Phase II) | 1.49 | 0.00 | 2.05 | NA | 0.3 | 0.0 |
| SED-58P2-0-6 (Phase II) | 1.21 | 0.05 | 1.37 | NA | 0.2 | 0.0 |
| SED-58P2-6-12 (Phase II) | 1.38 | 0.03 | 1.15 | NA | 0.2 | 0.0 |
| SED-59P2-0-6 (Phase II) | 2.09 | 0.05 | 1.88 | NA | 0.3 | 0.0 |
| SED-59P2-6-12 (Phase II) | 1.52 | 0.05 | 1.27 | NA | 0.2 | 0.0 |

As can be seen from the data in Table 3 above, the results of the new background sediment transect are consistent with the results of the two background sediment transects collected during Phase I of the RI. All Phase I Tc-99 reported results in Table 3 above were less than the instruments Minimum Detectable Activity (MDA), meaning that the results could not reliably be distinguished from the laboratory instrument's background value. Therefore no additional Tc-99 sampling was performed in Phase II.

***Site Drainage Ditch***

In Phase I of the RI, location SED-16 in an on-site drainage ditch was identified to be elevated, but similar results were not identified further upstream or downstream of this location. To determine the size and extent of the elevated concentrations at location SED-16, additional bounding sampling was performed. Location SED-60 was collected approximately 50 ft upstream, and SED-61 was collected approximately 50 ft downstream, of the original SED-16 location. The results of this additional sediment sampling are presented in Table 4.

**Table 4: Site Drainage Ditch Sediment Sampling Results**

| Sample ID | Gross Analyte Activity (pCi/g) | | | | SOF | SOF | % |
|---|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | Residential | Industrial | Moist. |
| SED-16P2-0-6 | 67.2 | 3.31 | 12.1 | 0.614 | **6.5** | 0.2 | 25.8 |
| SED-16P2-6-12 | 63.7 | 3.18 | 11.8 | 2.62 | **6.3** | 0.2 | 23.3 |
| SED-16P2-12-24 | 6.03 | 0.48 | 1.99 | 3.71 | 0.9 | 0.0 | 18.4 |
| SED-60P2-0-6 | 39.7 | 2.19 | 7.42 | 0.433 | **3.9** | 0.1 | 18.4 |
| SED-60P2-6-12 | 44.4 | 1.81 | 8.17 | 0.483 | **4.3** | 0.1 | 18.4 |
| SED-61P2-0-6 | 4.29 | 0.244 | 0.818 | 1.2 | 0.5 | 0.0 | 16.2 |
| SED-61P2-6-12 | 9.17 | 0.267 | 2.79 | 7.96 | **1.4** | 0.0 | 13.6 |
| SED-61P2-12-18 | 3.86 | 0.186 | 1.95 | 8.28 | 0.9 | 0.0 | 11 |

As can be seen from the data in Table 4 above, the results of the bounding sampling show that the elevated concentrations identified in location SED-16 are confined to the top 12 inches of soil and sediment, which is consistent with a surface release which is believed to be the source of surficial contamination in this area (1971 West Lagoon Rupture). While the top 12 inches in SED-60, and SED-61 remain elevated, concentrations are diminishing relative to SED-16. When compared to the RI Phase I sampling, this shows that the area of impact at location SED-16 is limited. Furthermore, this location remains in an industrial use area of the site. These concentrations do not represent any undue risk to the health and safety of the workforce or the public, and do not indicate potential off-site impact. Given the distance from the site boundary, there is little concern for migration, or offsite impact. This area will continue to be monitored, and potential remediation options will be evaluated during the Feasibility Study (FS) and approved by SCDHEC in the Record of Decision (ROD) as required by the Consent Agreement. Until remediation is performed, funding to clean-up the impact will be incorporated in the Decommissioning Funding Plan (DFP) required by Nuclear Regulatory Commission (NRC) regulations and the site's NRC license. The next triennial DFP update is due May 2022.

***Gator Pond***

In Phase I of the RI, surficial sediment samples identified the presence of Tc-99 in Gator Pond. To assess the vertical and horizontal extent of potential impact in Phase II of the RI, the original two locations, along with four new locations were sampled. The results of this additional sediment sampling are presented in Table 5.

**Table 5: Gator Pond Sediment Sampling Results**

| Sample ID | Gross Analyte Activity (pCi/g) | | | | SOF | SOF | % |
|---|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | Residential | Industrial | Moist. |
| SED-23P2-0-6 | 1.36 | 0.0994 | 1.36 | 144 | **7.8** | 0.0 | 66.5 |
| SED-23P2-6-12 | 1.19 | 0.0658 | 1.29 | 30.6 | **1.8** | 0.0 | 46.9 |
| SED-23P2-12-24 | 1.06 | 0.0187 | 1.19 | 1.4 | 0.2 | 0.0 | 24.5 |
| SED-23P2-24-36 | 1.11 | 0.0379 | 0.736 | 0.785 | 0.2 | 0.0 | 23.5 |
| SED-24P2-0-6 | 3.12 | 0.16 | 2.13 | 118 | **6.6** | 0.0 | 80.4 |
| SED-24P2-6-12 | 2.63 | 0.153 | 1.67 | 158 | **8.7** | 0.0 | 92 |
| SED-24P2-12-18 | 1.57 | 0.217 | 1.47 | 33.3 | **2.0** | 0.0 | 75.9 |
| SED-62P2-0-6 | 1.21 | 0.167 | 1.73 | 22.9 | **1.4** | 0.0 | 33.2 |
| SED-62P2-6-12 | 1.57 | 0.0659 | 2 | 2.89 | 0.4 | 0.0 | 22.9 |
| SED-62P2-12-24 | 1.84 | 0 | 1.12 | 1.08 | 0.3 | 0.0 | 23.6 |
| SED-63P2-0-6 | 0.853 | 0.148 | 0.875 | 25 | **1.5** | 0.0 | 22.8 |
| SED-63P2-6-12 | 0.76 | 0.0985 | 0.649 | 2.63 | 0.3 | 0.0 | 27.5 |
| SED-64P2-0-6 | 1.3 | 0.0856 | 1.18 | 85.8 | **4.7** | 0.0 | 22.1 |
| SED-64P2-6-12 | 1.11 | 0.0301 | 1.32 | 5.53 | 0.5 | 0.0 | 32.2 |
| SED-65P2-0-6 | 1.01 | 0.113 | 0.726 | 312 | **16.6** | 0.0 | 22.4 |
| SED-65P2-6-12 | 1.12 | 0 | 0.791 | 8.41 | 0.6 | 0.0 | 31.9 |

As can be seen from the data in Table 5 above, the results of the Gator Pond sediment sampling show elevated concentrations of Tc-99 across the Gator Pond in the top 6 inches of sediment. To a lesser extent, residual amounts of Tc-99 were identified at greater depths extending down to approximately 18 inches below the ground surface. Gator Pond is the only area of the site where Tc-99 is present in sediments above residential levels. Possible methods of contaminant transport into the Gator Pond include overland flow, and/or groundwater intrusion through permeable sands and sediments at the bottom of Gator Pond. Ongoing studies of the area in the Phase II RI will help determine a potential cause.

Gator Pond represents an industrial use area of the site and is not a source of drinking water; therefore, these concentrations do not represent any undue risk to the health and safety of the workforce or the public, and do not indicate a potential for off-site impact. This area will continue to be monitored, and potential remediation options will be evaluated during the FS and approved by SCDHEC in the ROD as required by the Consent Agreement. Until remediation is performed, funding to clean-up the impact will be incorporated in the Decommissioning Funding Plan (DFP) required by NRC regulations and the site's NRC license. The next triennial DFP update is due May 2022.

***Mill Creek Corridor***

During Phase I of the RI, 17 sediment sample locations within Upper and Lower Sunset Lake were identified to contain elevated concentrations of U in sediments. To further assess the vertical and horizontal extent of the potential impact, additional sampling was performed at these locations, extending to greater depths. The results of this additional sediment sampling are presented in Table 6.

**Table 6: Mill Creek Sediment Sampling Results**

| Sample ID | Gross Analyte Activity (pCi/g) | | | | SOF | SOF | % |
|---|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | Residential | Industrial | Moist. |
| SED-19P2-0-6 | 19.1 | 1.02 | 5.15 | 0.208 | **2.0** | 0.1 | 87.8 |
| SED-19P2-6-12 | 27 | 1.22 | 6.42 | 1.12 | **2.7** | 0.1 | 87.6 |
| SED-19P2-12-18 | 2.05 | 0.0675 | 1.51 | 0 | 0.3 | 0.0 | 68.6 |
| SED-20P2-0-6 | 1.72 | 0.0212 | 1.67 | 0.638 | 0.3 | 0.0 | 39.1 |
| SED-20P2-6-12 | 2.13 | 0.094 | 1.5 | 0.265 | 0.3 | 0.0 | 36.2 |
| SED-20P2-12-24 | 1.43 | 0.145 | 1.89 | 0.208 | 0.3 | 0.0 | 32.4 |
| SED-20P2-24-36 | 1.49 | 0.0841 | 1.4 | 0.7 | 0.3 | 0.0 | 32.5 |
| SED-21P2-0-6 | 13.2 | 0.393 | 3.79 | 1.17 | **1.4** | 0.0 | 77.5 |
| SED-21P2-6-12 | 2.19 | 0.131 | 1.51 | 0.528 | 0.3 | 0.0 | 72.7 |
| SED-21P2-12-24 | 1.56 | 0.0344 | 1.07 | 0.225 | 0.2 | 0.0 | 45.8 |
| SED-21P2-24-36 | 1.75 | 0 | 0.97 | 0.0586 | 0.2 | 0.0 | 52.5 |
| SED-22P2-0-6 | 6.21 | 0.257 | 2.24 | 0.304 | 0.7 | 0.0 | 61.1 |
| SED-22P2-6-12 | 1.97 | 0.192 | 0.971 | 0.0333 | 0.2 | 0.0 | 53 |
| SED-22P2-12-24 | 1.09 | 0.035 | 0.838 | 0 | 0.1 | 0.0 | 36.5 |
| SED-22P2-24-36 | 1.81 | 0.225 | 1.08 | 0 | 0.2 | 0.0 | 25.8 |
| SED-38P2-0-6 | 60.9 | 3.12 | 17 | 2.13 | **6.4** | 0.2 | 74.5 |
| SED-38P2-6-12 | 4.19 | 0.276 | 2.52 | 0.116 | 0.5 | 0.0 | 67.2 |
| SED-38P2-12-24 | 3.01 | 0.188 | 1.71 | 0.174 | 0.4 | 0.0 | 76 |
| SED-38P2-24-36 | 1.74 | 0.0835 | 1.6 | 0.128 | 0.3 | 0.0 | 44.3 |
| SED-39P2-0-6 | 2.22 | 0.0959 | 1.81 | 0.626 | 0.3 | 0.0 | 45.1 |
| SED-39P2-6-12 | 2.37 | 0.0929 | 1.85 | 0.732 | 0.4 | 0.0 | 43.7 |
| SED-39P2-12-24 | 1.58 | 0.243 | 1.63 | 0.536 | 0.3 | 0.0 | 43.3 |
| SED-39P2-24-36 | 1.86 | 0.181 | 1.96 | 0.281 | 0.3 | 0.0 | 33.1 |
| SED-40P2-0-6 | 4.69 | 0.362 | 2.29 | 0.4 | 0.6 | 0.0 | 32.2 |
| SED-40P2-6-12 | 1.34 | 0.0449 | 1.43 | 0.199 | 0.2 | 0.0 | 72.3 |
| SED-40P2-12-24 | 1.17 | 0 | 1.09 | 0.085 | 0.2 | 0.0 | 34.8 |
| SED-40P2-24-36 | 1.36 | 0.0645 | 1.23 | 0.137 | 0.2 | 0.0 | 32 |
| SED-41P2-0-6 | 17 | 0.789 | 3.38 | 1.12 | **1.7** | 0.0 | 24.7 |
| SED-41P2-6-12 | 1.84 | 0.0733 | 1.29 | 0.038 | 0.2 | 0.0 | 85.8 |

**Table 6: Mill Creek Sediment Sampling Results (continued)**

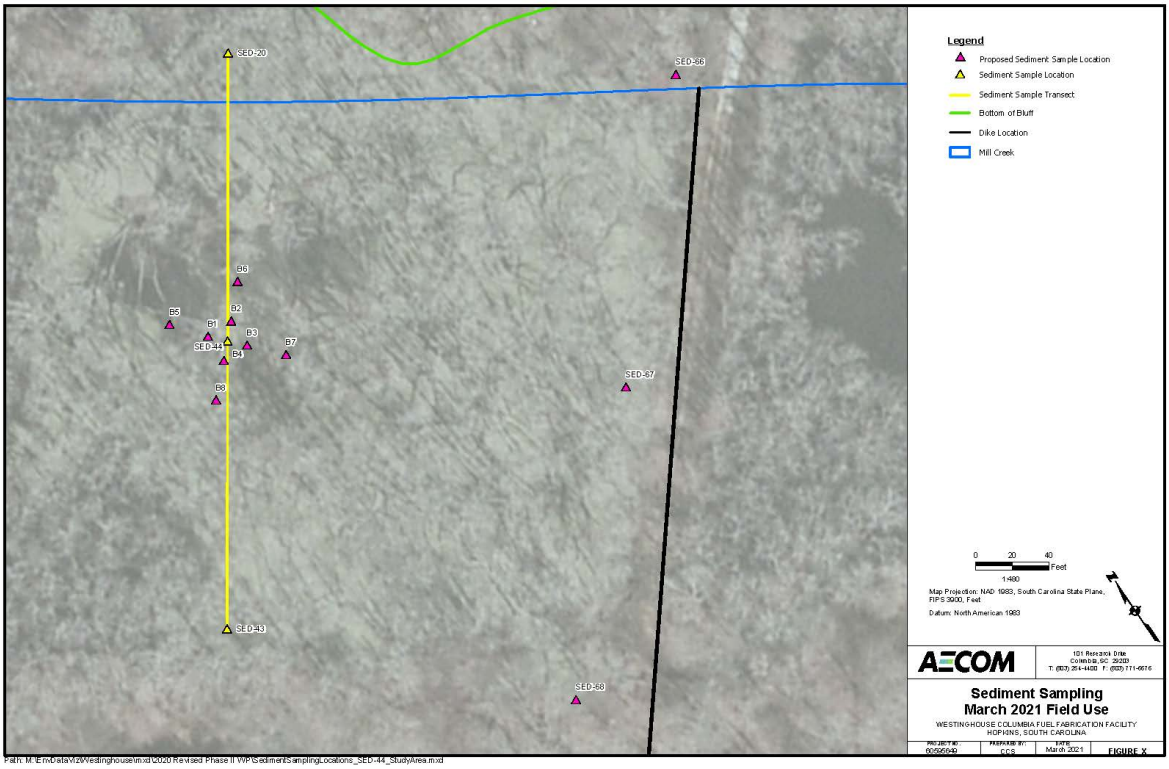
| Sample ID | Gross Analyte Activity (pCi/g) | | | | SOF | SOF | % |
|---|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | Residential | Industrial | Moist. |
| SED-41P2-12-24 | 2.14 | 0 | 1.87 | 0.216 | 0.3 | 0.0 | 67.6 |
| SED-41P2-24-36 | 0.806 | 0.06 | 0.925 | 0.185 | 0.1 | 0.0 | 78.7 |
| SED-42P2-0-6 | 31.1 | 1.18 | 7.57 | 1.21 | **3.1** | 0.1 | 92 |
| SED-42P2-6-12 | 4.34 | 0.248 | 1.68 | 0.137 | 0.5 | 0.0 | 84.3 |
| SED-42P2-12-24 | 3.19 | 0.135 | 1.5 | 0.0327 | 0.4 | 0.0 | 70.5 |
| SED-42P2-24-36 | 1.57 | 0.0342 | 1.58 | 0 | 0.2 | 0.0 | 71.3 |
| SED-43P2-0-6 | 5.13 | 0.211 | 1.87 | 0.226 | 0.6 | 0.0 | 71.4 |
| SED-43P2-6-12 | 16 | 0.873 | 4.5 | 0.00633 | **1.7** | 0.1 | 80.3 |
| SED-44P2-0-6 | 435 | 24.3 | 98.7 | 9.42 | **44.0** | **1.3** | 88.9 |
| SED-44P2-6-12 | 34 | 1.57 | 8.74 | 4.33 | **3.7** | 0.1 | 84.9 |
| SED-44P2-12-18 | 3.34 | 0.0293 | 2.7 | 0 | 0.5 | 0.0 | 73.3 |
| SED-45P2-0-6 | 6 | 0.325 | 1.92 | 0 | 0.6 | 0.0 | 87.3 |
| SED-45P2-6-12 | 2.95 | 0.0545 | 1.48 | 0 | 0.3 | 0.0 | 75.7 |
| SED-46P2-0-6 | 11.6 | 0.251 | 2.85 | 0 | **1.1** | 0.0 | 89.4 |
| SED-46P2-6-12 | 10.4 | 0.419 | 3.55 | 0.11 | **1.1** | 0.0 | 83.8 |
| SED-47P2-0-6 | 3.32 | 0.0528 | 1.95 | 0 | 0.4 | 0.0 | 76 |
| SED-47P2-6-12 | 4.86 | 0.0999 | 2.41 | 0 | 0.6 | 0.0 | 89.4 |
| SED-48P2-0-6 | 2.49 | 0.154 | 2.24 | 0 | 0.4 | 0.0 | 70.3 |
| SED-48P2-6-12 | 2.11 | 0.169 | 1.77 | 0 | 0.3 | 0.0 | 36.8 |
| SED-48P2-12-18 | 1.63 | 0.205 | 1.85 | 0 | 0.3 | 0.0 | 33.8 |
| SED-49P2-0-6 | 5.1 | 0.142 | 2.25 | 0 | 0.6 | 0.0 | 77.7 |
| SED-49P2-6-12 | 2.85 | 0.0436 | 2.04 | 0 | 0.4 | 0.0 | 70.4 |
| SED-50P2-0-6 | 6.83 | 0.351 | 2.65 | 0 | 0.8 | 0.0 | 83.9 |
| SED-50P2-6-12 | 2.33 | 0.152 | 1.83 | 0 | 0.3 | 0.0 | 66 |
| SED-50P2-12-24 | 1 | 0.139 | 0.808 | 0 | 0.2 | 0.0 | 59.4 |

The majority of the Phase II RI sediment results are consistent with the results collected from Phase I, showing only residual levels of U contamination in the surficial layer of sediment of Mill Creek. However, there is one significant sediment result that stands out. Location SED-44 (0-6") was significantly more elevated than any of the surrounding sediment locations collected during either the Phase I or Phase II sampling. This prompted an additional sampling campaign to further bound the extent of potential impact in this area.

## Mill Creek Corridor Bounding Sampling

During the RI Phase II bounding efforts, a sampling plan was developed and submitted to SCDHEC for review and approval. This plan established two bounding "boxes" placed around the location of SED-44. One box (with 4 corner points) was approximately 10 $m^2$ in area, and the other was approximately 100 $m^2$ in area. An additional sediment transect was also placed between the location of SED-44 and the Upper Sunset Lake dike which is the impounding barrier downstream. Samples SED-66, SED-67, and SED-68 were collected from this transect to determine if additional depositional areas could be identified further downstream of SED-44. The approximate locations of these bounding samples are shown in Figure 4.

**Figure 4 – SED-44 Bounding Sample Locations**




The original SED-44 results are presented alongside the bounding sample results in Table 7. Locations SED-B1, SED-B2, SED-B3, and SED-B4 represent the corner points of the 10 $m^2$ bounding area, and SED-B5, SED-B6, SED-B7, and SED-B8 represent the corner points of the 100 $m^2$ bounding area. SED-66, SED-67, and SED-68 make up the new sediment transect that was placed approximately 25 ft upstream of the Upper Sunset Lake dike.

**Table 7: SED-44 Bounding Sediment Sampling Results**

| Sample ID | Gross Analyte Activity (pCi/g) | | | | SOF | SOF | % |
|---|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | Residential | Industrial | Moist. |
| SED-44P2-0-6 | 435.0 | 24.3 | 98.7 | 9.4 | **44.0** | **1.3** | 88.9 |
| SED-44P2-6-12 | 34.0 | 1.6 | 8.7 | 4.3 | **3.7** | 0.1 | 84.9 |
| SED-44P2-12-18 | 3.3 | 0.0 | 2.7 | 0.0 | 0.5 | 0.0 | 73.3 |
| SED-B1-0-6 | 401.0 | 26.9 | 95.7 | 23.7 | **42.3** | **1.3** | 83.6 |
| SED-B1-6-12 | 3.2 | 0.3 | 2.0 | 0.3 | 0.4 | 0.0 | 72.3 |
| SED-B2-0-6 | 267.0 | 15.8 | 60.3 | 19.1 | **27.8** | 0.8 | 89.1 |
| SED-B2-6-12 | 5.5 | 0.4 | 2.3 | 0.7 | 0.7 | 0.0 | 77.1 |
| SED-B3-0-6 | 47.2 | 2.6 | 13.1 | 4.4 | **5.1** | 0.2 | 82.9 |
| SED-B3-6-12 | 90.6 | 4.8 | 22.1 | 5.3 | **9.4** | 0.3 | 85.3 |
| SED-B4-0-6 | 33.6 | 2.3 | 7.8 | 1.1 | **3.5** | 0.1 | 94.2 |
| SED-B4-6-12 | 10.4 | 0.4 | 3.5 | 0.4 | **1.1** | 0.0 | 73.5 |
| SED-B5-0-6 | 30.0 | 1.4 | 7.3 | 0.6 | **3.0** | 0.1 | 94.6 |
| SED-B5-6-12 | 4.4 | 0.2 | 2.3 | 1.4 | 0.6 | 0.0 | 72.9 |
| SED-B6-0-6 | 30.4 | 1.8 | 6.9 | 1.1 | **3.1** | 0.1 | 92.2 |
| SED-B6-6-12 | 8.0 | 0.4 | 2.9 | 1.4 | 0.9 | 0.0 | 73 |
| SED-B7-0-6 | 24.7 | 1.1 | 6.3 | 3.7 | **2.7** | 0.1 | 78 |
| SED-B7-6-12 | 5.5 | 0.3 | 3.2 | 0.5 | 0.7 | 0.0 | 77.6 |
| SED-B8-0-6 | 5.5 | 0.3 | 3.2 | 0.9 | 0.7 | 0.0 | 98 |
| SED-B8-6-12 | 37.6 | 1.9 | 8.7 | 1.4 | **3.8** | 0.1 | 90.5 |
| SED-66-0-6 | 14.5 | 0.6 | 4.2 | 2.2 | **1.6** | 0.0 | 63.3 |
| SED-66-6-12 | 4.8 | 0.3 | 2.5 | 0.8 | 0.6 | 0.0 | 49 |
| SED-66-12-24 | 1.5 | 0.2 | 1.2 | 0.2 | 0.2 | 0.0 | 51.7 |
| SED-67-0-6 | 14.8 | 0.7 | 4.4 | 1.8 | **1.6** | 0.0 | 86.5 |
| SED-67-6-12 | 2.8 | 0.1 | 1.4 | 0.6 | 0.4 | 0.0 | 70.4 |
| SED-67-12-24 | 2.6 | 0.1 | 1.4 | 0.5 | 0.3 | 0.0 | 71.8 |
| SED-68-0-6 | 1.0 | 0.0 | 1.5 | 0.1 | 0.2 | 0.0 | 28 |
| SED-68-6-12 | 1.3 | 0.1 | 1.1 | 0.0 | 0.2 | 0.0 | 26.3 |
| SED-68-12-24 | 0.1 | 1.2 | 0.0 | 0.6 | 0.2 | 0.0 | 26.8 |

As can be seen from the results above, locations SED-B1 and SED-B2 still have elevated U concentrations in the surficial layer indicating that the area of the interest around SED-44 may be slightly greater than $10m^2$. However, the results from all the surrounding sample areas are consistent with the levels seen throughout Upper and Lower Sunset Lake and indicate that while the area may be slightly greater than 10 $m^2$, it is less than 100 $m^2$ and appears to be isolated to this small area in Upper Sunset Lake. The elevated concentrations also appear to be limited to the surficial layer, and do not extend deeper into the sediment. Lastly it can be noted above that the

sample media itself was very high in percent moisture because these samples were mostly collected from areas under standing water. However, the analytical laboratory results are reported dried.

When evaluating radiological samples, the water (moisture content) in the sample is an efficient shield to radioactivity, reducing the amount of radioactivity transmitted into the environment. The water also adds weight to the overall sample mass. If the water content of a sediment sample is removed through heating and drying the sample, then the sample results are not necessarily reflective of the actual sediment that exists in the environment, which is covered by and saturated with water. Therefore, it is appropriate to interpret the results moving forward in two ways, Dry (as reported by the laboratory), and Wet (accounting for moisture in the sample). It is also appropriate to focus on the surficial sediment layer, since the underlying sediment concentrations are much lower, and the surficial layer provides a bounding case.

Next an area average calculation was performed on the 10 $m^2$ and 100 $m^2$ bounding areas. Utilizing the laboratory reported results (dry), a straight average was performed on the 10$m^2$ bounding area, giving equal weighting to each sample. The 10 $m^2$ area average results are presented in Table 8. A weighted average was applied to the 100 $m^2$ area, assigning a 10% area weight to the 10 $m^2$ average, and even weighting to the remaining 4 corner points. The 100$m^2$ area average results are presented in Table 9.

The 10 $m^2$ area average calculation was repeated utilizing moisture corrected activity (wet), which better represents the "as found" condition of the sediment, since it exists in extremely wet conditions nearly all year round. These results are reported in Table 10. The moisture corrected results were also used to calculate a weighted average for the 100 $m^2$ bounding area. These results are reported in Table 11.

## Table 8: SED-44 10 $m^2$ Bounding Area Average (Dry)

10 $m^2$ Bounding area, 0-6 inch layer, dried sample activity

| Sample ID | Gross Analyte Activity (pCi/g) | | | | Calculated Enrichment (%) | SOF Resid. | SOF Indust. | % of area | Gross Analyte Activity (pCi/g) | | | | SOF Resid. | SOF Indust. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | | | | | U-234 | U-235 | U-238 | Tc-99 | | |
| SED-44P2-0-6 | 435.0 | 24.3 | 98.7 | 9.4 | 3.7 | **44.0** | **1.3** | 20% | 87.0 | 4.9 | 19.7 | 1.9 | **8.8** | 0.3 |
| SED-B1-0-6 | 401.0 | 26.9 | 95.7 | 23.7 | 4.2 | **42.3** | **1.3** | 20% | 80.2 | 5.4 | 19.1 | 4.7 | **8.5** | 0.3 |
| SED-B2-0-6 | 267.0 | 15.8 | 60.3 | 19.1 | 4.0 | **27.8** | 0.8 | 20% | 53.4 | 3.2 | 12.1 | 3.8 | **5.6** | 0.2 |
| SED-B3-0-6 | 47.2 | 2.6 | 13.1 | 4.4 | 3.0 | **5.1** | 0.2 | 20% | 9.4 | 0.5 | 2.6 | 0.9 | **1.0** | 0.0 |
| SED-B4-0-6 | 33.6 | 2.3 | 7.8 | 1.1 | 4.4 | **3.5** | 0.1 | 20% | 6.7 | 0.5 | 1.6 | 0.2 | 0.7 | 0.0 |
| *Area Average* | | | | | | | | | *236.8* | *14.4* | *55.1* | *11.5* | *24.6* | *0.7* |

## Table 9: SED-44 100 $m^2$ Bounding Area Average (Dry)

100 $m^2$ Bounding area, 0-6 inch layer, dried sample activity

| Sample ID | Gross Analyte Activity (pCi/g) | | | | Calculated Enrichment (%) | SOF Resid. | SOF Indust. | % of area | Gross Analyte Activity (pCi/g) | | | | SOF Resid. | SOF Indust. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | | | | | U-234 | U-235 | U-238 | Tc-99 | | |
| 10M2-0-6-WA | 236.8 | 14.4 | 55.1 | 11.5 | N/A | **24.6** | 0.7 | 10% | 23.7 | 1.4 | 5.5 | 1.2 | **2.5** | 0.1 |
| SED-B5-0-6 | 30.0 | 1.4 | 7.3 | 0.6 | 2.9 | **3.0** | 0.1 | 23% | 6.8 | 0.3 | 1.6 | 0.1 | 0.7 | 0.0 |
| SED-B6-0-6 | 30.4 | 1.8 | 6.9 | 1.1 | 4.0 | **3.1** | 0.1 | 23% | 6.8 | 0.4 | 1.6 | 0.3 | 0.7 | 0.0 |
| SED-B7-0-6 | 24.7 | 1.1 | 6.3 | 3.7 | 2.8 | **2.7** | 0.1 | 23% | 5.6 | 0.3 | 1.4 | 0.8 | 0.6 | 0.0 |
| SED-B8-0-6 | 5.5 | 0.3 | 3.2 | 0.9 | 1.4 | 0.7 | 0.0 | 23% | 1.2 | 0.1 | 0.7 | 0.2 | 0.2 | 0.0 |
| *Weighted Average* | | | | | | | | | *44.1* | *2.5* | *10.8* | *2.6* | *4.6* | *0.1* |

## Table 10: SED-44 10 $m^2$ Bounding Area Average (Wet)

10 $m^2$ Bounding area, 0-6 inch layer, wet sample activity (moisture corrected)

| Sample ID | Gross Analyte Activity (pCi/g) | | | | Calculated Enrichment (%) | SOF Resid. | SOF Indust. | % of area | Gross Analyte Activity (pCi/g) | | | | SOF Resid. | SOF Indust. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | | | | | U-234 | U-235 | U-238 | Tc-99 | | |
| SED-44P2-0-6 | 48.3 | 2.7 | 11.0 | 9.4 | 3.7 | **5.3** | 0.1 | 20% | 9.7 | 0.5 | 2.2 | 1.9 | **1.1** | 0.0 |
| SED-B1-0-6 | 65.8 | 4.4 | 15.7 | 23.7 | 4.2 | **8.0** | 0.2 | 20% | 13.2 | 0.9 | 3.1 | 4.7 | **1.6** | 0.0 |
| SED-B2-0-6 | 29.1 | 1.7 | 6.6 | 19.1 | 4.0 | **3.9** | 0.1 | 20% | 5.8 | 0.3 | 1.3 | 3.8 | 0.8 | 0.0 |
| SED-B3-0-6 | 8.1 | 0.4 | 2.2 | 4.4 | 3.0 | **1.1** | 0.0 | 20% | 1.6 | 0.1 | 0.4 | 0.9 | 0.2 | 0.0 |
| SED-B4-0-6 | 1.9 | 0.1 | 0.5 | 1.1 | 4.4 | 0.3 | 0.0 | 20% | 0.4 | 0.0 | 0.1 | 0.2 | 0.1 | 0.0 |
| *Area Average* | | | | | | | | | *30.6* | *1.9* | *7.2* | *11.5* | *3.7* | *0.1* |

## Table 11: SED-44 100 $m^2$ Bounding Area Average (Wet)

100 $m^2$ Bounding area, 0-6 inch layer, wet sample activity (moisture corrected)

| Sample ID | Gross Analyte Activity (pCi/g) | | | | Calculated Enrichment (%) | SOF Resid. | SOF Indust. | % of area | Gross Analyte Activity (pCi/g) | | | | SOF Resid. | SOF Indust. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | | | | | U-234 | U-235 | U-238 | Tc-99 | | |
| 10M2-0-6-WA | 30.6 | 1.9 | 7.2 | 11.5 | N/A | **3.7** | 0.1 | 10% | 3.1 | 0.2 | 0.7 | 1.2 | 0.4 | 0.0 |
| SED-B5-0-6 | 1.6 | 0.1 | 0.4 | 0.6 | 2.9 | 0.2 | 0.0 | 23% | 0.4 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 |
| SED-B6-0-6 | 2.4 | 0.1 | 0.5 | 1.1 | 4.0 | 0.3 | 0.0 | 23% | 0.5 | 0.0 | 0.1 | 0.2 | 0.1 | 0.0 |
| SED-B7-0-6 | 5.4 | 0.2 | 1.4 | 3.7 | 2.8 | 0.7 | 0.0 | 23% | 1.2 | 0.1 | 0.3 | 0.8 | 0.2 | 0.0 |
| SED-B8-0-6 | 0.1 | 0.0 | 0.1 | 0.9 | 1.4 | 0.1 | 0.0 | 23% | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 |
| *Weighted Average* | | | | | | | | | *5.2* | *0.3* | *1.3* | *2.6* | *0.7* | *0.0* |

***Mill Creek Dose & Risk Assessment***

In accordance with WCFFF site procedure RA-433, when elevated sample results such as these from SED-44 are identified, further evaluation of the potential risks to the work force and public health and safety are completed. The average concentrations reported in Tables 8 through 11 above were used to develop a dose and risk assessment of the elevated area of sample SED-44. RESRAD-ONSITE Version 7.2 was used to calculate potential dose and risk to the evaluated receptor (residential farmer). RESRAD-ONSITE (formerly RESRAD) is a computer model developed by the Argonne National Laboratory (ANL) for the U.S. Department of Energy (DOE). RESRAD-ONSITE calculates site-specific risk and dose to various future hypothetical on-site receptors at sites with residual radioactive materials.

The use of the RESRAD family of codes for modeling risk and dose has become an acceptable regulatory standard. RESRAD-ONSITE Version 7.2 incorporates recently (2014) updated dose conversion and morbidity slope factors calculated by Oak Ridge National Laboratory (ORNL). These updated factors are presented in the ORNL document entitled Calculation of Slope Factors and Dose Coefficients (ORNL 2014) and are included in the DCFPAK 3.02 library of the RESRAD-ONSITE Version 7.2 model. The derivations of these factors are based on updated decay chain and nuclide energy data presented in International Commission on Radiological Protection Publication (ICRP)-107, Nuclear Decay Data for Dosimetric Calculations (ICRP 2008).

Using the default Residential Farmer scenario in RESRAD-ONSITE, 8 separate dose and risk models were created using both dry (laboratory reported) and wet (moisture corrected) results:

- SED-44 Area of Interest (dry)
- SED-44 Area of Interest (wet)
- SED-44 10$m^2$ average (dry)
- SED-44 10$m^2$ average (wet)
- SED-44 100$m^2$ average (dry)
- SED-44 100$m^2$ average (wet)
- Mill Creek (dry)
- Mill Creek (wet)

Each Dose and Risk assessment was evaluated for a period of 100 years. The wet conditions are considered most reflective of the current site conditions. Mill Creek, and subsequently Upper and Lower Sunset Lake remain saturated throughout the year. Therefore, the modeled scenario for wet conditions uses the moisture corrected sample activity, which assumes that the sediment is saturated, and has at least 12 inches (0.3 m) of water cover. The actual measured depth of water at the time of sampling in this area measured between 13.5 and 44 inches.

The Dry conditions are only reported as a "worst case scenario" in the extremely unlikely event that Mill Creek would run dry, or the area would experience an extreme and unforeseen drought. Therefore, the modeled scenario for dry conditions uses the laboratory dried sample activity and assumes no water cover. RESRAD-ONSITE parameters that differ from the default Residential Farmer settings are shown in Table 12.

**Table 12: RESRAD-ONSITE Dose and Risk Parameters**

| Area | Parameter | Wet Conditions | Dry Conditions |
|---|---|---|---|
| SED-44 Area of Interest | U-234 (pCi/g) | 48.3 | 435 |
| | U-235 (pCi/g) | 2.7 | 24.3 |
| | U-238 (pCi/g) | 11 | 55.1 |
| | Tc-99 (pCi/g) | 9.4 | 9.4 |
| | Area ($m^2$) | 10 | 10 |
| | Thickness (m) | 0.15 | 0.15 |
| | Length parallel to aquifer (m) | 1 | 1 |
| | Cover thickness (m) | 0.3 | 0 |
| | Cover Density (g/cc) | 1 | N/A |
| SED-44 10 $m^2$ Ave | U-234 (pCi/g) | 30.6 | 236.8 |
| | U-235 (pCi/g) | 1.9 | 14.4 |
| | U-238 (pCi/g) | 7.2 | 55.1 |
| | Tc-99 (pCi/g) | 11.5 | 11.5 |
| | Area (m2) | 10 | 10 |
| | Thickness (m) | 0.15 | 0.15 |
| | Length parallel to aquifer (m) | 1 | 1 |
| | Cover thickness (m) | 0.3 | 0 |
| | Cover Density (g/cc) | 1 | N/A |
| SED-44 100 $m^2$ Ave | U-234 (pCi/g) | 5.2 | 44.1 |
| | U-235 (pCi/g) | 0.3 | 2.5 |
| | U-238 (pCi/g) | 1.3 | 10.8 |
| | Tc-99 (pCi/g) | 2.6 | 2.6 |
| | Area (m2) | 100 | 100 |
| | Thickness (m) | 0.15 | 0.15 |
| | Length parallel to aquifer (m) | 10 | 10 |
| | Cover thickness (m) | 0.3 | 0 |
| | Cover Density (g/cc) | 1 | N/A |
| Mill Creek | U-234 (pCi/g) | 4.5 | 37.2 |
| | U-235 (pCi/g) | 0.2 | 1.9 |
| | U-238 (pCi/g) | 1.1 | 9.4 |
| | Tc-99 (pCi/g) | 1 | 1 |
| | Area (m2) | 14500 | 14500 |
| | Thickness (m) | 0.15 | 0.15 |
| | Length parallel to aquifer (m) | 381 | 381 |
| | Cover thickness (m) | 0.3 | 0 |
| | Cover Density (g/cc) | 1 | N/A |

Using the parameters listed in Table 12, eight separate dose evaluations, and eight separate risk reports were generated. These sixteen individual dose and risk reports combined represent over 400 pages of information and are available for review upon request. The maximum dose and risk reported over the 100 year period for each scenario is summarized in Table 13.

**Table 13: Mill Creek Dose & Risk Summary**

| Area | Wet Conditions | | Dry Conditions | |
|---|---|---|---|---|
| | Max. Dose (mRem/yr) | Max. Risk | Max. Dose (mRem/yr) | Max. Risk |
| SED-44 Area of Interest | 1.843 | 1.44E-05 | 17.13 | 1.88E-04 |
| SED-44 10 $m^2$ Ave | 1.18 | 9.24E-06 | 10.5 | 1.23E-04 |
| SED-44 100 $m^2$ Ave | 0.39 | 3.69E-06 | 2.567 | 3.47E-05 |
| Mill Creek | 0.421 | 4.56E-06 | 3.111 | 4.59E-05 |

The SED-44 Area of Interest is on WCFFF property and is not publicly accessible. It is within a controlled area that is monitored and patrolled by site security. Site personnel also monitor the area and perform environmental sampling. However, should a member of the public intentionally or inadvertently access the area, even under the potential worst case scenario, there is no risk of excessive exposure, as the calculated maximum exposure is below the threshold of 25 mRem/yr for unrestricted release.

Rather than making assumptions about the quantity of radioactive material present in the area, the dose and risk assessment summarized in Table 13 shows that, even under the potential worst case scenario, projected doses to a member of the public would not exceed regulatory criteria or require any type of posting or access restriction. No immediate action is required based on this assessment, and evaluation of remedial alternatives will be performed in the FS. Until remediation is performed, funding to clean-up the impact will be incorporated in the Decommissioning Funding Plan (DFP) required by NRC regulations and the site's NRC license. The next triennial DFP update is due May 2022.

## Conclusions

Evaluation of the elevated sediment results identified on WCFFF property could lead to three possible conclusions. First, the results could indicate an immediate need to take remedial action based on the determined level of risk. Second, the results could indicate that further evaluation is warranted in the FS that will be performed as part of the Consent Agreement, and third, the results could indicate that no action is necessary.

Based on this interim evaluation of the Phase II RI sediment sampling results, the follow up bounding sampling results, and the dose modeling/associated risk estimates, no immediate action

is necessary. The results of these comprehensive sampling campaigns have defined the limited horizontal and vertical extent of sediment impact. There are no current or future concerns for contaminants to potentially move offsite, and the documented impacts pose no potentially significant threat to plant workers, the general public or the environment. Continued environmental monitoring per the site's NRC license and WCFFF's procedure RA-434, Environmental Data Management, will be performed, and further evaluation in the areas of the site drainage ditch, Gator Pond and the Mill Creek Corridor will be included in the Final RI report and in the FS required by the Consent Agreement.

***References***


NRC 2006. *Consolidated Decommissioning Guidance: Decommissioning Process for Materials Licensees*, NUREG-1757, Vol. 1, Rev. 2.

NRC 2006. *Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria*, NUREG-1757, Vol. 2, Rev. 1.

ANL 1993. Argonne National Laboratory, Environmental Assessment and Information Sciences Division. *Data Collection Handbook to Support Modeling Impacts of Radioactive Material in Soil*. April 1993.

NRC 1992. *Residual Radioactive Contamination from Decommissioning: Technical Basis for Translating Contamination Levels to Annual Total Effective Dose Equivalent*, Volume 1. NUREG/CR-5512. PNL-7994. October 1992.

ORNL 2014. Oak Ridge National Laboratory. Oak Ridge, Tennessee. *Calculation of Slope Factors and Dose Coefficients*. ORNL/TM-2013/00. September 2014.

RA-433, Rev 1 - WCFFF Environmental Remediation Procedure, dated January 16, 2020.

RA-434, Rev 0 - WCFFF Environmental Data Management Procedure, dated July 11, 2019.

# Attachment C

**Sanitary Lagoon Sludge Sampling Results**

# Attachment C

**Sanitary Lagoon Analytical Results**

**Westinghouse Columbia Fuel Fabrication Facility, Hopkins, SC**

| | | Sample | SLS-02 | SLS-04 | SLS-06 | SLS-08 | SLS-10 | SLS-11 | SLS-12 | SLS-14 | SLS-15 | SLS-16 | SLS-18 | SLS-20 | SLS-22 | SLS-23 | SLS-24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Date | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 | 6/15/2021 |
| Group | Analyte | Units | | | | | | | | | | | | | | | |
| Radiological | Technetium-99 | pCi/g | **1.26** | **1.95** | 0 ## | **4.23** | **2.37** | **1.03** | **3.33** | **22.8** | 0.200 # | **1.02** | **11.2** | **3.00** | **2.96** | **3.25** | **1.32** |
| Radiological | Uranium-233/234 | pCi/g | **43.4** | **48.4** | **14.7** | **1880** | **12.6** | **309** | **2210** | **2870** | **33.4** | **192** | **2540** | **1790** | **1380** | **1300** | **1940** |
| Radiological | Uranium-235/236 | pCi/g | **2.71** | **2.61** | **0.836** | **146** | **0.732** | **15.0** | **121** | **189** | **2.29** | **11.1** | **147** | **120** | **96.6** | **107** | **144** |
| Radiological | Uranium-238 | pCi/g | **9.38** | **12.0** | **3.04** | **389** | **3.16** | **51.2** | **418** | **703** | **6.46** | **35.2** | **516** | **350** | **295** | **316** | **348** |
| Chemical | Ammonia | mg/kg | **100** | **26.9** | **133** | **2720** | **34.2** | **1150** | **4800** | **1330** | **91.5** | **151** | **3540** | **4780** | **3890** | **3820** | **5450** |
| Chemical | Fluoride | mg/kg | **8.54** | **12.2** | **12.5** | **67.2** | **12.2** | **14.4** | **152** | **84.5** | **2.28** | **3.25** | **71.2** | **108** | **114** | **94.1** | **137** |
| Chemical | Nitrate ion | mg/kg | < 1.28 | < 1.18 | < 1.26 | < 15.8 | < 1.19 | < 3.55 | < 22.8 | < 9.00 | < 1.37 | < 1.61 | < 16.9 | < 18.9 | < 19.4 | < 14.5 | < 25.5 |

# Attachment C

## Sanitary Lagoon Analytical Results

## Westinghouse Columbia Fuel Fabrication Facility, Hopkins, SC

| | | Sample | SLS-1 | SLS-21 | SLS-25 | SLS-3 | SLS-5 | SLS-B1 | SLS-B2 |
|---|---|---|---|---|---|---|---|---|---|
| | | Date | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 |
| Group | Analyte | Units | | | | | | | |
| Radiological | Technetium-99 | pCi/g | **2.86** | **11.4** | **6.56** | **5.58** | **50.2** | **1.16** | **1.42** |
| Radiological | Uranium-233/234 | pCi/g | **99.9** | **299** | **2490** | **105** | **351** | **42.5** | **50.0** |
| Radiological | Uranium-235/236 | pCi/g | **4.49** | **14.1** | **124** | **5.81** | **17.3** | **1.70** | **2.36** |
| Radiological | Uranium-238 | pCi/g | **20.8** | **61.8** | **546** | **24.3** | **80.3** | **8.39** | **9.62** |
| Chemical | Ammonia | mg/kg | **331** | **210** | **2740** | **42.8** | **132** | **74.0** | **35.2** |
| Chemical | Fluoride | mg/kg | **8.47** | **3.57** | **91.9** | **5.60** | **12.4** | **3.54** | **3.99** |
| Chemical | Nitrate ion | mg/kg | < 1.46 | **0.691** | < 13.6 | < 1.28 | **0.787** | < 1.30 | < 1.29 |
| SVOCs | 1,1'-Biphenyl | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 1,2,4,5-Tetrachlorobenzene | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2,3,4,6-Tetrachlorophenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2,4,5-Trichlorophenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2,4,6-Trichlorophenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2,4-Dichlorophenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2,4-Dimethylphenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2,4-Dinitrophenol | ug/kg | < 953 | < 4950 | | < 4370 | < 10500 | < 910 | < 8680 |
| SVOCs | 2,4-Dinitrotoluene | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2,6-Dinitrotoluene | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2-Chloronaphthalene | ug/kg | < 47.6 | < 248 | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | 2-Chlorophenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2-Methylnaphthalene | ug/kg | < 47.6 | < 248 | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | 2-Methylphenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2-Nitroaniline | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 2-Nitrophenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 3&4-Methylphenol(m&p Cresol) | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 3,3'-Dichlorobenzidine | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 3-Nitroaniline | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 4,6-Dinitro-2-methylphenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 4-Bromophenyl phenyl ether | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 4-Chloro-3-methylphenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 4-Chloroaniline | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 4-Chlorophenyl phenyl ether | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 4-Nitroaniline | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | 4-Nitrophenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Acenaphthene | ug/kg | < 47.6 | **126** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Acenaphthylene | ug/kg | < 47.6 | < 248 | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Acetophenone | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Anthracene | ug/kg | < 47.6 | **958** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Atrazine | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Benz(a)anthracene | ug/kg | < 47.6 | **12400** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Benzaldehyde | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Benzo(a)pyrene | ug/kg | < 47.6 | **13500** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Benzo(b)fluoranthene | ug/kg | **19.5** | **17700** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Benzo(g,h,i)perylene | ug/kg | < 47.6 | **6600** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Benzo(k)fluoranthene | ug/kg | < 47.6 | **6690** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Bis(2-chloroethoxy)methane | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Bis(2-chloroethyl)ether | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Bis(2-chloroisopropyl)ether | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Bis(2-ethylhexyl)phthalate | ug/kg | **51.4** | **800** | | < 218 | **384** | < 45.5 | **169** |
| SVOCs | Butyl benzyl phthalate | ug/kg | < 47.6 | < 248 | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Caprolactam | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Carbazole | ug/kg | < 47.6 | **166** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Chrysene | ug/kg | < 47.6 | **11800** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Dibenz(a,h)anthracene | ug/kg | < 47.6 | **1640** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Dibenzofuran | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Diethyl phthalate | ug/kg | < 47.6 | < 248 | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Dimethyl phthalate | ug/kg | < 47.6 | < 248 | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Di-n-butyl phthalate | ug/kg | < 47.6 | < 248 | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Di-n-octyl phthalate | ug/kg | < 47.6 | < 248 | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Diphenylamine | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Fluoranthene | ug/kg | **27.1** | **20900** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Fluorene | ug/kg | < 47.6 | **156** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Hexachlorobenzene | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Hexachlorobutadiene | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Hexachlorocyclopentadiene | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Hexachloroethane | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Indeno(1,2,3-cd)pyrene | ug/kg | < 47.6 | **8830** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Isophorone | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Naphthalene | ug/kg | < 47.6 | **240** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Nitrobenzene | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | N-Nitrosodi-n-propylamine | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Pentachlorophenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Phenanthrene | ug/kg | < 47.6 | **1800** | | < 218 | < 527 | < 45.5 | < 434 |
| SVOCs | Phenol | ug/kg | < 476 | < 2480 | | < 2180 | < 5270 | < 455 | < 4340 |
| SVOCs | Pyrene | ug/kg | **22.4** | **13300** | | < 218 | < 527 | < 45.5 | < 434 |
| VOCs | (1-Methylethyl)-Benzene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,1,1-Trichloroethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,1,2,2-Tetrachloroethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,1,2-Trichlor-1,2,2-trifluoroethane | ug/kg | < 5.37 | < 3.95 | < 73.4 | < 4.76 | < 5.42 | < 3.83 | < 4.42 |
| VOCs | 1,1,2-Trichloroethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,1-Dichloroethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,1-Dichloroethene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,2,3-Trichlorobenzene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,2,4-Trichlorobenzene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,2-Dibromo-3-chloropropane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,2-Dibromoethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,2-Dichlorobenzene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,2-Dichloroethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |

# Attachment C

## Sanitary Lagoon Analytical Results

## Westinghouse Columbia Fuel Fabrication Facility, Hopkins, SC

| | | Sample | SLS-1 | SLS-21 | SLS-25 | SLS-3 | SLS-5 | SLS-B1 | SLS-B2 |
|---|---|---|---|---|---|---|---|---|---|
| | | Date | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 |
| Group | Analyte | Units | | | | | | | |
| VOCs | 1,2-Dichloropropane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,3-Dichlorobenzene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,4-Dichlorobenzene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | 1,4-Dioxane | ug/kg | < 53.7 | < 39.5 | < 734 | < 47.6 | < 54.2 | < 38.3 | < 44.2 |
| VOCs | 2-Butanone | ug/kg | **9.06** | **17.9** | **1330** | **4.45** | **14.7** | **5.84** | **4.54** |
| VOCs | 2-Hexanone | ug/kg | < 5.37 | < 3.95 | < 73.4 | < 4.76 | < 5.42 | < 3.83 | < 4.42 |
| VOCs | 4-Methyl-2-pentanone | ug/kg | < 5.37 | < 3.95 | < 73.4 | < 4.76 | < 5.42 | < 3.83 | < 4.42 |
| VOCs | Acetone | ug/kg | **86.4** | **112** | **5890** | **71.1** | **84.3** | **46.3** | **67.5** |
| VOCs | Benzene | ug/kg | < 1.07 | < 0.789 | **9.39** | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Bromochloromethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Bromodichloromethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Bromoform | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Bromomethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Carbon disulfide | ug/kg | **2.36** | **4.20** | **457** | < 4.76 | **3.46** | < 3.83 | **2.62** |
| VOCs | Carbon tetrachloride | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Chlorobenzene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Chloroethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Chloroform | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Chloromethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | cis-1,2-Dichloroethene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | cis-1,3-Dichloropropene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Cyclohexane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Dibromochloromethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Dichlorodifluoromethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Ethylbenzene | ug/kg | < 1.07 | < 0.789 | **5.72** | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Methyl acetate | ug/kg | < 5.37 | < 3.95 | < 73.4 | < 4.76 | < 5.42 | < 3.83 | < 4.42 |
| VOCs | Methyl tert-butyl ether | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Methylcyclohexane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Methylene chloride | ug/kg | < 5.37 | < 3.95 | < 73.4 | < 4.76 | < 5.42 | < 3.83 | < 4.42 |
| VOCs | o-Xylene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Styrene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Tetrachloroethene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Toluene | ug/kg | **0.677** | < 0.789 | **10.4** | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | trans-1,2-Dichloroethene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | trans-1,3-Dichloropropene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Trichloroethene | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Trichlorofluoromethane | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Vinyl chloride | ug/kg | < 1.07 | < 0.789 | < 14.7 | < 0.953 | < 1.08 | < 0.766 | < 0.885 |
| VOCs | Xylenes, m- & p- | ug/kg | < 2.15 | < 1.58 | **23.8** | < 1.91 | < 2.17 | < 1.53 | < 1.77 |

# Attachment C

## Sanitary Lagoon Analytical Results

## Westinghouse Columbia Fuel Fabrication Facility, Hopkins, SC

| | | Sample | SLS-13 | SLS-17 | SLS-19 | SLS-7 | SLS-9 | SLS-B3 |
|---|---|---|---|---|---|---|---|---|
| | | Date | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 |
| Group | Analyte | Units | | | | | | |
| Radiological | Technetium-99 | pCi/g | **7.88** | **1.77** | **10.2** | **2.75** | **23.6** | **12.9** |
| Radiological | Uranium-233/234 | pCi/g | **1840** | **2580** | **2180** | **1390** | **1660** | **2180** |
| Radiological | Uranium-235/236 | pCi/g | **91.9** | **141** | **121** | **62.1** | **76.5** | **119** |
| Radiological | Uranium-238 | pCi/g | **435** | **467** | **538** | **250** | **391** | **511** |
| Chemical | Ammonia | mg/kg | **2610** | **3640** | **3240** | **2480** | **1900** | **3740** |
| Chemical | Fluoride | mg/kg | **98.8** | **114** | **93.0** | **77.5** | **91.3** | **93.9** |
| Chemical | Nitrate ion | mg/kg | **7.04** | **13.9** | **6.39** | **9.97** | **3.73** | **6.17** |
| SVOCs | 1,1'-Biphenyl | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 1,2,4,5-Tetrachlorobenzene | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2,3,4,6-Tetrachlorophenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2,4,5-Trichlorophenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2,4,6-Trichlorophenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2,4-Dichlorophenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2,4-Dimethylphenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2,4-Dinitrophenol | ug/kg | < 9100 | < 18800 | < 43200 | < 13100 | < 5410 | |
| SVOCs | 2,4-Dinitrotoluene | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2,6-Dinitrotoluene | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2-Chloronaphthalene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | 2-Chlorophenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2-Methylnaphthalene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | 2-Methylphenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2-Nitroaniline | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 2-Nitrophenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 3&4-Methylphenol(m&p Cresol) | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 3,3'-Dichlorobenzidine | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 3-Nitroaniline | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 4,6-Dinitro-2-methylphenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 4-Bromophenyl phenyl ether | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 4-Chloro-3-methylphenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 4-Chloroaniline | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 4-Chlorophenyl phenyl ether | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 4-Nitroaniline | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | 4-Nitrophenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Acenaphthene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Acenaphthylene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Acetophenone | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Anthracene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Atrazine | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Benz(a)anthracene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Benzaldehyde | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Benzo(a)pyrene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Benzo(b)fluoranthene | ug/kg | < 455 | < 940 | < 2160 | < 656 | **89.2** | |
| SVOCs | Benzo(g,h,i)perylene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Benzo(k)fluoranthene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Bis(2-chloroethoxy)methane | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Bis(2-chloroethyl)ether | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Bis(2-chloroisopropyl)ether | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Bis(2-ethylhexyl)phthalate | ug/kg | **218** | < 940 | < 2160 | **367** | **608** | |
| SVOCs | Butyl benzyl phthalate | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Caprolactam | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Carbazole | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Chrysene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Dibenz(a,h)anthracene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Dibenzofuran | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Diethyl phthalate | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Dimethyl phthalate | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Di-n-butyl phthalate | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Di-n-octyl phthalate | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Diphenylamine | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Fluoranthene | ug/kg | < 455 | < 940 | < 2160 | < 656 | **230** | |
| SVOCs | Fluorene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Hexachlorobenzene | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Hexachlorobutadiene | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Hexachlorocyclopentadiene | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Hexachloroethane | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Indeno(1,2,3-cd)pyrene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Isophorone | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Naphthalene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Nitrobenzene | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | N-Nitrosodi-n-propylamine | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Pentachlorophenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Phenanthrene | ug/kg | < 455 | < 940 | < 2160 | < 656 | < 270 | |
| SVOCs | Phenol | ug/kg | < 4550 | < 9400 | < 21600 | < 6560 | < 2700 | |
| SVOCs | Pyrene | ug/kg | < 455 | < 940 | < 2160 | < 656 | **211** | |
| VOCs | (1-Methylethyl)-Benzene | ug/kg | < 18.9 | < 41.5 | **9.81** | < 24.0 | **8.10** | **7.92** |
| VOCs | 1,1,1-Trichloroethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,1,2,2-Tetrachloroethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | **9.58** |
| VOCs | 1,1,2-Trichlor-1,2,2-trifluoroethane | ug/kg | < 94.6 | < 208 | < 87.6 | < 120 | < 55.4 | < 92.1 |
| VOCs | 1,1,2-Trichloroethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |

# Attachment C

## Sanitary Lagoon Analytical Results

## Westinghouse Columbia Fuel Fabrication Facility, Hopkins, SC

| | | Sample | SLS-13 | SLS-17 | SLS-19 | SLS-7 | SLS-9 | SLS-B3 |
|---|---|---|---|---|---|---|---|---|
| | | Date | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 |
| Group | Analyte | Units | | | | | | |
| VOCs | 1,1-Dichloroethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,1-Dichloroethene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,2,3-Trichlorobenzene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,2,4-Trichlorobenzene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,2-Dibromo-3-chloropropane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,2-Dibromoethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,2-Dichlorobenzene | ug/kg | < 18.9 | < 41.5 | **27.5** | < 24.0 | < 11.1 | **22.5** |
| VOCs | 1,2-Dichloroethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,2-Dichloropropane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,3-Dichlorobenzene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | 1,4-Dichlorobenzene | ug/kg | **100** | < 41.5 | **87.7** | < 24.0 | < 11.1 | **77.9** |
| VOCs | 1,4-Dioxane | ug/kg | < 946 | < 2080 | < 876 | < 1200 | < 554 | < 921 |
| VOCs | 2-Butanone | ug/kg | **1020** | **421** | **1270** | **213** | **1060** | **1240** |
| VOCs | 2-Hexanone | ug/kg | < 94.6 | < 208 | < 87.6 | < 120 | < 55.4 | < 92.1 |
| VOCs | 4-Methyl-2-pentanone | ug/kg | < 94.6 | < 208 | < 87.6 | < 120 | < 55.4 | < 92.1 |
| VOCs | Acetone | ug/kg | **4480** | **2080** | **4960** | **1080** | **4210** | **4910** |
| VOCs | Benzene | ug/kg | **8.32** | < 41.5 | **17.9** | < 24.0 | **3.88** | **14.4** |
| VOCs | Bromochloromethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Bromodichloromethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Bromoform | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Bromomethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Carbon disulfide | ug/kg | **225** | **94.7** | **316** | **82.9** | **256** | **283** |
| VOCs | Carbon tetrachloride | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Chlorobenzene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Chloroethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Chloroform | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Chloromethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | cis-1,2-Dichloroethene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | cis-1,3-Dichloropropene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Cyclohexane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Dibromochloromethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Dichlorodifluoromethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Ethylbenzene | ug/kg | **13.6** | < 41.5 | **14.4** | < 24.0 | **5.32** | **11.8** |
| VOCs | Methyl acetate | ug/kg | < 94.6 | < 208 | < 87.6 | < 120 | < 55.4 | < 92.1 |
| VOCs | Methyl tert-butyl ether | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Methylcyclohexane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Methylene chloride | ug/kg | **37.3** | < 208 | < 87.6 | < 120 | < 55.4 | < 92.1 |
| VOCs | o-Xylene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Styrene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Tetrachloroethene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Toluene | ug/kg | **7.19** | < 41.5 | **11.7** | < 24.0 | **6.76** | **9.77** |
| VOCs | trans-1,2-Dichloroethene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | trans-1,3-Dichloropropene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Trichloroethene | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Trichlorofluoromethane | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Vinyl chloride | ug/kg | < 18.9 | < 41.5 | < 17.5 | < 24.0 | < 11.1 | < 18.4 |
| VOCs | Xylenes, m- & p- | ug/kg | **39.2** | **38.2** | **62.5** | < 47.9 | **18.4** | **52.1** |

**Attachment C** **Work Order 547747**

**Sanitary Lagoon Analytical Results**

**Westinghouse Columbia Fuel Fabrication Facility, Hopkins, SC**

| | | Sample | SLS-1 | SLS-21 | SLS-25 | SLS-5 | SLS-B1 | SLS-B2 |
|---|---|---|---|---|---|---|---|---|
| | | Date | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 | 6/17/2021 |
| Group | Analyte | Units | | | | | | |
| TCLP Metals | Arsenic | mg/L | < 0.300 | < 0.300 | < 0.300 | < 0.300 | < 0.300 | < 0.300 |
| TCLP Metals | Barium | mg/L | **0.103** | **0.130** | **0.123** | **0.132** | **0.108** | **0.103** |
| TCLP Metals | Cadmium | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP Metals | Chromium | mg/L | < 0.100 | < 0.100 | < 0.100 | < 0.100 | < 0.100 | < 0.100 |
| TCLP Metals | Lead | mg/L | < 0.200 | < 0.200 | < 0.200 | < 0.200 | < 0.200 | < 0.200 |
| TCLP Metals | Mercury | mg/L | < 0.00200 | < 0.00200 | < 0.00200 | < 0.00200 | < 0.00200 | < 0.00200 |
| TCLP Metals | Selenium | mg/L | < 0.300 | < 0.300 | < 0.300 | < 0.300 | < 0.300 | < 0.300 |
| TCLP Metals | Silver | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | 1,4-Dichlorobenzene | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | 2,4,5-Trichlorophenol | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | 2,4,6-Trichlorophenol | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | 2,4-Dinitrotoluene | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | 2-Methylphenol | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | 3&4-Methylphenol(m&p Cresol) | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | Hexachlorobenzene | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | Hexachlorobutadiene | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | Hexachloroethane | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | Nitrobenzene | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | Pentachlorophenol | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP SVOCs | Pyridine | mg/L | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 | < 0.0500 |
| TCLP VOCs | 1,1-Dichloroethene | mg/L | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 |
| TCLP VOCs | 1,2-Dichloroethane | mg/L | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 |
| TCLP VOCs | 1,4-Dichlorobenzene | mg/L | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 |
| TCLP VOCs | 2-Butanone | mg/L | **0.0204** | **0.0294** | **0.0271** | **0.0207** | **0.0242** | **0.0183** |
| TCLP VOCs | Benzene | mg/L | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 |
| TCLP VOCs | Carbon tetrachloride | mg/L | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 |
| TCLP VOCs | Chlorobenzene | mg/L | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 |
| TCLP VOCs | Chloroform | mg/L | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 |
| TCLP VOCs | Tetrachloroethene | mg/L | < 0.0100 | < 0.0100 | **0.470** | < 0.0100 | < 0.0100 | < 0.0100 |
| TCLP VOCs | Trichloroethene | mg/L | < 0.0100 | < 0.0100 | **0.104** | < 0.0100 | < 0.0100 | < 0.0100 |
| TCLP VOCs | Vinyl chloride | mg/L | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 | < 0.0100 |

**Attachment C**
**Sanitary Lagoon Analytical Results**
**Westinghouse Columbia Fuel Fabrication Facility, Hopkins, SC**

| | | Sample Date | SLS-13 6/17/2021 |
|---|---|---|---|
| Group | Analyte | Units | |
| TCLP Metals | Arsenic | mg/L | < 0.300 |
| TCLP Metals | Barium | mg/L | **0.106** |
| TCLP Metals | Cadmium | mg/L | < 0.0500 |
| TCLP Metals | Chromium | mg/L | < 0.100 |
| TCLP Metals | Lead | mg/L | < 0.200 |
| TCLP Metals | Mercury | mg/L | < 0.00200 |
| TCLP Metals | Selenium | mg/L | < 0.300 |
| TCLP Metals | Silver | mg/L | < 0.0500 |
| TCLP SVOCs | 1,4-Dichlorobenzene | mg/L | < 0.0500 |
| TCLP SVOCs | 2,4,5-Trichlorophenol | mg/L | < 0.0500 |
| TCLP SVOCs | 2,4,6-Trichlorophenol | mg/L | < 0.0500 |
| TCLP SVOCs | 2,4-Dinitrotoluene | mg/L | < 0.0500 |
| TCLP SVOCs | 2-Methylphenol | mg/L | < 0.0500 |
| TCLP SVOCs | 3&4-Methylphenol(m&p Cresol) | mg/L | < 0.0500 |
| TCLP SVOCs | Hexachlorobenzene | mg/L | < 0.0500 |
| TCLP SVOCs | Hexachlorobutadiene | mg/L | < 0.0500 |
| TCLP SVOCs | Hexachloroethane | mg/L | < 0.0500 |
| TCLP SVOCs | Nitrobenzene | mg/L | < 0.0500 |
| TCLP SVOCs | Pentachlorophenol | mg/L | < 0.0500 |
| TCLP SVOCs | Pyridine | mg/L | < 0.0500 |
| TCLP VOCs | 1,1-Dichloroethene | mg/L | < 0.0100 |
| TCLP VOCs | 1,2-Dichloroethane | mg/L | < 0.0100 |
| TCLP VOCs | 1,4-Dichlorobenzene | mg/L | < 0.0100 |
| TCLP VOCs | 2-Butanone | mg/L | **0.0233** |
| TCLP VOCs | Benzene | mg/L | < 0.0100 |
| TCLP VOCs | Carbon tetrachloride | mg/L | < 0.0100 |
| TCLP VOCs | Chlorobenzene | mg/L | < 0.0100 |
| TCLP VOCs | Chloroform | mg/L | < 0.0100 |
| TCLP VOCs | Tetrachloroethene | mg/L | < 0.0100 |
| TCLP VOCs | Trichloroethene | mg/L | < 0.0100 |
| TCLP VOCs | Vinyl chloride | mg/L | < 0.0100 |

# Attachment C

Sanitary Lagoon Analytical Results
Westinghouse Columbia Fuel Fabrication Facility, Hopkins, SC

Notes: **Bold concentrations indicate detections**
# - value is reported as a negative number
## - value is below minimum detectable concentration
pCi/g - picocuires per gram
ug/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
SVOCs - semivolatile organic compounds
VOCs - volatile organic compounds
TCLP - Toxic Characteristic Leaching Protocol

## Attachment C

**Sanitary Lagoon Sludge Sampling Results**

***Radionuclide Sum of Fractions***

Sampling Event: Sanitary Lagoon Sludge Characterization  Total Sample Count: 28

| | Analyte (pCi/g) | | | | SOF | SOF |
|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | Residiential | Industrial |
| Minimum Result: | 12.6 | 0.7 | 3.0 | 0.0 | 1.4 | 0.0 |
| Average Result: | **1,136.8** | **67.4** | **242.8** | **7.1** | **113.6** | **3.4** |
| Maximum Result: | 2,870.0 | 189.0 | 703.0 | 50.2 | 295.8 | 9.6 |

| # | Sample ID | Gross Analyte Activity (pCi/g) | | | | SOF | SOF |
|---|---|---|---|---|---|---|---|
| | | U-234 | U-235 | U-238 | Tc-99 | Residiential | Industrial |
| 1 | SLS-01 | 99.9 | 4.5 | 20.8 | 2.9 | **9.9** | 0.3 |
| 2 | SLS-02 | 43.4 | 2.7 | 9.4 | 1.3 | **4.4** | 0.1 |
| 3 | SLS-03 | 105.0 | 5.8 | 24.3 | 5.6 | **10.8** | 0.3 |
| 4 | SLS-04 | 48.4 | 2.6 | 12.0 | 2.0 | **5.0** | 0.1 |
| 5 | SLS-05 | 351.0 | 17.3 | 80.3 | 50.2 | **37.5** | 1.0 |
| 6 | SLS-06 | 14.7 | 0.8 | 3.0 | 0.0 | **1.5** | 0.0 |
| 7 | SLS-07 | 1,390.0 | 62.1 | 250.0 | 2.8 | **132.7** | **3.4** |
| 8 | SLS-08 | 1,880.0 | 146.0 | 389.0 | 4.2 | **190.9** | **6.5** |
| 9 | SLS-09 | 1,660.0 | 76.5 | 391.0 | 23.6 | **166.4** | **4.6** |
| 10 | SLS-10 | 12.6 | 0.7 | 3.2 | 2.4 | **1.4** | 0.0 |
| 11 | SLS-11 | 309.0 | 15.0 | 51.2 | 1.0 | **29.4** | 0.8 |
| 12 | SLS-12 | 2,210.0 | 121.0 | 418.0 | 3.3 | **215.2** | **6.1** |
| 13 | SLS-13 | 1,840.0 | 91.9 | 435.0 | 7.9 | **184.5** | **5.3** |
| 14 | SLS-14 | 2,870.0 | 189.0 | 703.0 | 22.8 | **295.8** | **9.6** |
| 15 | SLS-15 | 33.4 | 2.3 | 6.5 | 0.2 | **3.3** | 0.1 |
| 16 | SLS-16 | 192.0 | 11.1 | 35.2 | 1.0 | **18.7** | 0.5 |
| 17 | SLS-17 | 2,580.0 | 141.0 | 467.0 | 1.8 | **249.5** | **7.0** |
| 18 | SLS-18 | 2,540.0 | 147.0 | 516.0 | 11.2 | **251.2** | **7.4** |
| 19 | SLS-19 | 2,180.0 | 121.0 | 538.0 | 10.2 | **221.8** | **6.8** |
| 20 | SLS-20 | 1,790.0 | 120.0 | 350.0 | 3.0 | **177.9** | **5.6** |
| 21 | SLS-21 | 299.0 | 14.1 | 61.8 | 11.4 | **29.8** | 0.8 |
| 22 | SLS-22 | 1,380.0 | 96.6 | 295.0 | 3.0 | **139.5** | **4.5** |
| 23 | SLS-23 | 1,300.0 | 107.0 | 316.0 | 3.3 | **136.1** | **4.9** |
| 24 | SLS-24 | 1,940.0 | 144.0 | 348.0 | 1.3 | **192.2** | **6.2** |
| 25 | SLS-25 | 2,490.0 | 124.0 | 546.0 | 6.6 | **246.4** | **7.0** |
| 26 | SLS-B1 | 42.5 | 1.7 | 8.4 | 1.2 | **4.1** | 0.1 |
| 27 | SLS-B2 | 50.0 | 2.4 | 9.6 | 1.4 | **4.9** | 0.1 |
| 28 | SLS-B3 | 2,180.0 | 119.0 | 511.0 | 12.9 | **219.7** | **6.6** |

| % Moisture | Moisture Corrected Activity (pCi/g) | | | | SOF | SOF |
|---|---|---|---|---|---|---|
| | U-234 | U-235 | U-238 | Tc-99 | Residiential | Industrial |
| 31 | 68.5 | 3.1 | 14.3 | 2.9 | **6.8** | 0.2 |
| 24 | 32.9 | 2.1 | 7.1 | 2.9 | **3.4** | 0.1 |
| 24 | 79.5 | 4.4 | 18.4 | 1.3 | **8.0** | 0.2 |
| 17 | 40.2 | 2.2 | 10.0 | 5.6 | **4.4** | 0.1 |
| 37 | 220.8 | 10.9 | 50.5 | 2.0 | **22.1** | 0.6 |
| 21 | 11.6 | 0.7 | 2.4 | 50.2 | **3.8** | 0.0 |
| 95 | 69.5 | 3.1 | 12.5 | 0.0 | **6.6** | 0.2 |
| 94 | 118.4 | 9.2 | 24.5 | 2.8 | **12.2** | 0.4 |
| 88 | 202.5 | 9.3 | 47.7 | 4.2 | **20.4** | 0.6 |
| 19 | 10.3 | 0.6 | 2.6 | 23.6 | **2.3** | 0.0 |
| 73 | 84.0 | 4.1 | 13.9 | 2.4 | **8.1** | 0.2 |
| 96 | 97.2 | 5.3 | 18.4 | 1.0 | **9.5** | 0.3 |
| 93 | 134.3 | 6.7 | 31.8 | 3.3 | **13.6** | 0.4 |
| 89 | 312.8 | 20.6 | 76.6 | 7.9 | **32.5** | **1.1** |
| 29 | 23.8 | 1.6 | 4.6 | 22.8 | **3.6** | 0.1 |
| 38 | 120.0 | 6.9 | 22.0 | 0.2 | **11.7** | 0.3 |
| 97 | 90.3 | 4.9 | 16.3 | 1.0 | **8.8** | 0.2 |
| 94 | 149.9 | 8.7 | 30.4 | 1.8 | **14.9** | 0.4 |
| 92 | 165.7 | 9.2 | 40.9 | 11.2 | **17.4** | 0.5 |
| 95 | 93.1 | 6.2 | 18.2 | 10.2 | **9.8** | 0.3 |
| 33 | 199.1 | 9.4 | 41.2 | 3.0 | **19.6** | 0.5 |
| 95 | 71.8 | 5.0 | 15.3 | 11.4 | **7.8** | 0.2 |
| 93 | 88.4 | 7.3 | 21.5 | 3.0 | **9.4** | 0.3 |
| 96 | 75.7 | 5.6 | 13.6 | 3.3 | **7.7** | 0.2 |
| 93 | 181.8 | 9.1 | 39.9 | 1.3 | **18.0** | 0.5 |
| 27 | 31.1 | 1.2 | 6.1 | 6.6 | **3.3** | 0.1 |
| 25 | 37.7 | 1.8 | 7.3 | 1.2 | **3.7** | 0.1 |
| 92 | 167.9 | 9.2 | 39.3 | 1.4 | **16.9** | 0.5 |


Sanitary Lagoon Proposed Sample Locations
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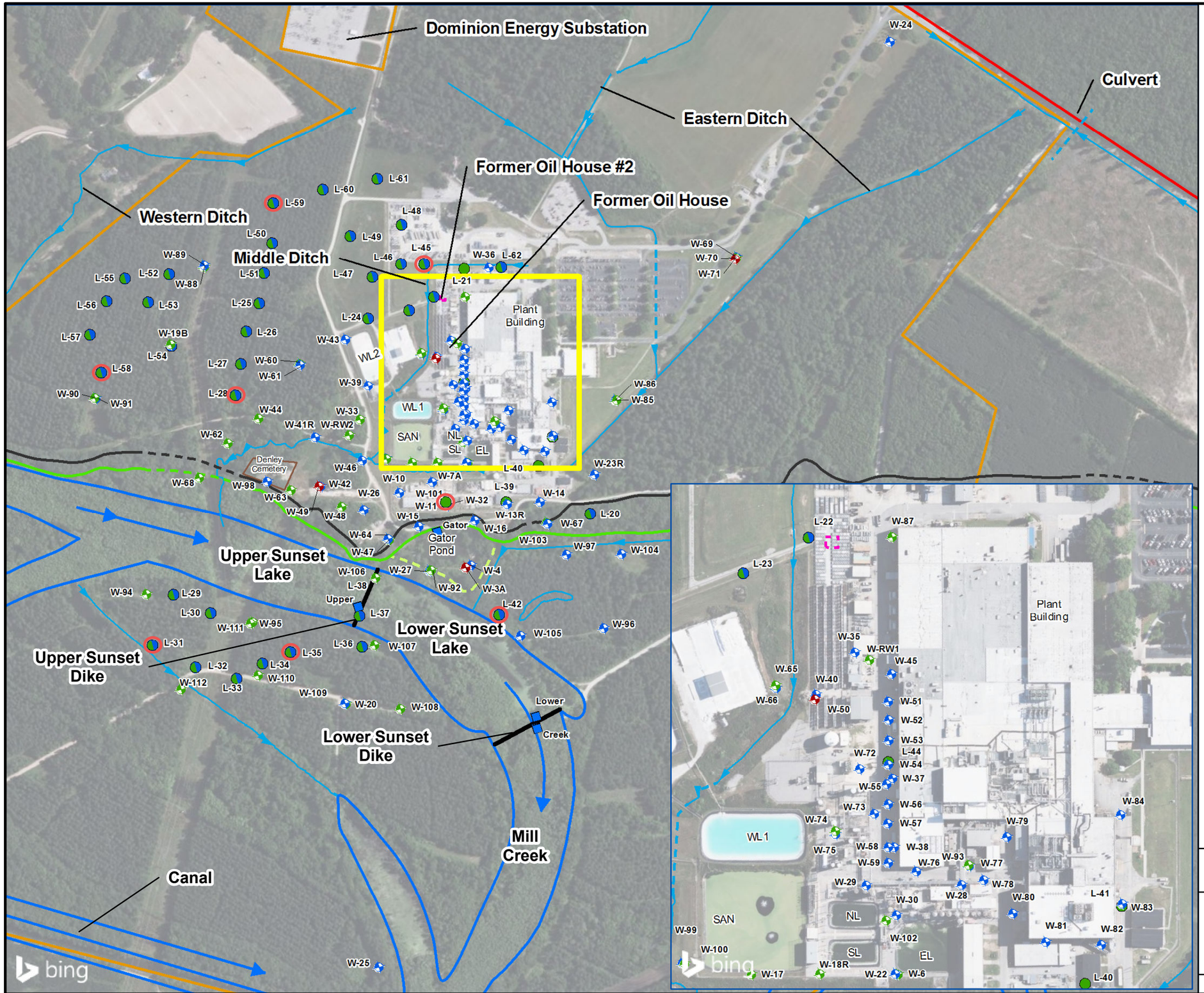
0 25 50 Feet
Legend
Proposed Systematic Sample Location
Sanitary Lagoon Grid
Sanitary Lagoon Boundary
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

# Attachment D

**Grain Size Analysis for Site Soils**







**Legend**

- Surficial Aquifer - Upper Zone Monitoring Well
- Surficial Aquifer - Lower Zone Monitoring Well
- Black Mingo Aquifer Monitoring Well
- L - Surficial Aquifer Groundwater Screening Location - Upper Zone
- L - Surficial Aquifer Groundwater Screening Location - Upper and Lower Zones
- L - Surficial Aquifer Groundwater Screening Location - Lower Zone
- Staff Gauge Location
- Ditch
- Culvert
- Dike Location
- Mill Creek Flow Direction
- Mill Creek
- Property Line
- SCRDI Bluff Road (Superfund Site)
- Former Oil House #2
- Top of Bluff
- Inferred Top of Bluff
- Bottom of Bluff
- Inferred Bottom of Bluff
- Secondary Bluff Area

EL East Lagoon
NL North Lagoon
SL South Lagoon
SAN Sanitary Lagoon
WL1 West Lagoon I
WL2 West Lagoon II

Grain size analysis location

0 300 600
Feet
1:7,200

Map Projection: NAD 1983, South Carolina State Plane, FIPS 3900, Feet

Datum: North American 1983

AECOM
101 Research Drive
Columbia, SC 29203
T: (803) 254-4400 F: (803) 771-6676

# Groundwater Screening and Monitoring Well Location Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

| PROJECT NO. | PREPARED BY: | DATE: | |
|---|---|---|---|
| 60595649 | CCS | April 2021 | **FIGURE 1** |

Path: M:\EnvDataViz\Westinghouse\mxd\Ad Hoc 2021\Site Map 04212021v2.mxd

# Report of Analysis

**Westinghouse Electric Company**
5801 Bluff Rd.
Hopkins, SC 29061
Attention: Diana Joyner

Project Name: RI Phase II-Grainsize

Lot Number:**WF23001**

Date Completed:06/25/2021

Project Manager:**Blaire M. Gagne**

07/08/2021 4:05 PM
Approved and released by:
Project Manager I: **Hannah K. Lucas**



Pace Analytical Services, LLC (*formerly Shealy Environmental Services, Inc.*)
106 Vantage Point Drive West Columbia, SC 29172
Tel: 803-791-9700 Fax: 803-791-9111 www.pacelabs.com

## Case Narrative
## Westinghouse Electric Company
**Lot Number: WF23001**

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved The NELAC Institute (TNI) standards, the Pace Analytical Services, LLC ("Pace") Laboratory Quality Manual, standard operating procedures (SOPs), and Pace policies. Any exceptions to the TNI standards, the Laboratory Quality Manual, SOPs or policies are qualified on the results page or discussed below.

If you have any questions regarding this report please contact the Pace Project Manager listed on the cover page.

Grain Size analysis was subcontracted to Schnabel Engineering. The report is included after the Pace report of analysis.

## Sample Summary
## Westinghouse Electric Company
### Lot Number: WF23001
### Project Name: RI Phase II-Grainsize
### Project Number:

| Sample Number | Sample ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| 001 | L-28-0-2 | Solid | 06/21/2021 | 06/21/2021 |
| 002 | L-28-2-5 | Solid | 06/21/2021 | 06/21/2021 |
| 003 | L-31-0-3 | Solid | 06/21/2021 | 06/21/2021 |
| 004 | L-31-3-5 | Solid | 06/21/2021 | 06/21/2021 |
| 005 | L-35-0-3 | Solid | 06/21/2021 | 06/21/2021 |
| 006 | L-35-3-5 | Solid | 06/21/2021 | 06/21/2021 |
| 007 | L-42-0-2 | Solid | 06/21/2021 | 06/21/2021 |
| 008 | L-45-0-1 | Solid | 06/21/2021 | 06/21/2021 |
| 009 | L-45-1-2 | Solid | 06/21/2021 | 06/21/2021 |
| 010 | L-45-2-5 | Solid | 06/21/2021 | 06/21/2021 |
| 011 | L-58-0-2 | Solid | 06/21/2021 | 06/21/2021 |
| 012 | L-59-0-2 | Solid | 06/21/2021 | 06/21/2021 |
| 013 | W-101-2 | Solid | 06/21/2021 | 06/21/2021 |

(13 samples)

## Detection Summary

## Westinghouse Electric Company

**Lot Number: WF23001**

**Project Name: RI Phase II-Grainsize**

**Project Number:**

| Sample | Sample ID | Matrix | Parameter | Method | Result | Q | Units | Page |
|---|---|---|---|---|---|---|---|---|

(0 detections)

# QC Summary

# Chain of Custody
# and
# Miscellaneous Documents

Pace Analytical®

**PACE ANALYTICAL SERVICES, LLC**
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

**Number** 120132

| | | | |
|---|---|---|---|
| Client: Westinghouse | Report to Contact: Diana Joyner | Telephone No. / E-mail: joynerdp@westinghouse.com | Quote No. |
| Address: 5801 Bluff Rd. | Sampler's Signature: X Charles K Suddeth | Analysis (Attach list if more space is needed) | Page 1 of 2 |
| City: Hopkins / State: SC / Zip Code: 29061 | Printed Name: Chuck Suddeth | | WF23001 |
| Project Name: RS Phase II | | | BMG |
| Project No. / P.O. No. | | | Remarks / Cooler ID. |

| Sample ID / Description (Containers for each sample may be combined on one line.) | Collection Date(s) | Collection Time (Military) | Grab=G Composite=C | Matrix: Air / Solid / Wipe / Liquid | No. of Containers by Preservative Type: Unpres. / HNO3 / HCl / NaOH / H2SO4 / Na2S2O3 / Field Filtered | Gamma Spec with Uranium Isotopics |
|---|---|---|---|---|---|---|
| L-28-0-2 | | | G | X | 1 | X |
| L-28-2-5 | | | G | X | 1 | X |
| L-31-0-3 | | | G | X | 1 | X |
| L-31-3-5 | | | G | X | 1 | X |
| L-35-0-3 | | | G | X | 1 | X |
| L-35-3-5 | | | G | X | 1 | X |
| L-42-0-2 | | | G | X | 1 | X |
| L-45-0-1 | | | G | X | 1 | X |
| L-45-1-2 | | | G | X | 1 | X |
| L-45-2-5 | | | G | X | 1 | X |

Turn Around Time Required (Prior lab approval required for expedited TAT.): [X] Standard [ ] Rush (Specify)

Sample Disposal: [ ] Return to Client [X] Disposal by Lab

Possible Hazard Identification: [X] Non-Hazard [ ] Flammable [ ] Skin Irritant [ ] Poison [ ] Unknown

QC Requirements (Specify)

| | Date | Time | | Date | Time |
|---|---|---|---|---|---|
| 1. Relinquished by: Charles K Suddeth | 6/21/21 | 1714 | 1. Received by | | |
| 2. Relinquished by | | | 2. Received by | | |
| 3. Relinquished by | | | 3. Received by | | |
| 4. Relinquished by | 6.21.21 | 1714 | 4. Laboratory received by: Kathleen Williams | 6.21.21 | 1714 |

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle) Yes (No) Ice Pack — Receipt Temp. 2.1.6 °C — Temp Blank [ ] Y [X] N

DISTRIBUTION: WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME033N2-01

Pace Analytical®

**PACE ANALYTICAL SERVICES, LLC**
106 Vantage Point Drive • West Columbia, SC 29172
Telephone No. 803-791-9700 Fax No. 803-791-9111
www.pacelabs.com

**Number** 120133

| | | |
|---|---|---|
| Client: Westinghouse | Report to Contact: Diana Joyner | Telephone No. / E-mail: joynerdp@westinghouse.com |
| Address: 5801 Bluff Rd | Sampler's Signature: X Charles K Sudduth | Quote No. |
| City: Hopkins / State: SC / Zip Code: 29061 | Printed Name: Chuck Sudduth | Page 2 of 2 |
| Project Name: RI Phase II | | Pace Project No. WF23001 |

| Project No. | P.O. No. | | Matrix | | | No. of Containers by Preservative Type | | | | | | | Analysis (Attach list if more space is needed) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID / Description (Containers for each sample may be combined on one line.) | Collection Date(s) | Collection Time (Military) | Matrix Codes (Grab / Composite) | Aqueous | Solid | Non-Aqueous | Unpres. | HNO3 | H2SO4 | HCl | NaOH | Na2S2O3 | Field Filtered | Grain Size with Hydrometer | | | | | | | |
| L-58-0-2 | | | G | | X | | 1 | | | | | | | X | | | | | | | |
| L-59-0-2 | | | G | | X | | 1 | | | | | | | X | | | | | | | |
| W-101-0-2 | | | G | | X | | 1 | | | | | | | X | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |

**Turn Around Time Required** (Prior lab approval required for expedited TAT.): X Standard ☐ Rush (Specify)

**Sample Disposal**: ☐ Return to Client X Disposal by Lab

**Possible Hazard Identification**: X Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison ☐ Unknown

**QC Requirements (Specify)**

| | Date | Time | | Date | Time |
|---|---|---|---|---|---|
| 1. Relinquished by: Charles K Sudduth | 6/21/21 | 1714 | 1. Received by | | |
| 2. Relinquished by | Date | Time | 2. Received by | | |
| 3. Relinquished by | Date | Time | 3. Received by | | |
| 4. Relinquished by | Date: 10.21.21 | Time: 1714 | 4. Laboratory received by: Kathryn Greene | Date: 6.21.21 | Time: 1714 |

Note: All samples are retained for four weeks from receipt unless other arrangements are made.

LAB USE ONLY — Received on Ice (Circle) Yes (No) Ice Pack — Receipt Temp. 21.4 °C — Temp Blank ☐ Y ☒ N

**DISTRIBUTION:** WHITE & YELLOW-Return to laboratory with Sample(s); PINK-Field/Client Copy

Document Number: ME003N2-01

Pace Analytical

Samples Receipt Checklist (SRC) (ME0018C-15)
Issuing Authority: Pace ENV - WCOL

Revised:9/29/2020
Page 1 of 1

# Sample Receipt Checklist (SRC)

Client: Westinghouse  Cooler Inspected by/date: KSC / 06/23/2021  Lot #: WF23001

Means of receipt: ☐ Pace ☑ Client ☐ UPS ☐ FedEx ☐ Other: _____

| | | | |
|---|---|---|---|
| ☐ Yes | ☑ No | | 1. Were custody seals present on the cooler? |
| ☐ Yes | ☐ No | ☑ NA | 2. If custody seals were present, were they intact and unbroken? |

pH Strip ID: NA  Chlorine Strip ID: NA  Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt  %Solid Snap-Cup ID: NA

21.6 / 21.6 °C  NA / NA °C  NA / NA °C  NA / NA °C

Method: ☐ Temperature Blank ☑ Against Bottles  IR Gun ID: 5  IR Gun Correction Factor: 0 °C

Method of coolant: ☐ Wet Ice ☐ Ice Packs ☐ Dry Ice ☑ None

| | | | |
|---|---|---|---|
| ☑ Yes | ☐ No | ☐ NA | 3. If temperature of any cooler exceeded 6.0°C, was Project Manager Notified? PM was Notified by: phone / (email) / face-to-face (circle one). |
| ☐ Yes | ☐ No | ☑ NA | 4. Is the commercial courier's packing slip attached to this form? |
| ☑ Yes | ☐ No | | 5. Were proper custody procedures (relinquished/received) followed? |
| ☑ Yes | ☐ No | | 6. Were sample IDs listed on the COC? |
| ☑ Yes | ☐ No | | 7. Were sample IDs listed on all sample containers? |
| ☐ Yes | ☑ No | | 8. Was collection date & time listed on the COC? |
| ☐ Yes | ☑ No | | 9. Was collection date & time listed on all sample containers? |
| ☑ Yes | ☐ No | | 10. Did all container label information (ID, date, time) agree with the COC? |
| ☑ Yes | ☐ No | | 11. Were tests to be performed listed on the COC? |
| ☑ Yes | ☐ No | | 12. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? _____ |
| ☑ Yes | ☐ No | | 13. Was adequate sample volume available? |
| ☑ Yes | ☐ No | | 14. Were all samples received within ½ the holding time or 48 hours, whichever comes first? |
| ☐ Yes | ☑ No | | 15. Were any samples containers missing/excess (circle one) samples Not listed on COC? |
| ☐ Yes | ☐ No | ☑ NA | 16. For VOA and RSK-175 samples, were bubbles present >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials? |
| ☐ Yes | ☐ No | ☑ NA | 17. Were all DRO/metals/nutrient samples received at a pH of < 2? |
| ☐ Yes | ☐ No | ☑ NA | 18. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9? |
| ☐ Yes | ☐ No | ☑ NA | 19. Were all applicable $NH_3$/TKN/cyanide/phenol/625.1/608.3 (< 0.5mg/L) samples free of residual chlorine? |
| ☐ Yes | ☐ No | ☑ NA | 20. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc…) correctly transcribed from the COC into the comment section in LIMS? |
| ☐ Yes | ☑ No | | 21. Was the quote number listed on the container label? If yes, Quote # _____ |

**Sample Preservation** (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA _____ were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA.

Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA _____ were received with bubbles >6 mm in diameter.

Samples(s) NA _____ were received with TRC > 0.5 mg/L. (If #19 is *no*) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Shealy ID: NA.

SR barcode labels applied by: KSC  Date: 06/23/2021

Comments:

Schnabel ENGINEERING

104 Corporate Boulevard, Suite 420
West Columbia, SC 29169
**T/** 803-796-6240
**F/** 803-796-6250

# TRANSMITTAL

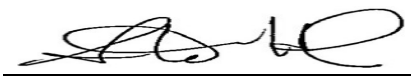
| | | | |
|---|---|---|---|
| **TO:** | Blaire Gagne | **DATE:** | 7/8/21 |
| **COMPANY:** | Pace Analytical | **SUBJECT:** | Lab Results |
| **ADDRESS:** | 106 Vantage Point Drive<br>West Columbia, South Carolina<br>29169 | **PROJECT NAME/NO.:** | Pace Analytical – Westinghouse<br>Schnabel Reference Number:<br>08190058.00.497-509<br>Lot No. WF23001 |
| **FROM:** | Stephen Hahn | **CC:** | |

| COPIES | DATE | NO. | DESCRIPTION |
|---|---|---|---|
| 1 | -- | 13 | Gradation |

☒ AS REQUESTED ☐ FOR APPROVAL ☐ PLEASE REPLY ☐ FOR YOUR USE

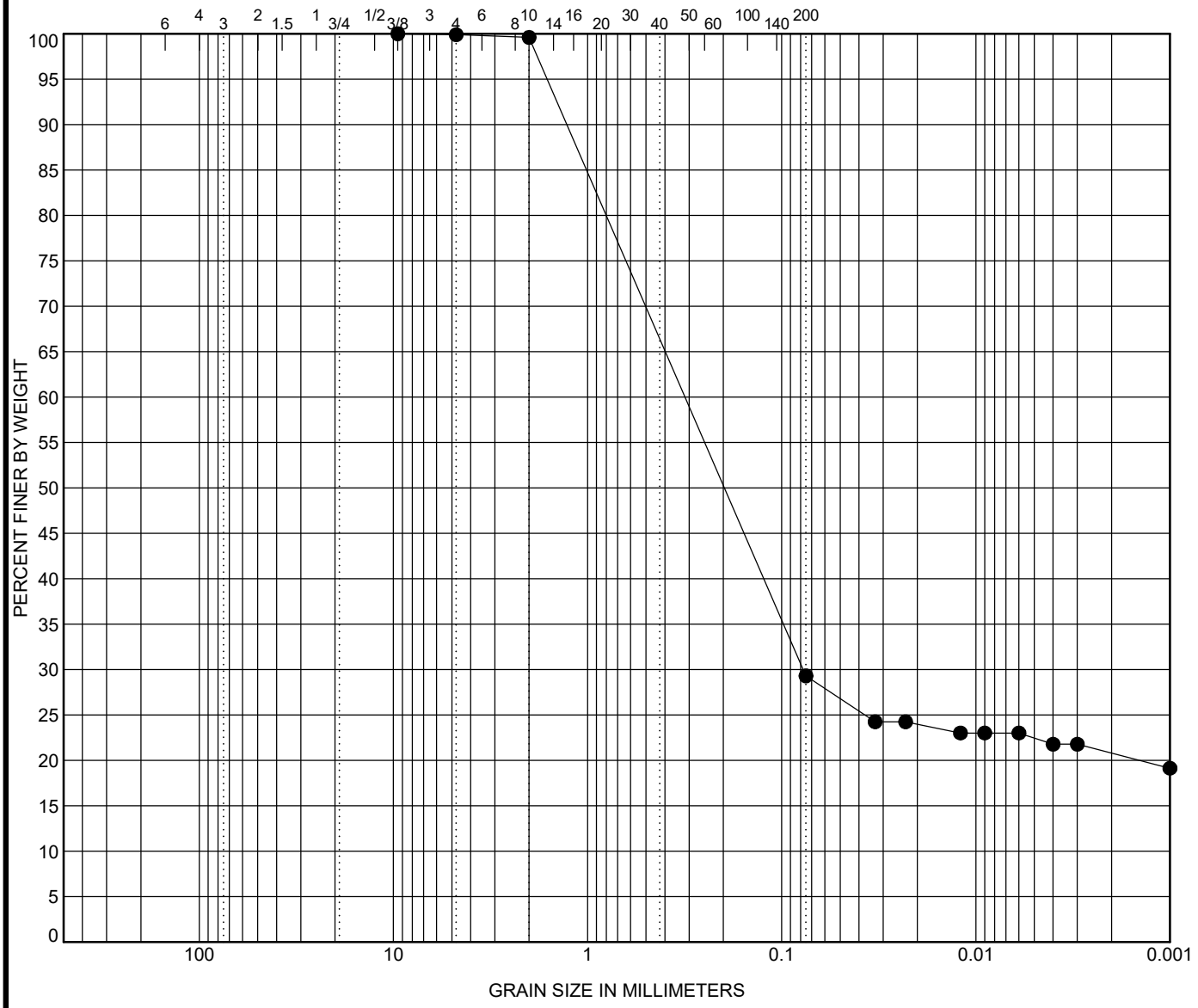
Attached, please find our lab results for sample(s) for Lot no. WF23001.

Please advise if you have any questions.

**SIGNED:** 

Stephen Hahn

SENT VIA: ☐ First Class Mail ☐ Overnight Service ☒ Email ☐ Other




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|---|
| ● L-28-0-2 | 0.0 ft | **CLAYEY SAND (SC), yellowish brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **9.5** | **0.315** | **0.077** | | **0.1** | **70.6** | **8.5** | **20.8** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 | 3/8" |
|---|---|---|---|---|
| % Finer | 29.3 | 99.6 | 99.9 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

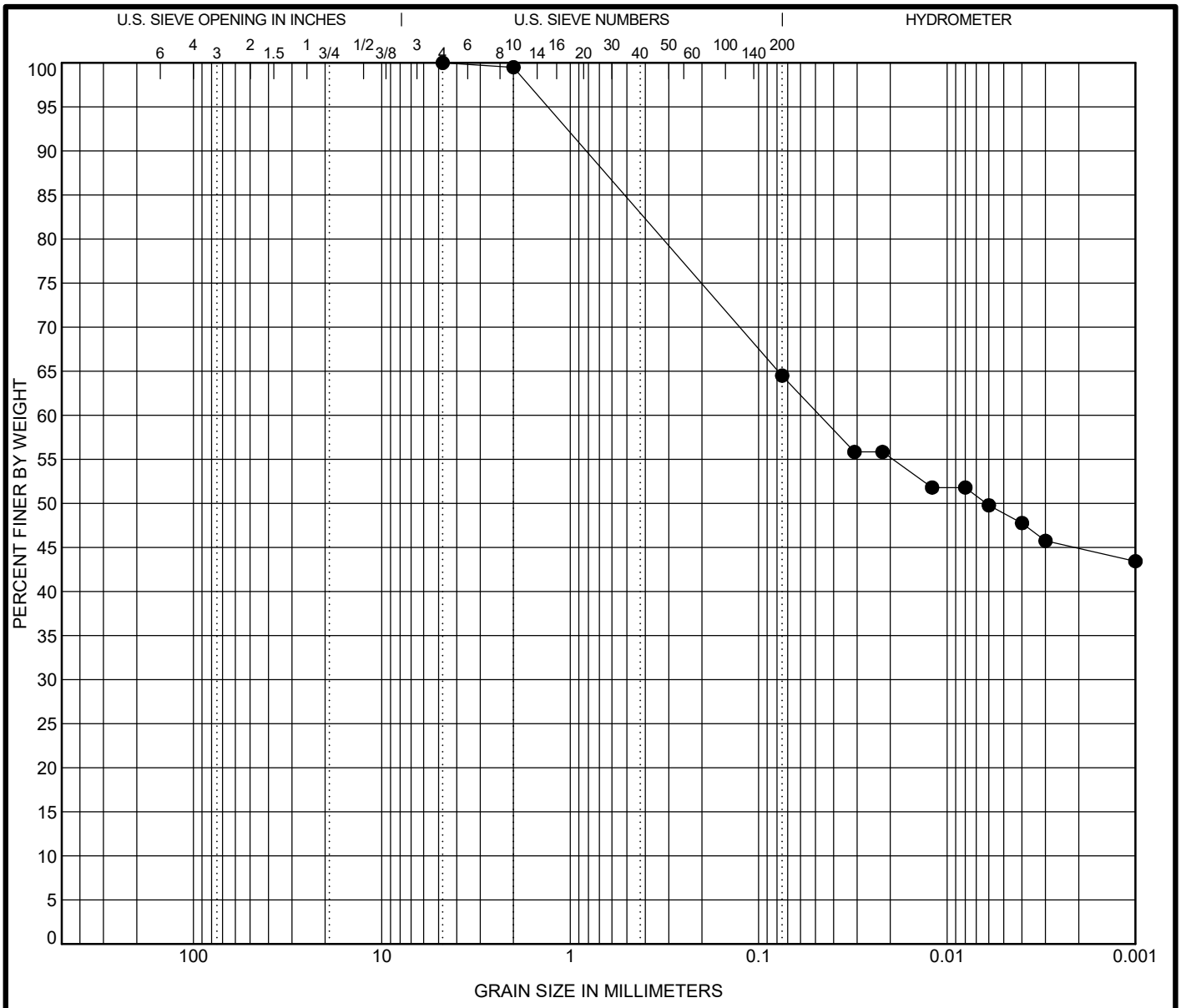
Schnabel ENGINEERING

# GRADATION CURVE

**Project:** Pace Analytical
WF23001
Cayce, South Carolina

**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-28-2-5 2.0 ft | **SANDY LEAN CLAY (CL), brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **4.75** | **0.047** | | | **0.0** | **35.5** | **19.6** | **44.9** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 64.5 | 99.5 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

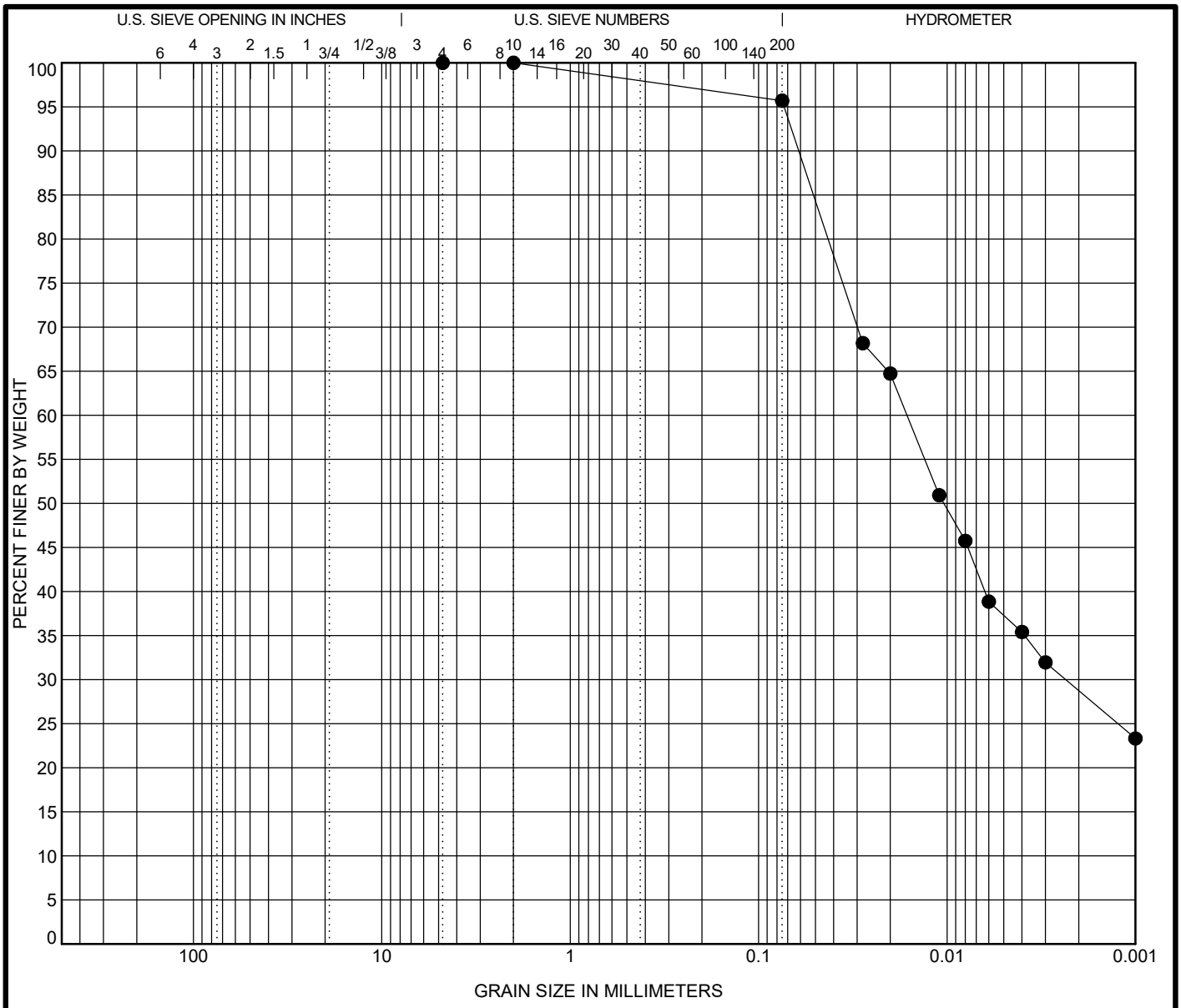
Schnabel ENGINEERING

# GRADATION CURVE

**Project:** Pace Analytical
WF23001
Cayce, South Carolina

**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-31-0-3 0.0 ft | **SILT (ML), brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **2** | **0.016** | **0.002** | | **0.0** | **4.3** | **66.9** | **28.8** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 95.7 | 100.0 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

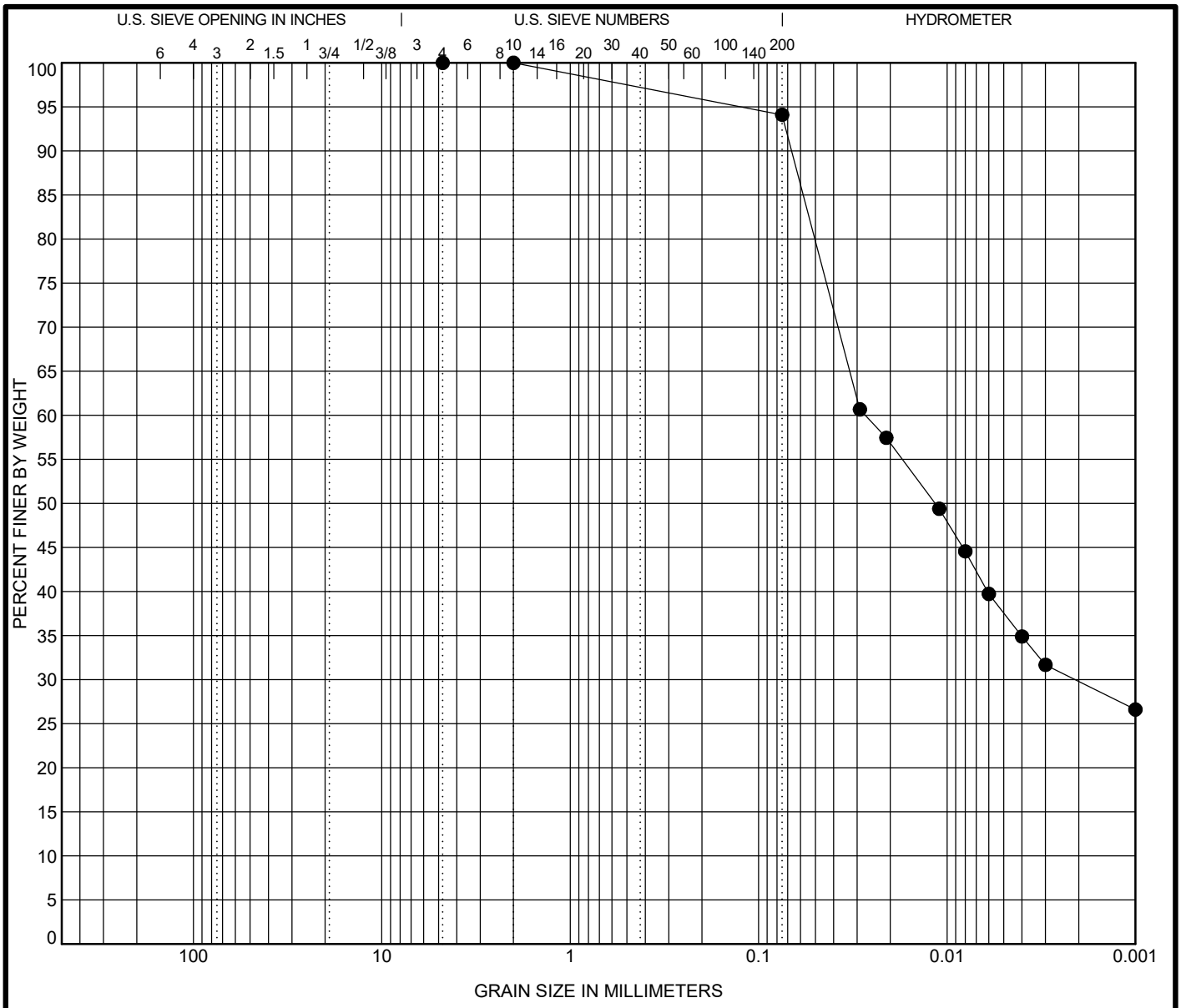
Schnabel ENGINEERING

# GRADATION CURVE

**Project:** Pace Analytical
WF23001
Cayce, South Carolina

**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-31-3-5 3.0 ft | **SILT (ML), brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **2** | **0.027** | **0.002** | | **0.0** | **5.9** | **64.3** | **29.8** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 94.1 | 100.0 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

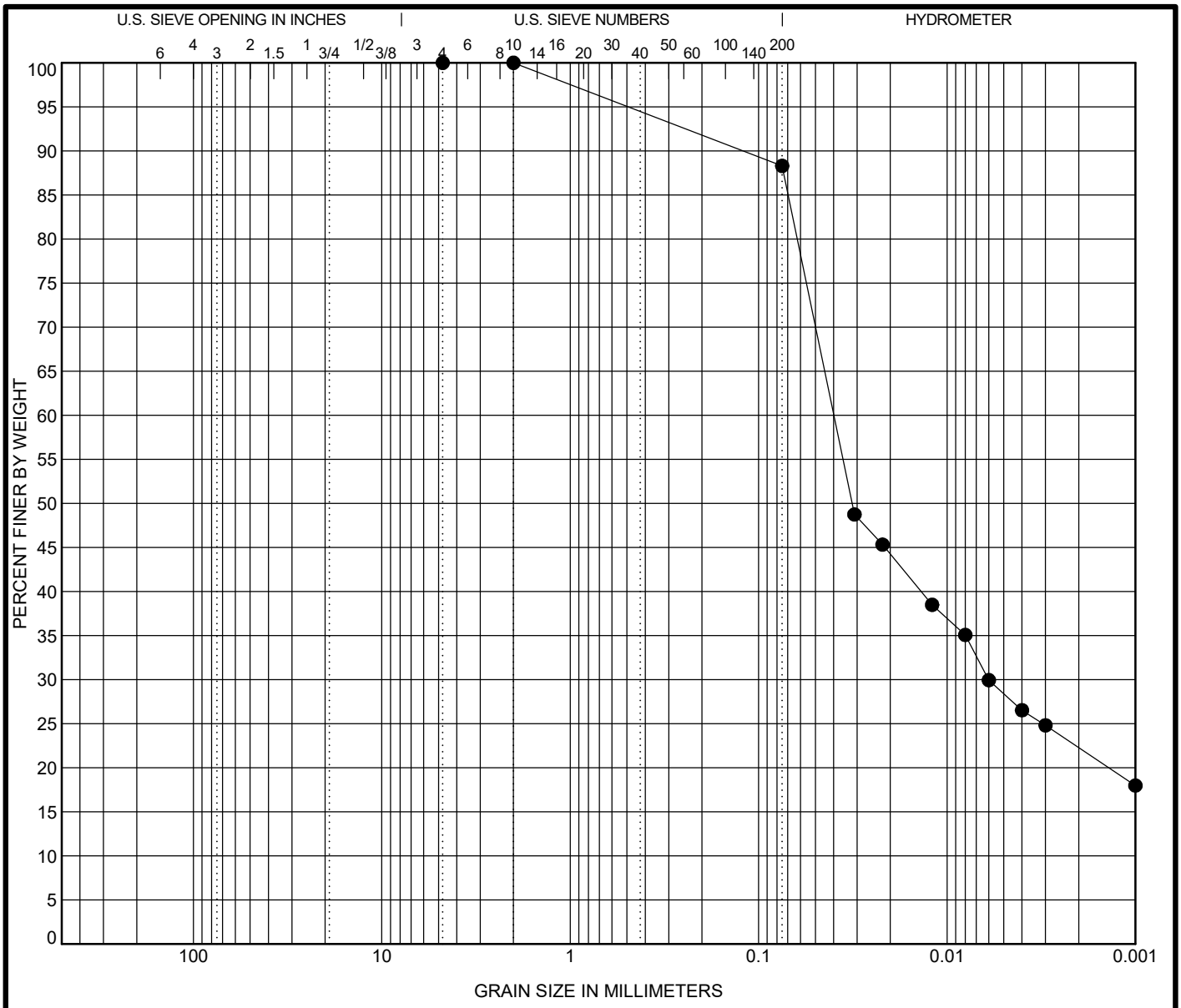
Schnabel ENGINEERING

# GRADATION CURVE

**Project:** Pace Analytical
WF23001
Cayce, South Carolina

**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-35-0-3 0.0 ft | **SILT (ML), brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **2** | **0.04** | **0.006** | | **0.0** | **11.7** | **66.0** | **22.3** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 88.3 | 100.0 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

Schnabel ENGINEERING

# GRADATION CURVE

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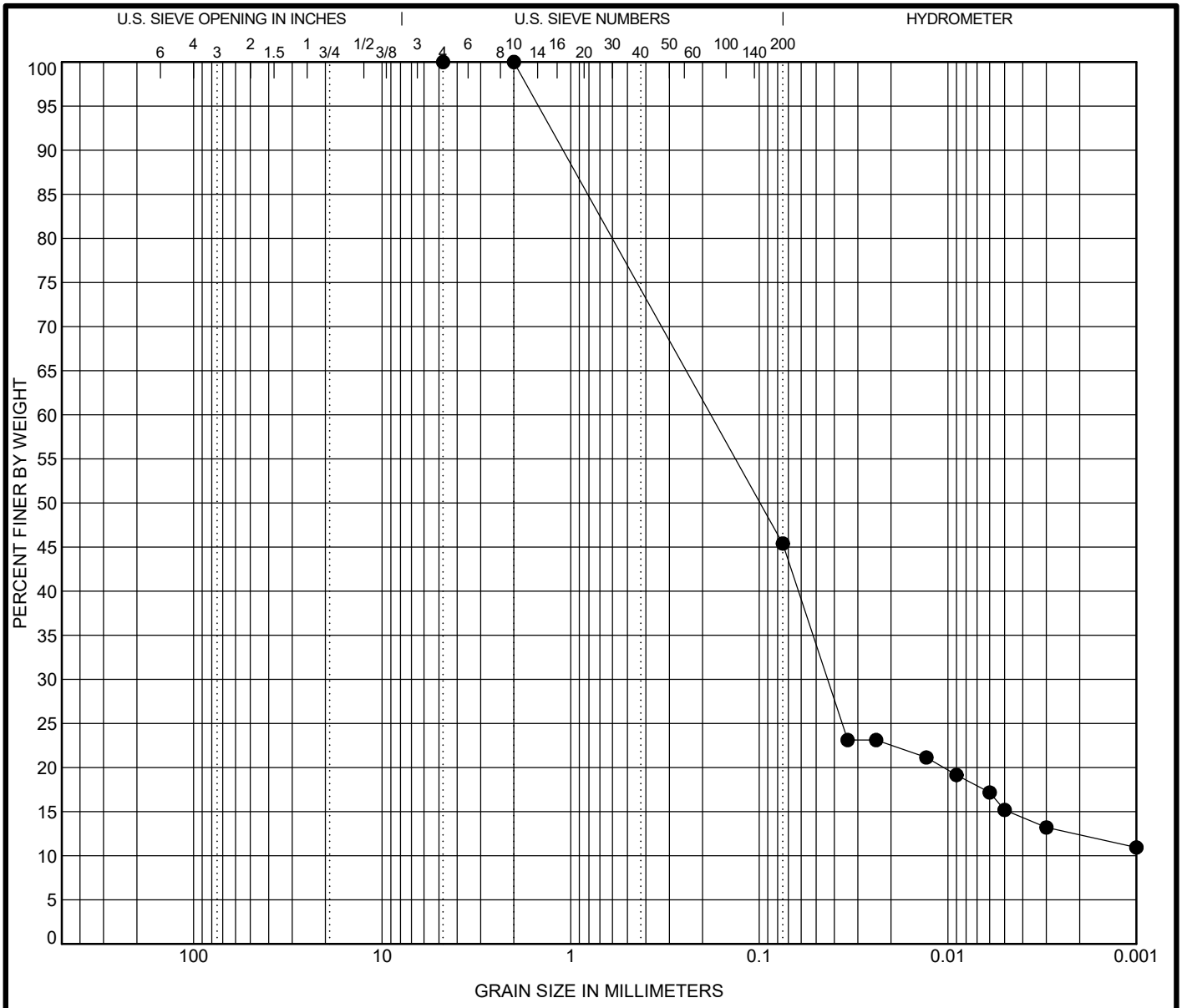
**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-35-3-5 3.0 ft | **SILTY SAND (SM), brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **2** | **0.18** | **0.043** | | **0.0** | **54.6** | **33.0** | **12.4** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 45.4 | 100.0 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

Schnabel ENGINEERING

# GRADATION CURVE

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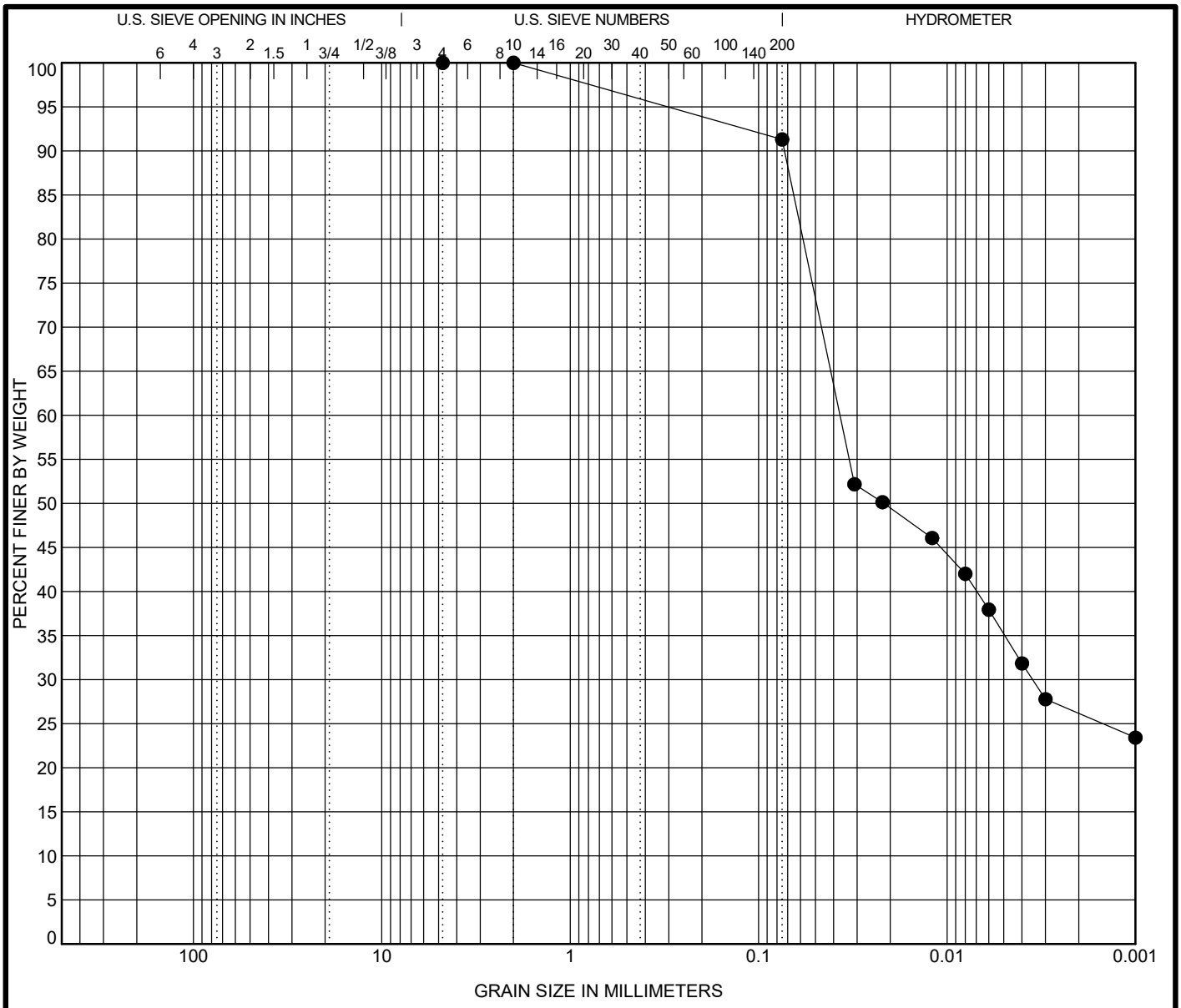
**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-42-0-2 0.0 ft | **SILT (ML), brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **2** | **0.037** | **0.004** | | **0.0** | **8.7** | **65.1** | **26.2** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 91.3 | 100.0 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

Schnabel ENGINEERING

# GRADATION CURVE

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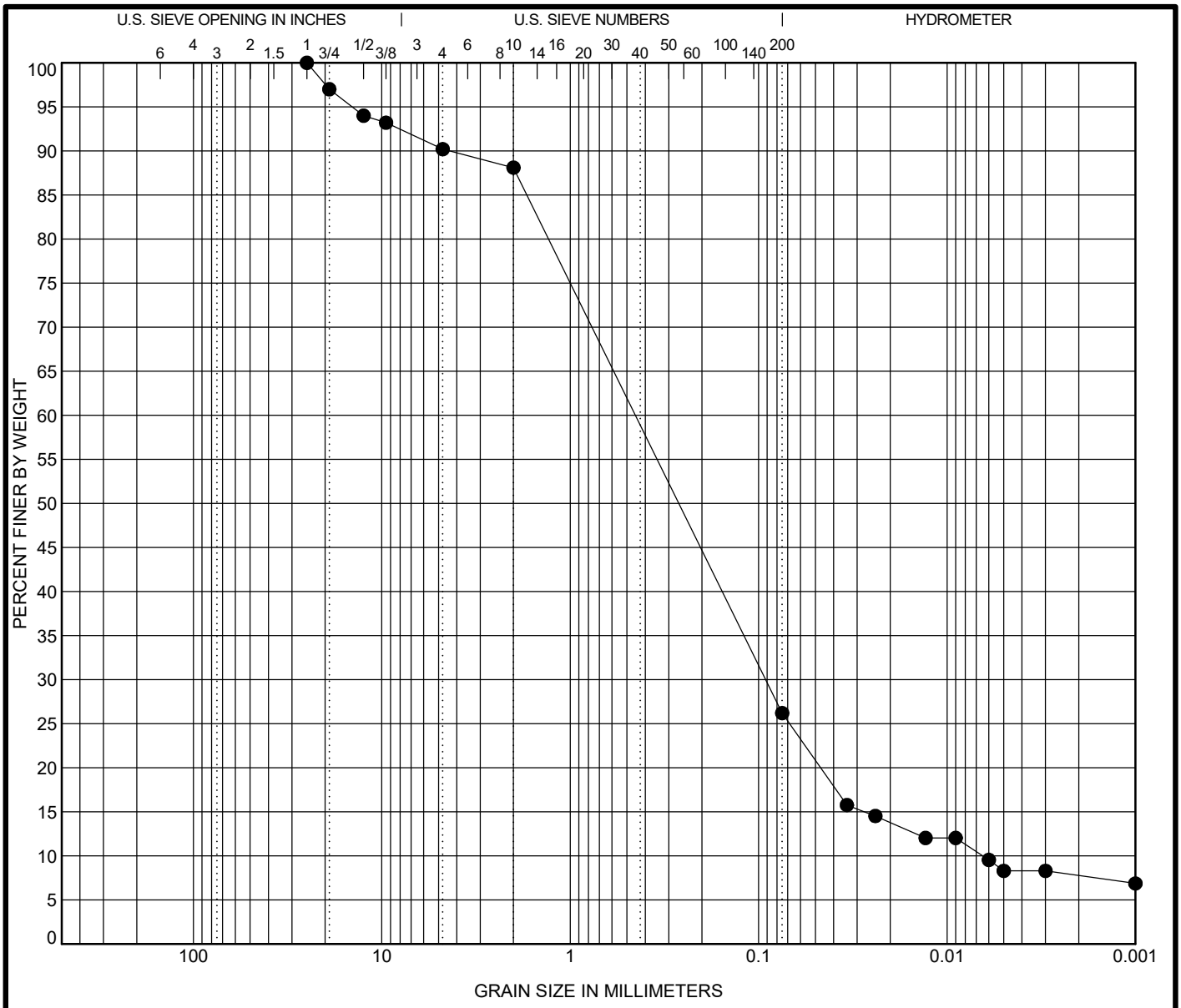
**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-45-0-1 0.0 ft | **SILTY SAND (SM), trace gravel, brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **25** | **0.451** | **0.092** | **0.006** | **9.8** | **64.0** | **18.4** | **7.8** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 | 3/8" | 1/2" | 3/4" | 1.0" |
|---|---|---|---|---|---|---|---|
| % Finer | 26.2 | 88.1 | 90.2 | 93.2 | 94.0 | 97.0 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

Schnabel ENGINEERING

# GRADATION CURVE

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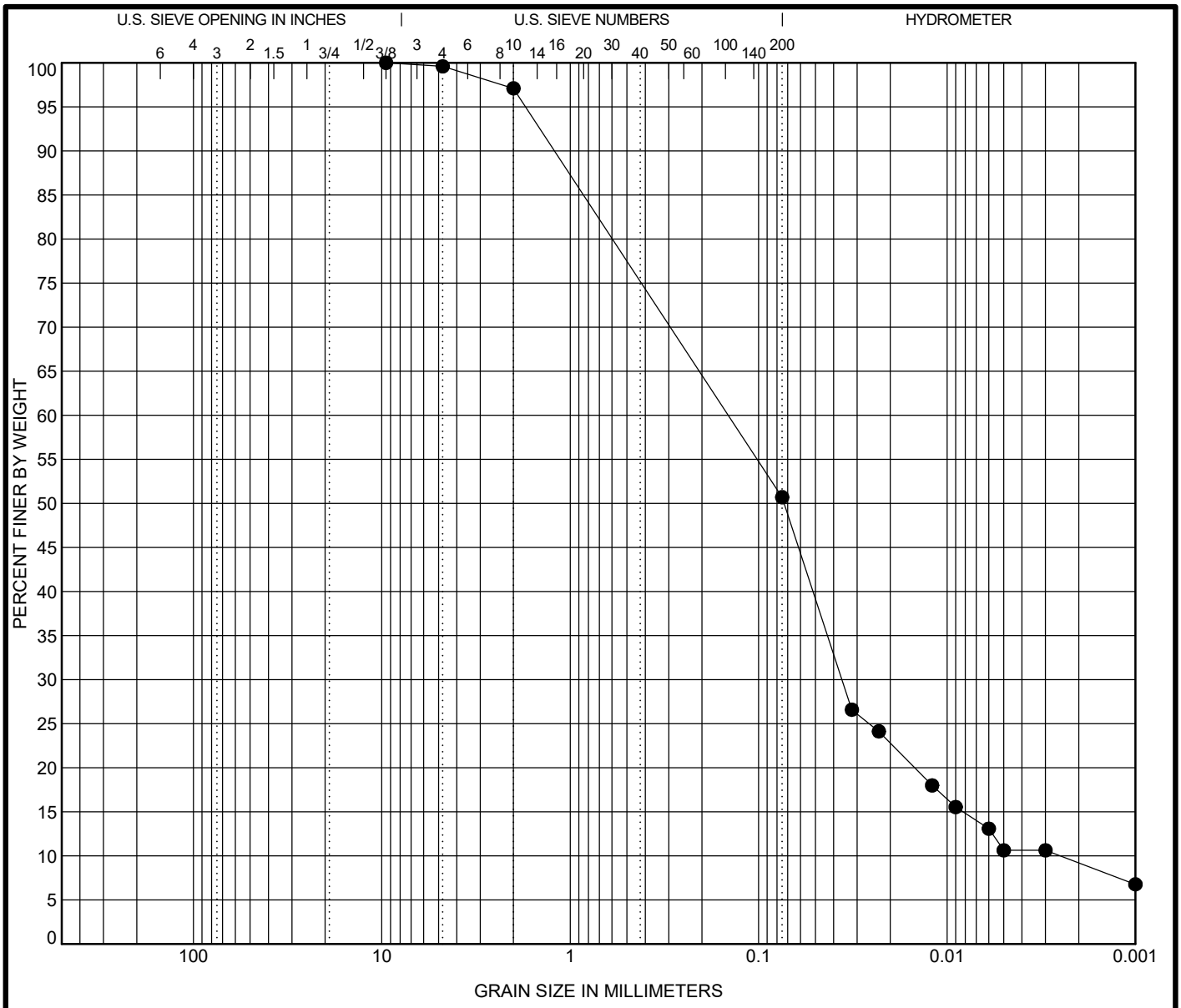
WF23001
Cayce, South Carolina

**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-45-1-2 1.0 ft | **SANDY SILT (ML), yellowish brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **9.5** | **0.145** | **0.036** | **0.003** | **0.4** | **48.9** | **41.5** | **9.2** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 | 3/8" |
|---|---|---|---|---|
| % Finer | 50.7 | 97.1 | 99.6 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

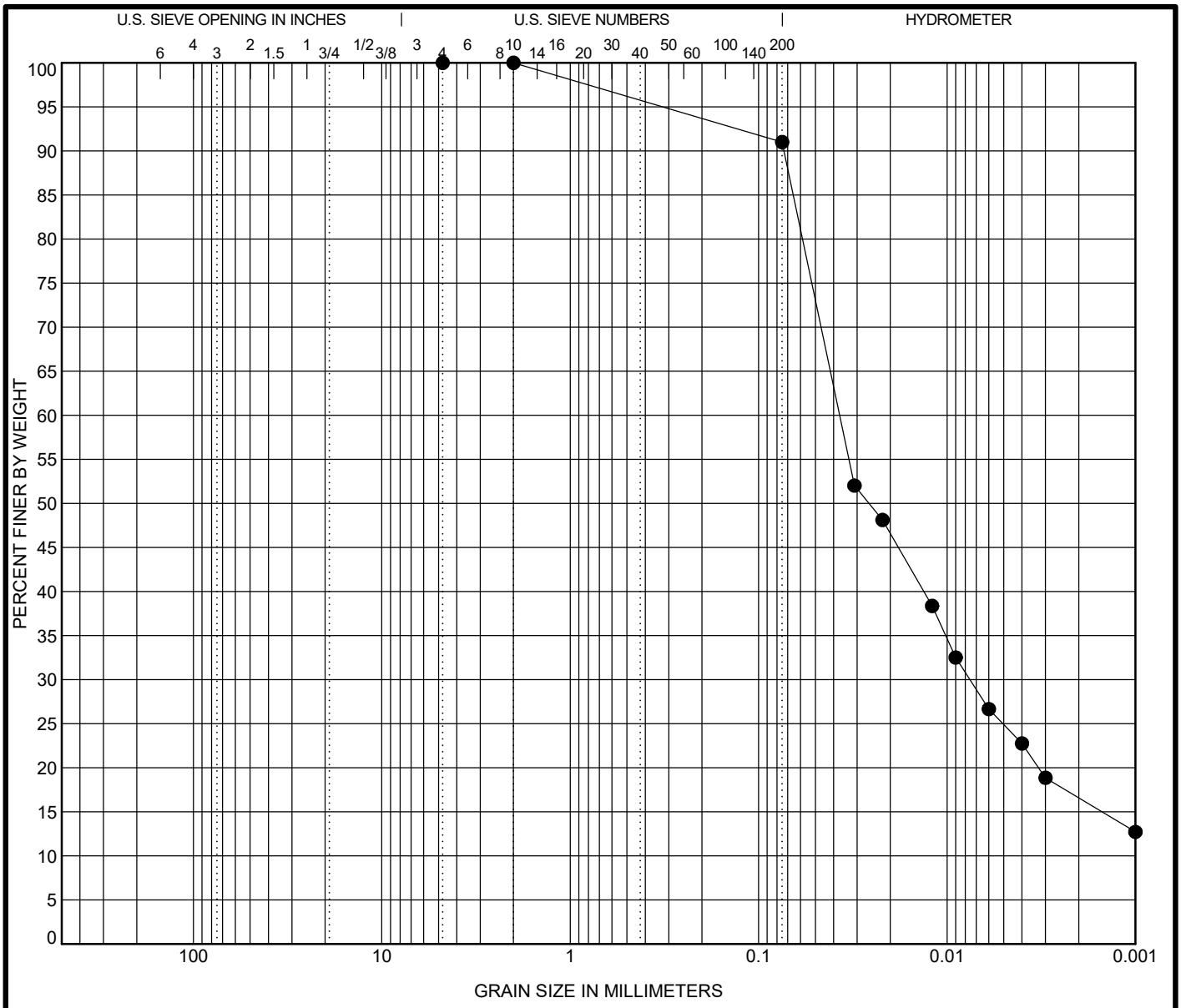
Schnabel ENGINEERING

# GRADATION CURVE

**Project:** Pace Analytical
WF23001
Cayce, South Carolina

**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-45-2-5 2.0 ft | **SILT (ML), brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **2** | **0.037** | **0.008** | | **0.0** | **9.0** | **74.4** | **16.6** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 91.0 | 100.0 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

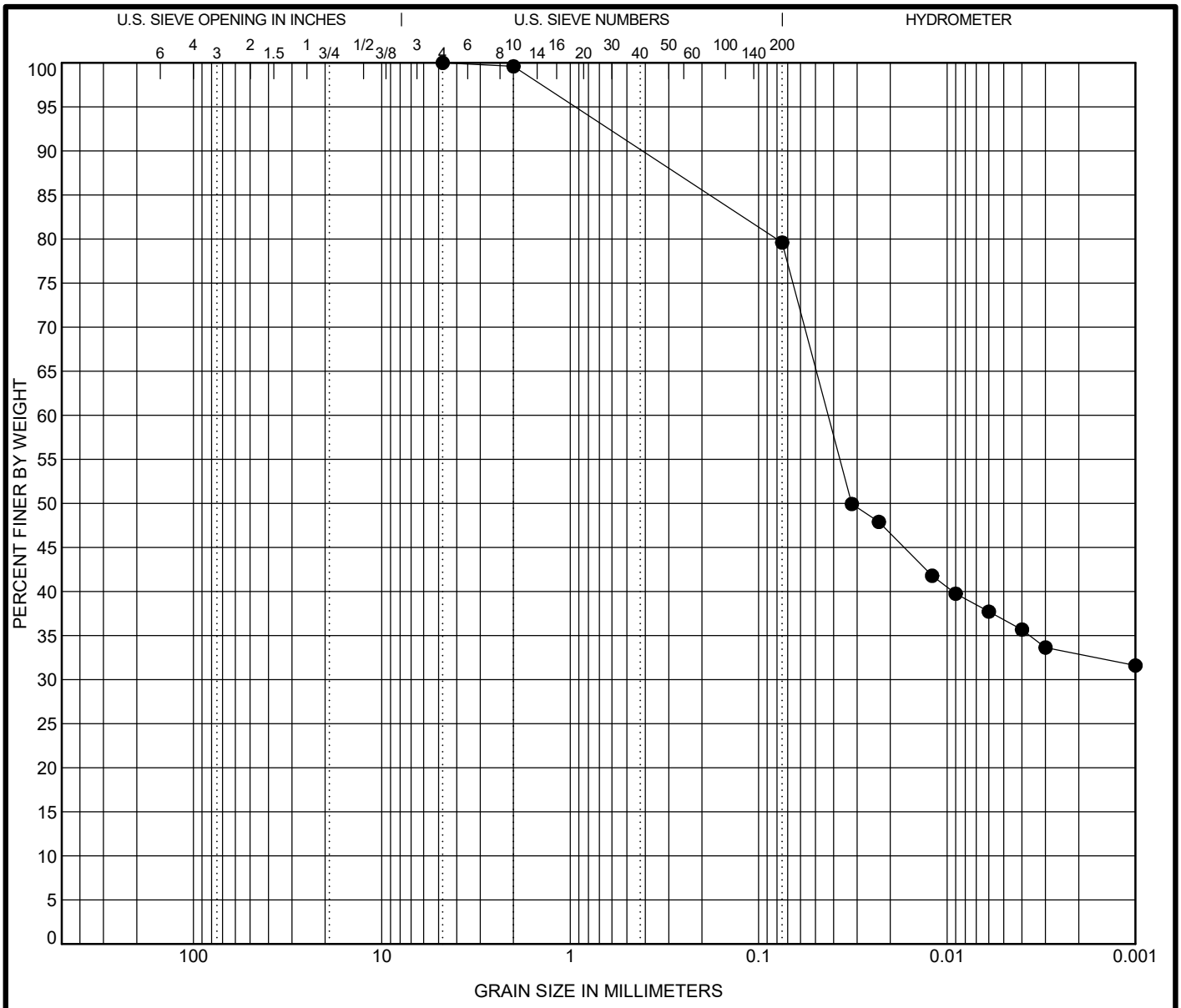
Schnabel ENGINEERING

# GRADATION CURVE

**Project:** Pace Analytical
WF23001
Cayce, South Carolina

**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● L-58-0-2 0.0 ft | **SILT WITH SAND (ML), brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **4.75** | **0.043** | | | **0.0** | **20.4** | **46.7** | **32.9** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 79.6 | 99.6 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

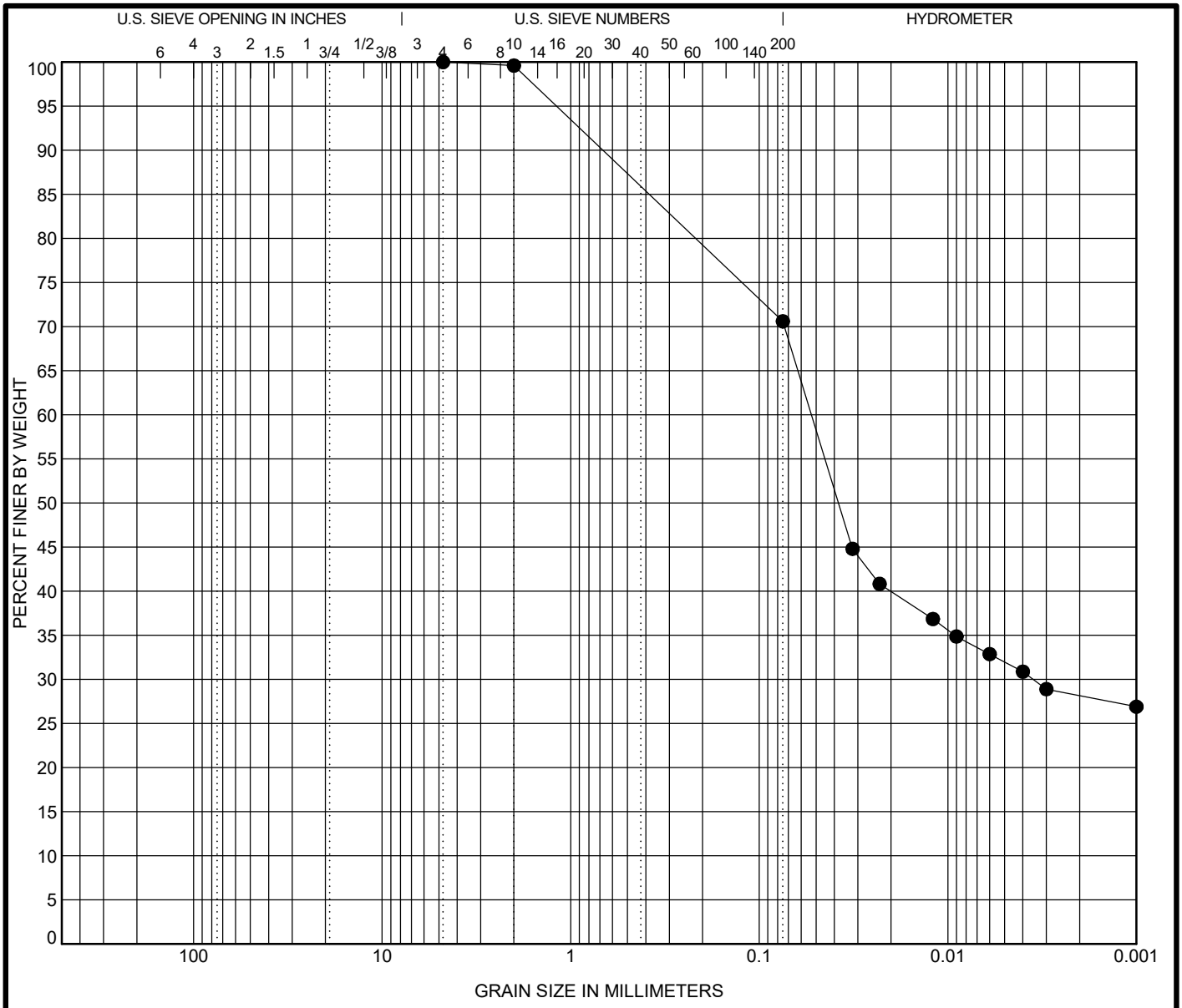
Schnabel ENGINEERING

# GRADATION CURVE

**Project:** Pace Analytical
WF23001
Cayce, South Carolina

**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● LI-59-0-2 0.0 ft | **SILT WITH SAND (ML), reddish brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **4.75** | **0.053** | **0.004** | | **0.0** | **29.4** | **42.4** | **28.2** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 70.6 | 99.6 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

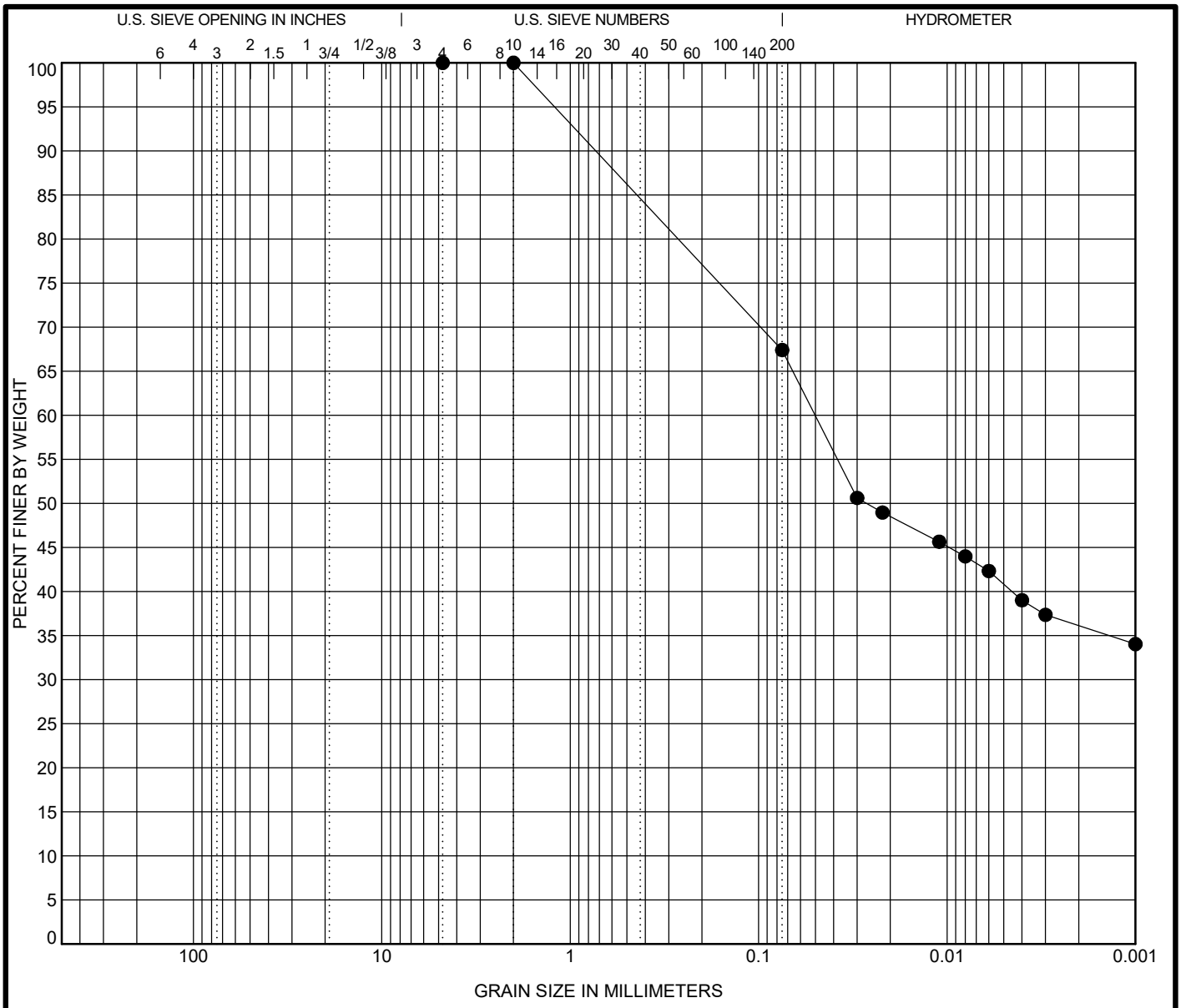
Schnabel ENGINEERING

# GRADATION CURVE

**Project:** Pace Analytical
WF23001
Cayce, South Carolina

**Contract:** 08190058.00.497-509

SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21




| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |

| Specimen | Sample Description | LL | PL | PI | Test Method |
|---|---|---|---|---|---|
| ● W-101-2 2.0 ft | **SANDY SILTY CLAY (CL-ML), reddish brown** | -- | -- | -- | Atterberg ASTM D4318 |

| Test Method | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|---|---|---|---|---|---|---|---|---|
| **ASTM D7928** | **2** | **0.05** | | | **0.0** | **32.6** | **31.3** | **36.1** |

**Percent Finer**

| Sieve Size | 200 | 10 | 4 |
|---|---|---|---|
| % Finer | 67.4 | 100.0 | 100.0 |

| Tested By | Tested Date | Reviewed by | Calc by |
|---|---|---|---|
| EC | 7/1/21 | SRH | EC |

Schnabel ENGINEERING

# GRADATION CURVE

**Project:** Pace Analytical
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SIEVE 1/SHEET HYDROMETERS-2020-2021.GPJ TEST TEMPLATE.GDT 7/8/21