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

SCDHEC, BLWM
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Your ref:
Our ref: LTR-RAC-20-65

July 30, 2020

Subject: HF Spiking Station #1 Soil Sampling Assessment Report

Mrs. Kuhn:

Attached for your review and approval are the Westinghouse Columbia Fuel Fabrication Facility ("CFFF" or "Site") assessment report ("Assessment") for the Hydrofluoric Acid Spiking Station ("HFSS") #1 as well as the Technical Basis Document ("TBD"). The Assessment and TBD were prepared by AECOM Technical Services ("AECOM") and Leidos, respectively, and document the investigation activities, results and conclusions from completion of the Work Plan which was approved by South Carolina Department of Health and Environmental Control's ("SCDHEC" or "Department") on March 30, 2020. Based on these submittals, CFFF concludes that HFSS #1 is protective of employee health and safety and poses no threat to the public.

Background

CFFF uses two independent spiking stations referred to as Hydrofluoric Acid Spiking Stations 1 or 2 ("HFSS #1 or HFSS #2"). The stations are adjacent to each other and mix hydrofluoric acid with uranyl nitrate ("UN") for the conversion process. Previous assessment of HFSS #2 after the discovery in 2018 of a release from this station indicated the presence of uranium (U) within sub-slab soils beneath HFSS #2. Subject to DHEC's review and approval, the station was subsequently remediated and returned to normal operation. Following the HFSS #2 assessment, CFFF completed the following actions to mitigate future issues at the spiking stations in the plant.

- Developed an improved design for both spiking stations and diked areas that prevents spills of process solution from impacting the concrete, protects the concrete with a floor coating that is impervious to acidic materials and guards against undetected deterioration of the concrete floor.
    - The improved design for HFSS #2 was implemented and also included a new preventive maintenance strategy.

To comprehensively assess potential environmental impacts at the CFFF from current and historical operations, the Site also:

- Entered into Consent Agreement ("CA") 19-02-HW with SCDHEC in February of 2019 to address environmental impacts originating from facility operations. This included the establishment of eight operational units (OUs) and the installation of sentinel wells. One OU (Chemical Area) includes the portions of the manufacturing building where liquid uranium processing and handling operations occur. A network of sentinel wells was installed around the Chemical Area OU to detect a potential leak or contaminant migration from this area.

- Completed the first phase of a comprehensive Remedial Investigation ("RI") performed under the CA, with a final summary report submitted to SCDHEC on July 15, 2020. The results of this assessment show there is no off-site impact from CFFF operations, and the extent of the existing impact is limited, generally well-defined and poses no significant threat to plant workers, the general public or the environment.

- Developed procedure RA-433, *Environmental Remediation*, using industry best practices to standardize a risk-based, decision-making process for analysis of environmental data and facility response to a release with potential environmental impact. This procedure uses best practices from an industry groundwater protection initiative to prevent migration of material off-site and to minimize decommissioning impacts.

- Developed and implemented a Conceptual Site Model ("CSM") to assist CFFF with the assessment of environmental data. The CSM was enhanced using the data from the first phase of the RI, making it a more effective decision-making tool. The CSM coupled with improved environmental monitoring and the remediation procedure provide a robust environmental protection program.

HFSS #1 Investigation

Due to the conditions found in HFSS #2 CFFF investigated the conditions of HFSS #1. CFFF submitted for SCDHEC's approval a Work Plan for the subsurface investigation of the HFSS #1 area in a letter (LTR-RAC-20-31) dated March 20, 2020. The Department subsequently approved the plan on March 30, 2020.

In accordance with the aforementioned plan and as part of implementation of the improved HFSS #1 design, the concrete floor was removed to construct the new containment dike. Soil samples were collected from May 4-6 of 2020 to evaluate the subsurface conditions. The results of the sampling are included within the Assessment Report prepared by AECOM (**Attachment 1**).

Calculations of Dose and Risk

Following the Site's *Environmental Remediation* procedure, RA-433 and AECOM's recommendations, CFFF contracted Leidos to evaluate risk and dose to the industrial worker at HFSS #1 resulting from residual uranium beneath the concrete floor. The Technical Basis Document prepared by Leidos and dated July 28, 2020 is attached to this cover letter (**Attachment 2**).

Conclusions and Further Environmental Evaluation

Based on the data provided in the AECOM HFSS #1 Assessment Report and the Leidos TBD, the following conclusion were made:

- Neither fluoride nor nitrate exceeded the CFFF action levels delineated in the Site's Remediation Procedure.
- Tc-99 results were non-detect and further evaluation of Tc-99 was not warranted.
- Uranium results showed exceedances of the remedial action levels, triggering an evaluation of the residual contamination.
- Based on the operating configuration of the HF Spiking Station, the concrete floor slab provides an adequate barrier between the residual U and an industrial worker under current conditions.
- Over the course of the 100-year timeframe that was modeled, the highest dose was calculated at 0.324 mRem/year and the highest Total Excess Cancer Risk (TR) was calculated at 6.47E-6.
- Based on the TBD results, it is acceptable to leave the material in place beneath a 6-in concrete cover at present time and for the next 100 years.
- The current decommissioning cost estimate includes funding for the removal of material beneath the process-building slab in the Chemical Area OU, including the area where the Spiking Stations are located.
- Leaving the residual contamination in-place, with the existing controls and monitoring program poses no risk for off-site impacts.
- Based on the Final Interim RI Data Summary Report, the potential for U to migrate with groundwater has been shown to be limited at the Site.

Closing

We look forward to continuing work with SCDHEC to finalize this assessment. CFFF is committed to protecting the safety of its employees, the community, and the environment, and we believe the transparency and ongoing activities being performed under the Consent Agreement demonstrate this commitment. If you have any questions or comments, or if we can be of further assistance, please do not hesitate to contact me or Nancy Parr at (803) 647-3338 or parrnb@westinghouse.com.

Respectfully,

Diana P. Joyner
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cc: M. Annacone, VP Columbia Fuel
J. Ferguson, EH&S Manager
V. Kelmeckis, Corporate Environmental Manager
N. Parr, Environmental Protection Manager
J. Grant, AECOM Project Manager
K. Harris, Leidos
ENOVIA Records

Attachments:

1. HF Spiking Station #1 Assessment Report dated July 22, 2020 prepared by AECOM
2. Technical Basis Document dated July 28, 2020 prepared by Leidos

HF Spiking Station #1 Assessment Report

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

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

Prepared by:

AECOM Technical Services, Inc.
101 Research Drive
Columbia, SC 29203

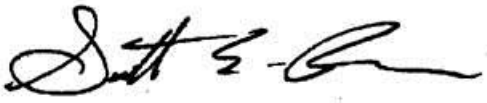
AECOM Project No. 60633543

July 22, 2020

HF Spiking Station #1 Assessment Report

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

Prepared By Jeremy Grant, Senior Project Manager



Reviewed By Scott Ross, P.G., Senior Project Manager

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LIST OF ACRONYMS

AECOM	AECOM Technical Services, Inc.
bss	Below Soil Surface
CSM	Conceptual Site Model
CA	Consent Agreement
CFFF	Columbia Fuel Fabrication Facility
GEL	GEL Laboratories, LLC
HF	Hydrofluoric Acid
HFSS	HF Spiking Station
OU	Operable Unit
RAL	Remedial Action Level
RI	Remedial Investigation
SCDHEC	South Carolina Department of Health and Environmental Control
Tc-99	Technetium 99
U	Uranium

1.0 INTRODUCTION

The Westinghouse Columbia Fuel Fabrication Facility (CFFF) uses two spiking stations, located directly adjacent to each other, where hydrofluoric acid (HF) is mixed with uranyl nitrate for the conversion process. Previous assessment of HF Spiking Station (HFSS) #2 in 2018 after the discovery of a potential release from this station indicated the presence of uranium (U) within subslab soils beneath HFSS #2. Approximately 76 metric tons of soil from beneath HFSS #2 were excavated and disposed prior to HFSS #2 being rebuilt. As part of CFFF's extent of condition review, the facility is also upgrading the HFSS #1 to the new design which includes investigation of subslab soil quality beneath HFSS #1 under the Consent Agreement (CA) with the South Carolina Department of Health and Environmental Control (SCDHEC). The CA, Conceptual Site Model (CSM) and a risk-based site remediation procedure were not in place when the HFSS #2 issue was discovered. This report documents assessment activities related to HFSS #1.

1.1 Site Background

1.1.1 Site Description

The CFFF (the "Site") is located at 5801 Bluff Road (SC Hwy 48) near Hopkins, South Carolina (**Figure 1**). The Site includes approximately 1,151 acres, the majority of which is undeveloped. The developed portion of the property including the plant building, an employee parking area, several smaller support buildings, outdoor supply staging areas, and wastewater lagoons encompasses approximately 75 acres. The developed area is located approximately 2,700 feet southwest of Bluff Road within the north-central portion of the property. The position of the developed area within the Site creates a substantial buffer from downgradient, adjoining properties. HFSS #1 is located in the south central portion of the plant building.

A manmade dike approximately 1,850 feet south of HFSS #1 backs up water in Mill Creek, creating Lower Sunset Lake. A second manmade dike cuts across Mill Creek creating Upper Sunset Lake. Upper and Lower Sunset Lake are located approximately 1,250 feet southwest of the HFSS #1 (**Figure 2**) within a natural oxbow of Mill Creek. A small, man-made pond known as the Gator Pond is also located approximately 900 feet southwest of HFSS #1. Surface water drainage on the developed portion of the property is managed by several ditches which empty into Upper Sunset Lake.

The southern portion of the property, including the Gator Pond, and both portions of Sunset Lake (part of Mill Creek) are located within the floodplain of the Congaree River. The plant and the floodplain are separated by a bluff, approximately 20 feet high, located immediately south of the east-west trending dirt road on the plant property.

1.1.2 Site History

The CFFF plant was constructed in 1969 to manufacture fuel assemblies and components for the commercial nuclear power industry. Prior to construction the Site consisted of farmland, woodlands, and floodplain.

As a result of historical operations and the need to further assess environmental impacts, the Site entered into a CA with SCDHEC on February 26, 2019. As discussed in the Final Remedial Investigation Work Plan (AECOM, 2019), CFFF records indicate historic releases in the Chemical Area of the manufacturing building. This area was established as the Chemical Area Operable Unit (OU). The soil underneath this portion of the manufacturing building is known to be radiologically impacted with residual quantities of U. Because of this, a Chemical Area OU groundwater monitoring well network was established in 2018-2019. Collectively, the monitoring wells and the CSM provide a robust early detection program to monitor the OU for migration of potential impacts from past or future manufacturing operations for the life of the plant.

The HFSS #1 system and containment dike were last replaced in March 2002 following an above ground piping leak in October 2001. The previous containment dike, with interior dimensions of 112 inches by 84 inches, used the exterior manufacturing building wall as one of its four sides. The replacement project included moving the south wall of the dike approximately 12 inches from the exterior building wall. Seventeen 55-gallon drums of concrete floor and subsurface soils were removed to install the new containment dike. The event was documented in the Site's decommissioning records in 2001 and was incorporated into the initial CSM included with the Final Remedial Investigation (RI) Work Plan approved in June 2019 (AECOM, 2019).

1.2 Site Investigation Objective

As part of the CA, CFFF is performing an RI to understand the source, nature and extent of impacts, resulting from current and historical operations at the Site. The first phase of the investigation has been completed and supported the conclusion that there are no known offsite impacts from plant operations. CFFF is currently developing the scope of work to be proposed to SCDHEC for the second phase of the RI.

2.0 SITE INVESTIGATION ACTIVITIES

This section discusses the rationale and methods used during the soil investigation. AECOM Technical Services, Inc (AECOM) performed the soil assessment in HFSS #1 from May 4, 2020 to May 6, 2020. The investigative efforts were performed to determine if subsurface soils and plant building footers have been impacted by potential releases from HFSS #1.

2.1 Field Investigation Activities

Field investigation activities included the following:

- Installation of 5 vertical hand auger borings (HF1-B1 through HF1-B5) to collect soil samples from beneath HFSS #1 footprint; and
- Installation of 2 angled hand auger borings (HF1-B6 and HF1-B7) to collect soil samples within and adjacent to the HFSS #1 footprint that were also in close proximity to the building footer for structural engineering evaluation.

2.1.1 Soil Assessment

To protect CFFF workers outside of the HFSS #1 study area from potential exposure to dust generated during concrete removal and soil disturbance, a tented structure was set up around the work station. A temporary berm was also installed on the floor to keep potential spills from outside of the study area from reaching the exposed subslab soil.

Seven (7) borings (HF1-B1 through HF-B7) were advanced using dedicated stainless steel hand augers within the HFSS #1 study area (**Figure 3**). These borings were advanced to hand auger refusal or a depth of 10 feet below soil surface (bss), whichever was less. The depth to the water table below HFSS #1 is approximately 12 feet bss. Boreholes HF1-B4, HF1-B6, and HF1-B7 encountered hand auger refusal at depths ranging from 5.08 feet to 5.37 feet bss.

Composite soil samples were collected from the following intervals: 1-2 feet bss, 3-4 feet bss, 5-6 feet bss, 7-8 feet bss, and 8-10 feet bss, with the exception of borings where hand auger refusal was encountered at shallower depths. The top foot of soil generated at each boring was discarded because the surface of the soil beneath the concrete was likely cross contaminated with Uranium (U) during the cutting and removal of the concrete floor. The concrete floor in this area is known to contain elevated U concentrations.

When pulling the hand auger bucket out of the borehole and pushing the hand auger bucket back into the borehole, soil from the sidewalls of the borehole could have collapsed into the bottom of the borehole. To ensure that representative samples were collected from the desired depths, AECOM personnel used a tape measure before and after each advancement of the hand auger bucket within the sample interval to document how much soil within each retrieved hand auger bucket was native soil at a given depth. Soil from the top of the hand auger bucket was emptied into 3-gallon plastic bags until only the measured increase in the total borehole depth remained within the hand auger bucket.

One grab sample (HF1-B7 REFUSAL) was collected at the refusal depth of borehole HF1-B7 to assess pH at the depth that is believed to be the top of the plant building's footer.

Soil from the composite sample intervals was emptied from the hand auger bucket onto a 3 foot by 3 foot 4-mil polyethylene plastic mixing square, dedicated to the specified sampling interval, and homogenized. Homogenized soil samples were placed in pre-cleaned, laboratory-provided sample bottles.

After the soil samples were collected from HF1-B6 and HF1-B7, CFFF and AECOM personnel used the hand auger extension rods and a plumb bob to obtain measurements that would allow for the assessment of the angle at which boreholes B-6 and B-7 extended into the subsurface, the depth below soil surface of the sampling intervals, and how far from the borehole opening each borehole extended towards the plant building's footer.

Subsurface lithology from each borehole was logged by an AECOM geologist. Boring logs are included in **Appendix A**.

2.1.2 Soil Sample Analysis and Results

Soil samples were submitted to GEL Laboratories, LLC (GEL) for analysis of percent moisture using ASTM D 2216 (Modified), fluoride and nitrate using EPA Method 9056A, isotopic U using EPA DOE EML HASL-300 (U-02-RC Modified), technetium 99 (Tc-99) using DOE EML HASL-300 (Tc-02-RC Modified) and pH using EPA Method 9045D. Soil analytical results and the depth bss of the samples are summarized in **Table 1** and displayed on **Figure 3**. Laboratory analytical results are contained in **Appendix B**.

Soil from borings HF1-B1, HF1-B3, HF1-B5, and HF1-B7 contained uranium above the Site-specific remediation action level (RAL), as documented in the facility's *Procedure RA-433 Environmental Remediation Revision 1* (CFFF, 2020), with the greatest impact encountered in soil samples from boreholes HF1-B1 and HF1-B3 at depths ranging from two feet bss to eight feet bss. The Site-specific RAL incorporates established regulatory screening levels that are protective of human health and the environment for decision making purposes. Impact in soil within boreholes HF1-B1 and HF1-B3 increased from the surface to the greatest impact in the 4-6 feet sampling interval and decreased thereafter.

Surficial soils from the two angled borings (HF1-B6 0-2 foot and HF1-B7 0-2 foot) were intended to be analyzed for pH only due to potential cross contamination with U impacted concrete from the floor. However, the chain of custody for the surficial composite soil sample from HFSS1-B7 0-2 foot was errantly marked to also analyze soil from this interval for fluoride, nitrate, Tc-99 and U. Analytical results from the 0-2 foot interval in samples HFSS-1 B6 and HFSS-1 B-7 are similar to the analytical for the surface soil samples from the 1-2 foot interval for HFSS-1 B1 through HF1-B5.

3.0 CONCLUSIONS

Based upon the results of this assessment, AECOM concludes the following:

- Some of the soil below the concrete floor within the HFSS #1 area is impacted with fluoride, nitrate, and uranium, and has areas of low pH (<5 standard units). This data is representative of other soils below the Chemical Area OU.

- In general, surficial soils (0-2 feet bss) had minimal impact from the operations of HFSS #1. This is likely due to the dike replacement early 2002. Based on the minimal impact in the shallow surficial soil beneath the concrete slab, operations of HFSS #1 do not appear to have impacted these soils since this replacement.

- Soil from borings HFSS1-B1, HFSS1-B3, HFSS1-B5, and HFSS1-B7 exceed the Site-specific remedial action levels. Based upon the facility's *Procedure RA-433 Environmental Remediation Revision 1*, the following evaluations should be undertaken:

  1. Complete dose/risk assessment under current circumstances (industrial worker scenario).

  2. Determine the potential for off-site impacts if the impacted soil is left in place.

  3. Complete an assessment of Site conditions and future use of the area.

  The results of these evaluations are documented in the Technical Basis Document prepared by Leidos (Leidos, 2020).

4.0 REFERENCES

AECOM, 2013. Final Remedial Investigation Work Plan, Westinghouse Columbia Fuel Fabrication Facility, June 2019.

Leidos, 2020. Technical Basis Document - Evaluation of Dose and Risk from Uranium in Soil at HF Spiking Station #1 at the Westinghouse Columbia Fuel Fabrication Facility (CFFF), July 2020.

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

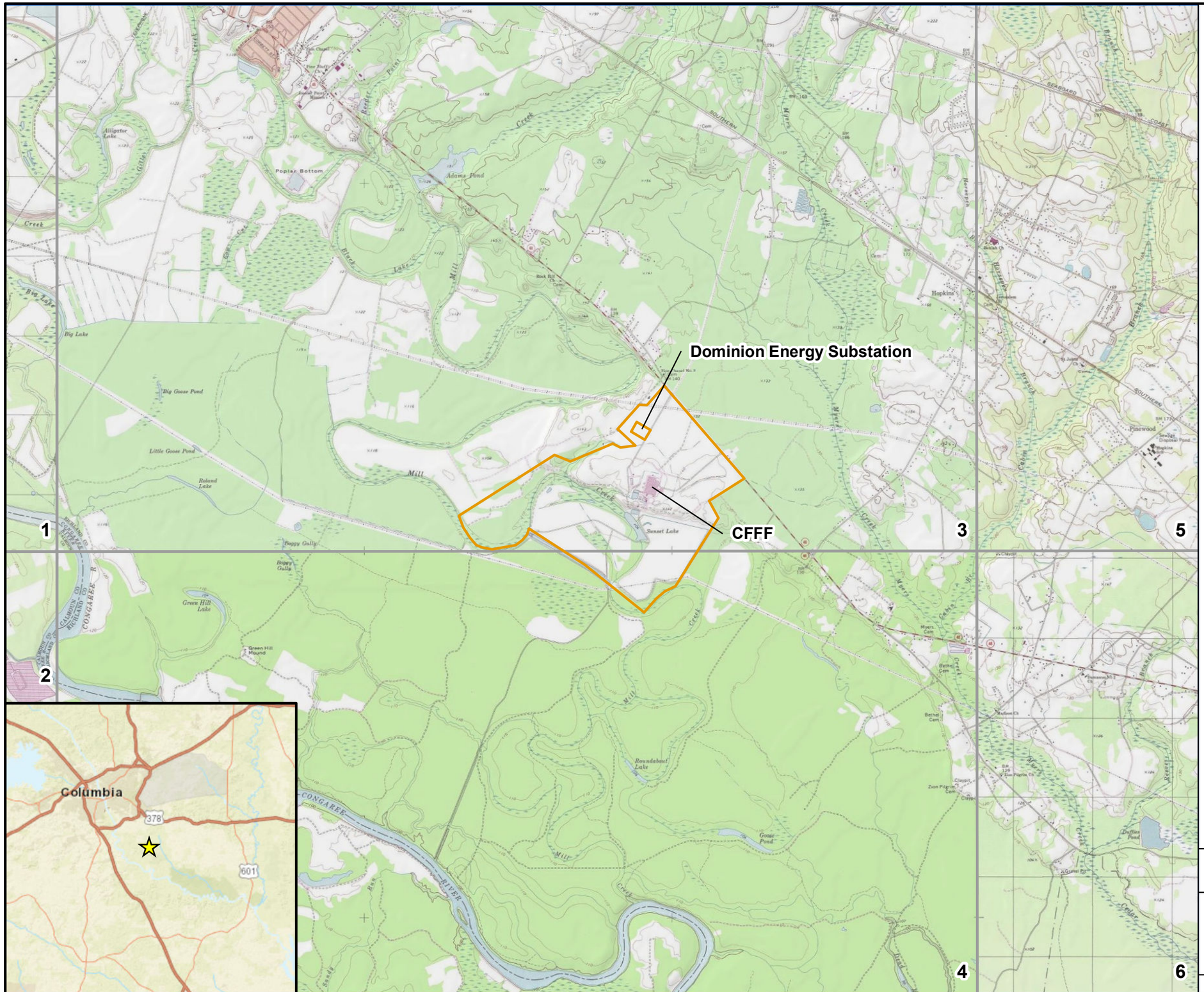
TABLES

Table 1
Westinghouse Columbia Fuel Fabrication Facility
HF Spiking Station #1
Soil Analytical Results

			Analyte	pH	Fluoride	Nitrate	Technetium-99	Uranium-233/234	Uranium-235/236	Uranium-238
			Unit	SU	mg/kg	mg/kg	pCi/g	pCi/g	pCi/g	pCi/g
Sample ID	Sample Depth	Depth BSS	Sample Date							
HF1-B1-(1-2)	1 - 2 ft	1 - 2 ft	5/4/2020	**4.81**	**28.3**	**180**	0.447 U	**13.2**	**0.828**	**3.22**
HF1-B1-(2-4)	2 - 4 ft	2 - 4 ft	5/4/2020	**4.02**	**706**	**707**	0.88 U	**8,310**	**465**	**1,620**
HF1-B1-(4-6)	4 - 6 ft	4 - 6 ft	5/4/2020	**3.88**	**1500**	**1240**	0.0772 U	**10,100**	**436**	**1,680**
HF1-B1-(6-8)	6 - 8 ft	6 - 8 ft	5/4/2020	**4.03**	**936**	**971**	0.871 U	**4,500**	**252**	**802**
HF1-B1-(8-10)	8 - 10 ft	8 - 10 ft	5/4/2020	**4.26**	**96.4**	**303**	0.656 U	**1,440**	**79.4**	**263**
HF1-B2-(1-2)	1 - 2 ft	1 - 2 ft	5/5/2020	**6.38**	**1.28**	**76.5**	0	**4.65**	**0.455**	**1.39**
HF1-B2-(2-4)	2 - 4 ft	2 - 4 ft	5/5/2020	**5.16**	**0.623 J**	**90.8**	0	**0.847**	0.107 U	**0.785**
HF1-B2-(4-6)	4 - 6 ft	4 - 6 ft	5/5/2020	**6.05**	1.09	**94**	0	**1.5**	0.0943 U	**0.955**
HF1-B2-(6-8)	6 - 8 ft	6 - 8 ft	5/5/2020	**5.98**	1.1	**45.9**	0.00658 U	**0.926**	0.0131 U	**0.218**
HF1-B2-(8-10)	8 - 10 ft	8 - 10 ft	5/5/2020	**6.17**	**0.8 J**	**23.4**	0	**1.52**	0.0407 U	**0.421**
HF1-B3-(1-2)	1 - 2 ft	1 - 2 ft	5/5/2020	**4.82**	**6.24**	**285**	0	**3.52**	0.0795 U	**1.13**
HF1-B3-(2-4)	2 - 4 ft	2 - 4 ft	5/5/2020	**4.08**	**683**	**589**	0	**3,510**	**159**	**582**
HF1-B3-(4-6)	4 - 6 ft	4 - 6 ft	5/5/2020	**3.96**	**1020**	**1290**	0	**5,600**	**264**	**948**
HF1-B3-(6-8)	6 - 8 ft	6 - 8 ft	5/5/2020	**4.11**	**546**	**700**	0	**2,790**	**171**	**632**
HF1-B3-(8-10)	8 - 10 ft	8 - 10 ft	5/5/2020	**4.25**	**343**	**398**	0	**2,600**	**139**	**636**
HF1-B4-(1-2)	1 - 2 ft	1 - 2 ft	5/6/2020	**5.46**	**65.8**	**69.3**	0	**563**	**29**	**110**
HF1-B4-(2-4)	2 - 4 ft	2 - 4 ft	5/6/2020	**3.97**	**335**	**70.4**	0.171 U	**511**	**22.1**	**105**
HF1-B4-(4-5.33)	4 - 5.33 ft	4 - 5.33 ft	5/6/2020	**3.29**	**359**	**82.5**	2.6 U	**700**	**31.9**	**139**
HF1-B5-(1-2)	1 - 2 ft	1 - 2 ft	5/6/2020	**5.07**	**1.55**	**232**	0	**9.36**	**0.396**	**2.56**
HF1-B5-(2-4)	2 - 4 ft	2 - 4 ft	5/6/2020	**4.39**	**135**	**288**	0	**1,520**	**82.8**	**246**
HF1-B5-(4-6)	4 - 6 ft	4 - 6 ft	5/6/2020	**4.28**	**21.7**	**440**	0	**1,250**	**50.9**	**224**
HF1-B5-(6-8)	6 - 8 ft	6 - 8 ft	5/6/2020	**5.67**	1.11	**150**	0	**9.67**	**0.587**	**1.61**
HF1-B5-(8-10)	8 - 10 ft	8 - 10 ft	5/6/2020	**4.35**	**0.879 J**	**54.3**	0	**2.65**	**0.294**	**1.02**
HF1-B6-(0-2)	0 - 2 ft	0-1.90 ft	5/6/2020	**8.09**	NA	NA	NA	NA	NA	NA
HF1-B6-(2-4)	2 - 4 ft	1.90-3.79 ft	5/6/2020	**6.35**	**5.67**	**14.5**	0	**403**	**19.3**	**78.5**
HF1-B6-(4-5.67)	4 - 5.67 ft	3.79-5.37 ft	5/6/2020	**6.22**	**43.8**	**38**	0	**226**	**9.66**	**41.6**
HF1-B7-(0-2)	0 - 2 ft	0-1.88 ft	5/6/2020	**4.72**	**40.4**	**127**	0	**2,140**	**93.5**	**313**
HF1-B7-(2-4)	2 - 4 ft	1.88-3.75 ft	5/6/2020	**4.41**	**158**	**178**	3.15 U	**2,020**	**92**	**355**
HF1-B7-(4-5.42)	4 - 5.42 ft	3.75-5.08 ft	5/6/2020	**5.21**	**121**	**83**	0.627 U	**799**	**46.5**	**158**
HF1-B7-REFUSAL	5.42 - 5.42 ft	5.08 ft	5/6/2020	**4.58**	NA	NA	NA	NA	NA	NA
Industrial Use Remedial Action Level					3,100	130,000	89,400	3,310	39	179

Notes:
SU - standard units
mg/kg - milligram per kilogram
pCi/g - picocuries per gram
BSS - below soil surface
ft - feet
U - not detected above the minimum detectible concentration
Shaded cells exceed the remedial action screening level

FIGURES



Legend

Locations

- Property Line
- Topographic Quadrangle Boundary

ID	Topographic Quadrangle Name
1	Southwest Columbia
2	Gaston
3	Fort Jackson South
4	Saylors Lake
5	Congaree
6	Gadsden

0 2,000 4,000 Feet

1:48,000

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

Datum: North American 1983

Data Source: Esri/USGS

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

Site Location Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60633543	CCS	July 2020	**FIGURE 1**

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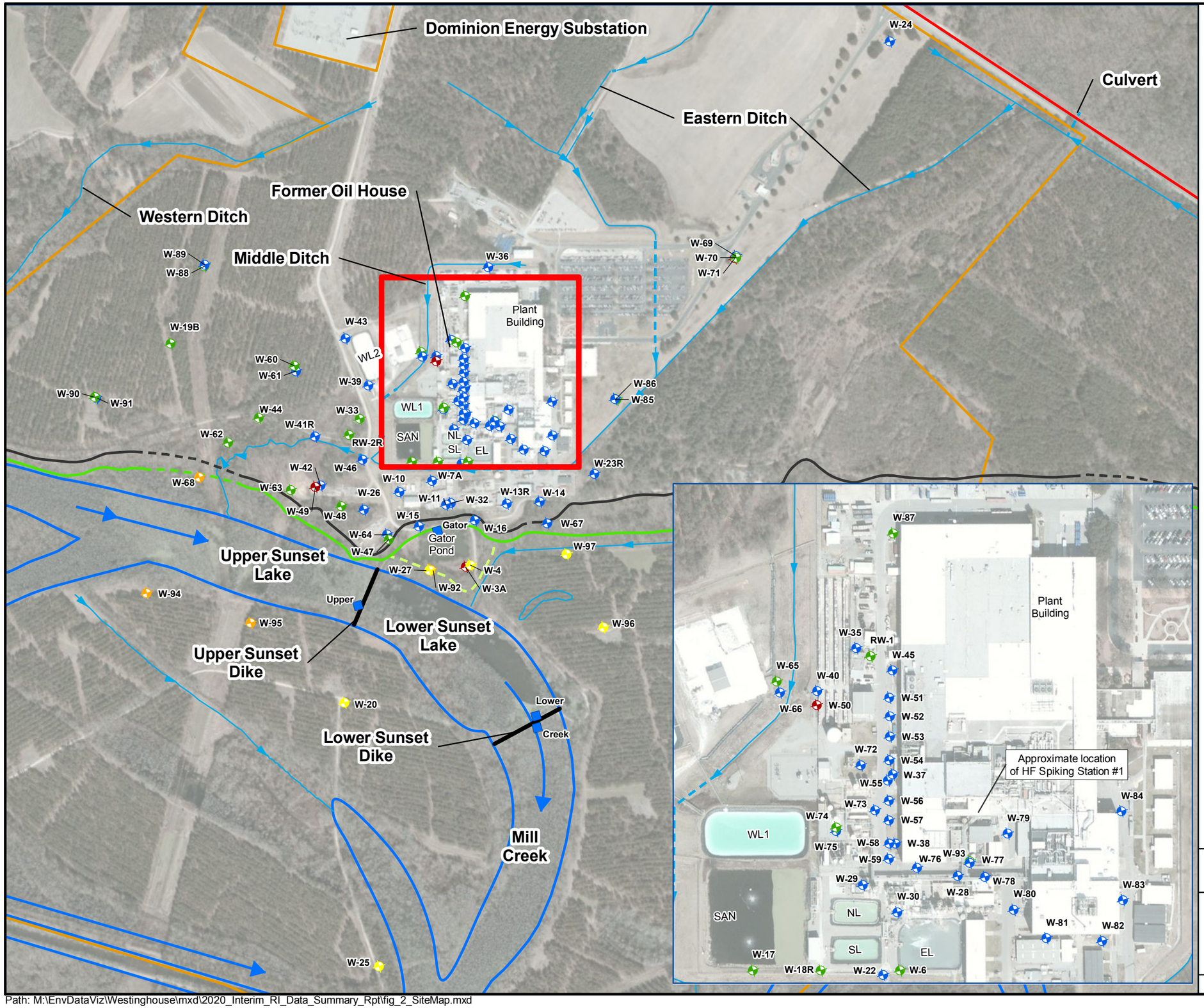

Legend

- Ditch
- Culvert
- Mill Creek Flow Direction
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon I
- WL2 West Lagoon II

Groundwater Monitoring Wells

- Upper Surficial Aquifer
- Lower Surficial Aquifer
- Black Mingo Aquifer
- Upper Floodplain Well
- Lower Floodplain Well

- Mill Creek
- Property Line
- SCRDI Bluff Road (Superfund Site)
- Dike Location
- Staff Gauge Location
- Top of Bluff
- Inferred Top of Bluff
- Bottom of Bluff
- Inferred Bottom of Bluff
- Secondary Bluff Area

0 300 600 Feet

1:7,200

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

Datum: North American 1983

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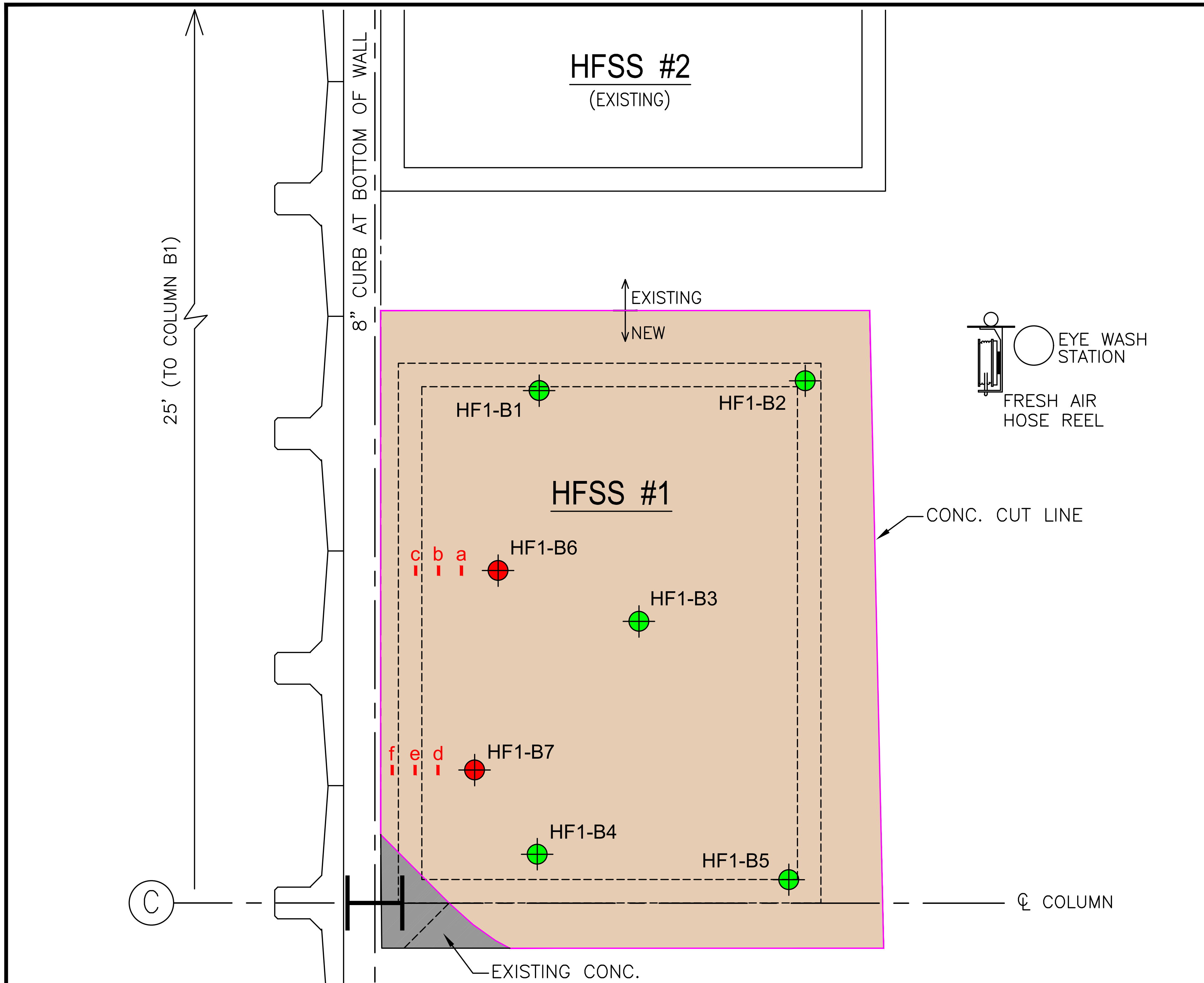
Site Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60633543	CCS	July 2020	**FIGURE 2**

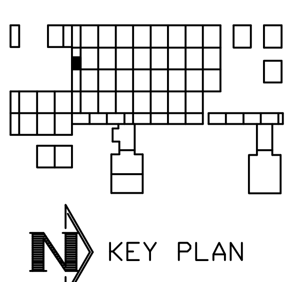
Path: M:\EnvDataViz\Westinghouse\mxd\2020_Interim_RI_Data_Summary_Rpt\fig_2_SiteMap.mxd

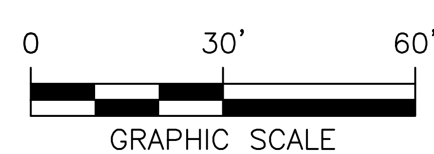


PLAN VIEW - HF SPIKING STATION
SCALE: 1"= 30'

LEGEND - SOIL SAMPLING

SYMBOL	DESCRIPTION
(dashed outline)	REMOVED DIKE OUTLINE, HF SPIKING STATION 1
(shaded box)	CONCRETE REMOVAL FOR REPLACEMENT SPIKING STATION
(green dot)	SOIL SAMPLING LOCATIONS FOR SCDHEC WORK PLAN
(red dot)	SOIL SAMPLING LOCATIONS FOR STRUCTURAL ENGINEERING, (SAMPLES COLLECTED @ AN ANGLE)





Sample Data Collection Results

HF1 - B1 Sample Data — 05-04-2020

Depth BSS ft.	Corrosivity SU	Fluoride mg/kg	Nitrate mg/kg	Technetium-99 pCi/g	Uranium-233/234 pCi/g	Uranium-235/236 pCi/g	Uranium-238 pCi/g
1–2	4.81	28.3	180	0.447 U	13.2	0.828	3.22
2–4	4.02	706	707	0.88 U	8,310	465	1,620
4–6	3.88	1,500	1,240	0.0772 U	10,100	436	1,680
6–8	4.03	936	971	0.871 U	4,500	252	802
8–10	4.26	96.4	303	0.656 U	1,440	79.4	263

HF1 - B2 Sample Data — 05-05-2020

Depth BSS ft.	Corrosivity SU	Fluoride mg/kg	Nitrate mg/kg	Technetium-99 pCi/g	Uranium-233/234 pCi/g	Uranium-235/236 pCi/g	Uranium-238 pCi/g
1–2	6.38	1.28	76.5	0	4.65	0.455	1.39
2–4	5.16	0.623 J	90.8	0	0.847	0.107 U	0.785
4–6	6.05	1.09	94	0	1.5	0.0943 U	0.955
6–8	5.98	1.1	45.9	0.00658 U	0.926	0.0131 U	0.218
8–10	6.17	0.8 J	23.4	0	1.52	0.0407 U	0.421

HF1 - B3 Sample Data — 05-05-2020

Depth BSS ft.	Corrosivity SU	Fluoride mg/kg	Nitrate mg/kg	Technetium-99 pCi/g	Uranium-233/234 pCi/g	Uranium-235/236 pCi/g	Uranium-238 pCi/g
1–2	4.82	6.24	285	0	3.52	0.0795 U	1.13
2–4	4.08	683	589	0	3,510	159	582
4–6	3.96	1,020	1,290	0	5,600	264	948
6–8	4.11	546	700	0	2,790	171	632
8–10	4.25	343	398	0	2,600	139	636

HF1 - B4 Sample Data — 05-06-2020

Depth BSS ft.	Corrosivity SU	Fluoride mg/kg	Nitrate mg/kg	Technetium-99 pCi/g	Uranium-233/234 pCi/g	Uranium-235/236 pCi/g	Uranium-238 pCi/g
1–2	5.46	65.8	69.3	0	563	29	110
2–4	3.97	335	70.4	0.171 U	511	22.1	105
4–5.33	3.29	359	82.5	2.6 U	700	31.9	139

HF1 - B5 Sample Data — 05-06-2020

Depth BSS ft.	Corrosivity SU	Fluoride mg/kg	Nitrate mg/kg	Technetium-99 pCi/g	Uranium-233/234 pCi/g	Uranium-235/236 pCi/g	Uranium-238 pCi/g
1–2	5.07	1.55	232	0	9.36	0.396	2.56
2–4	4.39	135	288	0	1,520	82.8	246
4–6	4.28	21.7	440	0	1,250	50.9	224
6–8	5.67	1.11	150	0	9.67	0.587	1.61
8–10	4.35	0.879 J	54.3	0	2.65	0.294	1.02

HF1 - B7 Sample Data (Sample collected @ angle - a,b,c) — 05-06-2020

Depth BSS ft.	Corrosivity SU	Fluoride mg/kg	Nitrate mg/kg	Technetium-99 pCi/g	Uranium-233/234 pCi/g	Uranium-235/236 pCi/g	Uranium-238 pCi/g
"a" 0–1.90	8.09	N/S	N/S	N/S	N/S	N/S	N/S
"b" 1.90–3.79	6.35	5.67	14.5	0	403	19.3	78.5
"c" 3.79–5.37	6.22	43.8	38.0	0	226	9.66	41.6

HF1 - B7 Sample Data (Sample collected @ angle - d,e,f) — 05-06-2020

Depth BSS ft.	Corrosivity SU	Fluoride mg/kg	Nitrate mg/kg	Technetium-99 pCi/g	Uranium-233/234 pCi/g	Uranium-235/236 pCi/g	Uranium-238 pCi/g
"d" 0–1.88	4.72	40.4	127	0	2,140	93.5	313
"e" 1.88–3.75	4.41	158	178	3.15 U	2,020	92	355
"f" 3.75–5.08	5.21	121	83	0.627 U	799	46.5	158
5.08–REFUSAL	4.58	N/S	N/S	N/S	N/S	N/S	N/S

	Fluoride mg/kg	Nitrate mg/kg	Technetium-99 pCi/g	Uranium-233/234 pCi/g	Uranium-235/236 pCi/g	Uranium-238 pCi/g
REMEDIAL ACTION SCREENING LEVEL	3,100	130,000	89,400	3,310	39	179

NOTES:

BSS - BELOW SOIL SURFACE
FT. - FEET
SU - STANDARD UNITS
mg/kg - MILLIGRAM PER KILOGRAM
pCi/g - PICOCURIES PER GRAM
U - NOT DETECTED ABOVE THE METHOD DETECTION CONCENTRATION
N/S - NOT SAMPLED
(yellow box) - SHADED CELLS EXCEED THE REMEDIAL ACTION SCREENING LEVEL
- GEL LABORATORY WORK ORDERS : 510581, 510757, 510807

AECOM
101 Research Drive
Columbia, South Carolina 29203
Telephone (803) 254-4400 : Fax (803) 771-6676
www.AECOM.com

Figure 3

HF Spiking Station #1
Soil CoC Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY: CAV	CHECKED BY: JG	APPROVED BY: JG
60533543	DATE: JULY 15, 2020	DATE: JULY 15, 2020	SHEET: 1 OF 1

APPENDIX A
BORING LOGS

Soil Boring Report

AECOM

BORING NO. HF1-B1
PAGE 1 OF 1

PROJECT: HF Spiking Station #1
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60633543
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 5/4/2020
DATE FINISH: 5/4/2020
DRILLER: Not Applicable
OVERSIGHT: Jeremy Grant

GROUNDWATER			DRILLING INFORMATION							
DATE	HRS	WATER	METHOD			CASING		TEMP / PERM		
			HOLE DIA.			CASING DIA.		CASING TYPE		
			DEPTH			CASING DEPTH		GROUT TYPE		
			SAMPLING			HAMMER WT		HAMMER FALL		

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS (SOIL CLASSIFICATION: USCS)
					Light tan to brown fine to medium grained sand. Slightly moist.
			1		
			2		Brown fine to medium grained sand. Some silt. Slightly moist..
					Tan fine grained sand. Few silt. Dry.
5.0			3		Tan fine grained sandy silt. Slightly moist.
					Light yellow clayey silt. Some fine sand. Slightly moist.
			4		Tan fine to medium grained silty sand. Slightly moist.
					Light tan fine grained sand. Some silt. Slightly moist.
			5		Light tan fine grained silty sand. Moist.
10.0					
15.0					
20.0					

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
5-10	LOOSE
11-30	MEDIUM DENSE
31-50	DENSE
50+	VERY DENSE

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
3-4	SOFT
5-8	MEDIUM STIFF
9-15	STIFF
16-30	VERY STIFF
31+	HARD

SAMPLER ID.	
SS	SPLIT SPOON
ST	SHELBY TUBE
G	GRAB SAMPLE
MC	MACRO-CORE

DESCRIPTIONS	
MOSTLY	50-100%
SOME	30-45%
LITTLE	15-25%
FEW	5-10%
TRACE	<5%

NOTES	
WD	WHILE DRILLING
NE	NOT ENCOUNTERED
UR	NOT READ
NR	NO RECOVERY

Soil Boring Report

AECOM

BORING NO. HF1-B2
PAGE 1 OF 1

PROJECT: HF Spiking Station #1
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60633543
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 5/5/2020
DATE FINISH: 5/5/2020
DRILLER: Not Applicable
OVERSIGHT: Jeremy Grant

GROUNDWATER			DRILLING INFORMATION							
DATE	HRS	WATER	METHOD			CASING		TEMP / PERM		
			HOLE DIA.			CASING DIA.		CASING TYPE		
			DEPTH			CASING DEPTH		GROUT TYPE		
			SAMPLING			HAMMER WT		HAMMER FALL		

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS SOIL CLASSIFICATION: USCS
					Light tan fine to medium grained sand.Dry.
			1		Dark brown fine to medium grained silty sand. Slightly moist. Reddish brown silty clay. Some fine sand. Slightly moist.
			2		Light brown fine to medium grained sand. Few silt. Slightly moist. Tan fine grained sand. Few silt. Dry.
5.0			3		Light brown fine grained sandy silt. Few clay. Slightly moist. Light brown fine grained sandy silt. Few clay. Slightly moist.
			4		Tan fine grained sand. Few silt. Slightly moist.
10.0			5		Grey and tan fine to medium grained silty sand. Moist.
15.0					
20.0					

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
5-10	LOOSE
11-30	MEDIUM DENSE
31-50	DENSE
50+	VERY DENSE

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
3-4	SOFT
5-8	MEDIUM STIFF
9-15	STIFF
16-30	VERY STIFF
31+	HARD

SAMPLER ID.	
SS	SPLIT SPOON
ST	SHELBY TUBE
G	GRAB SAMPLE
MC	MACRO-CORE

DESCRIPTIONS	
MOSTLY	50-100%
SOME	30-45%
LITTLE	15-25%
FEW	5-10%
TRACE	<5%

NOTES	
WD	WHILE DRILLING
NE	NOT ENCOUNTERED
UR	NOT READ
NR	NO RECOVERY

Soil Boring Report

AECOM

BORING NO. HF1-B3
PAGE 1 OF 1

PROJECT: HF Spiking Station #1
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60633543
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 5/5/2020
DATE FINISH: 5/5/2020
DRILLER: Not Applicable
OVERSIGHT: Jeremy Grant

GROUNDWATER			DRILLING INFORMATION							
DATE	HRS	WATER	METHOD			CASING		TEMP / PERM		
			HOLE DIA.			CASING DIA.		CASING TYPE		
			DEPTH			CASING DEPTH		GROUT TYPE		
			SAMPLING			HAMMER WT		HAMMER FALL		

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS (SOIL CLASSIFICATION: USCS)
					Light tan fine grained sand. Dry.
			1		Brown fine to medium grained sand. Some silt. Slightly moist.
			2		Orangish brown clayey sit. Few fine grained sand. Slightly moist.
					Tan fine grained sand. Few silt. Slightly moist.
			3		Tan fine grained silty sand. Slightly moist.
5.0					Tan fine grained sandy silt. Slightly moist.
			4		Tan fine to medium grained silty sand. Slightly moist.
			5		Light brown and grey fine to medium grained sand. Some silt.Slightly moist.
					Light tan medium to coarse grained sand. Some silt. Moist.
10.0					
15.0					
20.0					

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
5-10	LOOSE
11-30	MEDIUM DENSE
31-50	DENSE
50+	VERY DENSE

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
3-4	SOFT
5-8	MEDIUM STIFF
9-15	STIFF
16-30	VERY STIFF
31+	HARD

SAMPLER ID.	
SS	SPLIT SPOON
ST	SHELBY TUBE
G	GRAB SAMPLE
MC	MACRO-CORE

DESCRIPTIONS	
MOSTLY	50-100%
SOME	30-45%
LITTLE	15-25%
FEW	5-10%
TRACE	<5%

NOTES	
WD	WHILE DRILLING
NE	NOT ENCOUNTERED
UR	NOT READ
NR	NO RECOVERY

Soil Boring Report

AECOM

BORING NO. HF1-B4
PAGE 1 OF 1

PROJECT: HF Spiking Station #1
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60633543
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 5/6/2020
DATE FINISH: 5/6/2020
DRILLER: Not Applicable
OVERSIGHT: Jeremy Grant

GROUNDWATER			DRILLING INFORMATION							
DATE	HRS	WATER	METHOD			CASING		TEMP / PERM		
			HOLE DIA.			CASING DIA.		CASING TYPE		
			DEPTH			CASING DEPTH		GROUT TYPE		
			SAMPLING			HAMMER WT		HAMMER FALL		

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS (SOIL CLASSIFICATION: USCS)
					Light tan to brown fine to medium grained sand. Slightly moist.
			1		
			2		
			3		
5.0					Hand auger refusal at 5.33 feet.
10.0					
15.0					
20.0					

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
5-10	LOOSE
11-30	MEDIUM DENSE
31-50	DENSE
50+	VERY DENSE

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
3-4	SOFT
5-8	MEDIUM STIFF
9-15	STIFF
16-30	VERY STIFF
31+	HARD

SAMPLER ID.	
SS	SPLIT SPOON
ST	SHELBY TUBE
G	GRAB SAMPLE
MC	MACRO-CORE

DESCRIPTIONS	
MOSTLY	50-100%
SOME	30-45%
LITTLE	15-25%
FEW	5-10%
TRACE	<5%

NOTES	
WD	WHILE DRILLING
NE	NOT ENCOUNTERED
UR	NOT READ
NR	NO RECOVERY

Soil Boring Report

AECOM

BORING NO. HF1-B5
PAGE 1 OF 1

PROJECT: HF Spiking Station #1
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60633543
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 5/6/2020
DATE FINISH: 5/6/2020
DRILLER: Not Applicable
OVERSIGHT: Jeremy Grant

GROUNDWATER			DRILLING INFORMATION							
DATE	HRS	WATER	METHOD			CASING		TEMP / PERM		
			HOLE DIA.			CASING DIA.		CASING TYPE		
			DEPTH			CASING DEPTH		GROUT TYPE		
			SAMPLING			HAMMER WT		HAMMER FALL		

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS (SOIL CLASSIFICATION: USCS)
					Light tan to brown fine to medium grained sand. Dry.
			1		Brown fine to medium grained silty sand. Slightly moist.
					Brown fine to medium grained sand. Few silt. Slightly moist.
			2		Reddish brown silty clay. Some fine grained sand. Slightly moist.
					Brown fine to medium grained sand. Some silt. Slightly moist.
					Tan fine grained sandy silt. Some clay. Slightly moist.
5.0			3		Light brown fine grained sandy silt. Few clay. Slightly moist.
					Tan clayey silt. Few fine grained sand. Slightly moist.
			4		Tan fine grained silty sand. Slightly moist.
					Light tan fine grained sand. Some silt. Slightly moist.
			5		Grey and tan fine to coarse grained silty sand. Moist.
10.0					
15.0					
20.0					

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
5-10	LOOSE
11-30	MEDIUM DENSE
31-50	DENSE
50+	VERY DENSE

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
3-4	SOFT
5-8	MEDIUM STIFF
9-15	STIFF
16-30	VERY STIFF
31+	HARD

SAMPLER ID.	
SS	SPLIT SPOON
ST	SHELBY TUBE
G	GRAB SAMPLE
MC	MACRO-CORE

DESCRIPTIONS	
MOSTLY	50-100%
SOME	30-45%
LITTLE	15-25%
FEW	5-10%
TRACE	<5%

NOTES	
WD	WHILE DRILLING
NE	NOT ENCOUNTERED
UR	NOT READ
NR	NO RECOVERY

Soil Boring Report

AECOM

BORING NO. HF1-B6
PAGE 1 OF 1

PROJECT: HF Spiking Station #1
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60633543
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 5/6/2020
DATE FINISH: 5/6/2020
DRILLER: Not Applicable
OVERSIGHT: Jeremy Grant

GROUNDWATER			DRILLING INFORMATION							
DATE	HRS	WATER	METHOD			CASING		TEMP / PERM		
			HOLE DIA.			CASING DIA.		CASING TYPE		
			DEPTH			CASING DEPTH		GROUT TYPE		
			SAMPLING			HAMMER WT		HAMMER FALL		

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS SOIL CLASSIFICATION: USCS
			1		Light tan to brown fine to medium grained sand. Slightly moist.
			2		
			3		
5.0					Hand auger refusal at 5.67 feet.
10.0					
15.0					
20.0					

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
5-10	LOOSE
11-30	MEDIUM DENSE
31-50	DENSE
50+	VERY DENSE

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
3-4	SOFT
5-8	MEDIUM STIFF
9-15	STIFF
16-30	VERY STIFF
31+	HARD

SAMPLER ID.	
SS	SPLIT SPOON
ST	SHELBY TUBE
G	GRAB SAMPLE
MC	MACRO-CORE

DESCRIPTIONS	
MOSTLY	50-100%
SOME	30-45%
LITTLE	15-25%
FEW	5-10%
TRACE	<5%

NOTES	
WD	WHILE DRILLING
NE	NOT ENCOUNTERED
UR	NOT READ
NR	NO RECOVERY

Soil Boring Report

AECOM

BORING NO. HF1-B7
PAGE 1 OF 1

PROJECT: HF Spiking Station #1
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60633543
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 5/6/2020
DATE FINISH: 5/6/2020
DRILLER: Not Applicable
OVERSIGHT: Jeremy Grant

GROUNDWATER			DRILLING INFORMATION							
DATE	HRS	WATER	METHOD			CASING		TEMP / PERM		
			HOLE DIA.			CASING DIA.		CASING TYPE		
			DEPTH			CASING DEPTH		GROUT TYPE		
			SAMPLING			HAMMER WT		HAMMER FALL		

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS SOIL CLASSIFICATION: USCS
					Light tan to brown fine to medium grained sand. Slightly moist.
			1		
			2		
			3		
5.0					Hand auger refusal at 5.42 feet. Grab sample also collected at refusal depth.
10.0					
15.0					
20.0					

BLOWS/FT.	DENSITY
0-4	VERY LOOSE
5-10	LOOSE
11-30	MEDIUM DENSE
31-50	DENSE
50+	VERY DENSE

BLOWS/FT.	CONSISTENCY
0-2	VERY SOFT
3-4	SOFT
5-8	MEDIUM STIFF
9-15	STIFF
16-30	VERY STIFF
31+	HARD

SAMPLER ID.	
SS	SPLIT SPOON
ST	SHELBY TUBE
G	GRAB SAMPLE
MC	MACRO-CORE

DESCRIPTIONS	
MOSTLY	50-100%
SOME	30-45%
LITTLE	15-25%
FEW	5-10%
TRACE	<5%

NOTES	
WD	WHILE DRILLING
NE	NOT ENCOUNTERED
UR	NOT READ
NR	NO RECOVERY

APPENDIX B
LABORATORY ANALYTICAL RESULTS

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

May 28, 2020

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

Re: Soil and Vegetation Analysis
Work Order: 510581

Dear Ms. Logsdon:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 05, 2020. 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. 4707.

Sincerely,

Katelyn Gray

Katelyn Gray
Project Manager

Purchase Order: 4500799254
Enclosures

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

Certificate of Analysis Report
for

WNUC008 Westinghouse Electric Co, LLC (4500775170)

Client SDG: 510581 GEL Work Order: 510581

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

H Analytical holding time was exceeded

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, Katelyn Gray.

Reviewed by Katelyn Gray

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

Certificate of Analysis

Report Date: May 28, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(1-2)
Sample ID: 510581001
Matrix: Soil
Collect Date: 04-MAY-20 13:13
Receive Date: 05-MAY-20
Collector: Client
Moisture: 7.46%

Project: WNUC00821
Client ID: WNUC008

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		28.3	0.366	1.08	mg/kg	9.95	1	JLD1	05/05/20	1932	1994861	1
Nitrate-N		180	1.77	5.38	mg/kg	9.95	5	JLD1	05/06/20	0110	1994861	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.81	0.0100	0.100	SU		1	RXB5	05/07/20	1446	1994735	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/05/20	1814	1994849

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Report Date: May 28, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(2-4)
Project: WNUC00821
Sample ID: 510581002
Client ID: WNUC008
Matrix: Soil
Collect Date: 04-MAY-20 13:43
Receive Date: 05-MAY-20
Collector: Client
Moisture: 7.57%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		706	7.38	21.7	mg/kg	10.0	20	JLD1	05/06/20	0243	1994861	1
Nitrate-N		707	7.16	21.7	mg/kg	10.0	20					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.02	0.0100	0.100	SU		1	RXB5	05/07/20	1448	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/05/20	1814	1994849

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Company : Westinghouse Electric Company, LLC
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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(4-6)
Project: WNUC00821
Sample ID: 510581003
Client ID: WNUC008
Matrix: Soil
Collect Date: 04-MAY-20 14:58
Receive Date: 05-MAY-20
Collector: Client
Moisture: 11.8%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		1500	19.1	56.1	mg/kg	9.90	50	JLD1	05/06/20	0314	1994861	1
Nitrate-N		1240	18.5	56.1	mg/kg	9.90	50					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	3.88	0.0100	0.100	SU		1	RXB5	05/07/20	1449	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/05/20	1814	1994849

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(6-8)
Project: WNUC00821
Sample ID: 510581004
Client ID: WNUC008
Matrix: Soil
Collect Date: 04-MAY-20 16:10
Receive Date: 05-MAY-20
Collector: Client
Moisture: 11.6%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		936	9.45	27.8	mg/kg	9.83	25	JLD1	05/06/20	0345	1994861	1
Nitrate-N		971	9.17	27.8	mg/kg	9.83	25					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.03	0.0100	0.100	SU		1	RXB5	05/07/20	1450	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/05/20	1814	1994849

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(8-10) Project: WNUC00821
Sample ID: 510581005 Client ID: WNUC008
Matrix: Soil
Collect Date: 04-MAY-20 17:02
Receive Date: 05-MAY-20
Collector: Client
Moisture: 12.8%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		96.4	3.90	11.5	mg/kg	10.0	10	JLD1	05/06/20	0415	1994861	1
Nitrate-N		303	3.79	11.5	mg/kg	10.0	10					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.26	0.0100	0.100	SU		1	RXB5	05/07/20	1451	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/05/20	1814	1994849

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(1-2)
Sample ID: 510581001
Matrix: Soil
Collect Date: 04-MAY-20 13:13
Receive Date: 05-MAY-20
Collector: Client
Moisture: 7.46%

Project: WNUC00821
Client ID: WNUC008

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		13.2	+/-0.986	0.221	0.500	pCi/g			HAKB	05/09/20	1307	1994680	1
Uranium-235/236		0.828	+/-0.286	0.186	0.500	pCi/g							
Uranium-238		3.22	+/-0.486	0.111	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.447	+/-1.94	3.34	5.00	pCi/g			JJ3	05/10/20	0542	1994733	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	05/05/20	1018	1994664

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			81.9	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			97.3	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(2-4)
Project: WNUC00821
Sample ID: 510581002
Client ID: WNUC008
Matrix: Soil
Collect Date: 04-MAY-20 13:43
Receive Date: 05-MAY-20
Collector: Client
Moisture: 7.57%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		8310	+/-213	11.4	0.500	pCi/g			HAKB	05/11/20	1159	1995912	1
Uranium-235/236		465	+/-56.2	5.28	0.500	pCi/g							
Uranium-238		1620	+/-94.3	8.12	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.880	+/-2.19	3.75	5.00	pCi/g			JJ3	05/10/20	0603	1994733	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	05/05/20	1018	1994664

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			62	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.5	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(4-6)
Project: WNUC00821
Sample ID: 510581003
Client ID: WNUC008
Matrix: Soil
Collect Date: 04-MAY-20 14:58
Receive Date: 05-MAY-20
Collector: Client
Moisture: 11.8%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		10100	+/-239	9.20	0.500	pCi/g			HAKB	05/11/20	1159	1995912	1
Uranium-235/236		436	+/-55.3	7.65	0.500	pCi/g							
Uranium-238		1680	+/-97.6	8.76	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.0772	+/-2.09	3.63	5.00	pCi/g			JJ3	05/10/20	0625	1994733	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	05/05/20	1018	1994664

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			67.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			95.8	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(6-8)
Project: WNUC00821
Sample ID: 510581004
Client ID: WNUC008
Matrix: Soil
Collect Date: 04-MAY-20 16:10
Receive Date: 05-MAY-20
Collector: Client
Moisture: 11.6%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		4500	+/-119	4.20	0.500	pCi/g			HAKB	05/07/20	2115	1994680	1
Uranium-235/236		252	+/-31.3	4.22	0.500	pCi/g							
Uranium-238		802	+/-50.2	3.97	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.871	+/-2.06	3.53	5.00	pCi/g			JJ3	05/10/20	0647	1994733	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	05/05/20	1018	1994664

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			15	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.1	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 28, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B1-(8-10) Project: WNUC00821
Sample ID: 510581005 Client ID: WNUC008
Matrix: Soil
Collect Date: 04-MAY-20 17:02
Receive Date: 05-MAY-20
Collector: Client
Moisture: 12.8%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1440	+/-43.8	1.98	0.500	pCi/g			HAKB	05/07/20	2115	1994680	1
Uranium-235/236		79.4	+/-11.5	1.79	0.500	pCi/g							
Uranium-238		263	+/-18.7	1.69	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.656	+/-2.13	3.65	5.00	pCi/g			JJ3	05/10/20	0708	1994733	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	05/05/20	1018	1994664

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			31.5	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			92.7	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

QC Summary

Report Date: May 28, 2020

Westinghouse Electric Company, LLC
PO Drawer R
Columbia, South Carolina

Contact: **Ms. Cynthia Logsdon**

Workorder: **510581**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 1994861										
QC1204556272 510581001 DUP										
Fluoride		28.3		37.9	mg/kg	29.1		(0%-109%)	JLD1	05/05/20 23:07
Nitrate-N		180		238	mg/kg	28		(0%-104%)		05/06/20 01:41
QC1204556271 LCS										
Fluoride	25.3			24.1	mg/kg		95.6	(90%-110%)		05/05/20 22:36
Nitrate-N	25.3			24.8	mg/kg		98.2	(90%-110%)		
QC1204556270 MB										
Fluoride			U	ND	mg/kg					05/05/20 22:05
Nitrate-N			U	ND	mg/kg					
QC1204556273 510581001 MS										
Fluoride	26.9	28.3		40.8	mg/kg		46.8 *	(75%-125%)		05/05/20 23:38
Nitrate-N	26.9	180		221	mg/kg		N/A	(75%-125%)		05/06/20 02:12
Titration and Ion Analysis										
Batch 1994735										
QC1204556044 510581001 DUP										
Corrosivity	H	4.81	H	5.15	SU	6.83		(0%-10%)	RXB5	05/07/20 14:47
QC1204556042 LCS										
Corrosivity	7.00			7.00	SU		100	(95%-105%)		05/07/20 14:42

Notes:

The Qualifiers in this report are defined as follows:

< Result is less than value reported

QC Summary

Workorder: **510581**

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

>	Result is greater than value reported
B	The target analyte was detected in the associated blank.
E	General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
H	Analytical holding time was exceeded
J	See case narrative for an explanation
J	Value is estimated
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	Per section 9.3.4.1 of Method 1664 Revision B, due to matrix spike recovery issues, this result may not be reported or used for regulatory compliance purposes.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Z	Paint Filter Test--Particulates passed through the filter, however no free liquids were observed.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
d	5-day BOD--The 2:1 depletion requirement was not met for this sample
e	5-day BOD--Test replicates show more than 30% difference between high and low values. The data is qualified per the method and can be used for reporting purposes
h	Preparation or preservation holding time was exceeded

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.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance 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.
* Indicates that a Quality Control parameter was not within specifications.
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.

QC Summary

Report Date: May 28, 2020

Westinghouse Electric Company, LLC
PO Drawer R
Columbia, South Carolina

Contact: **Ms. Cynthia Logsdon**

Workorder: **510581**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch 1994680											
QC1204555898 510581001 DUP											
Uranium-233/234		13.2		12.1	pCi/g	9.25		(0%-20%)	HAKB	05/07/20	20:55
	Uncertainty	+/-0.986		+/-1.02							
Uranium-235/236		0.828		0.575	pCi/g	36.1*		(0%-20%)			
	Uncertainty	+/-0.286		+/-0.253							
Uranium-238		3.22		2.27	pCi/g	34.6*		(0%-20%)			
	Uncertainty	+/-0.486		+/-0.450							
QC1204555899 LCS											
Uranium-233/234				12.2	pCi/g					05/07/20	20:55
	Uncertainty			+/-0.829							
Uranium-235/236				0.933	pCi/g						
	Uncertainty			+/-0.257							
Uranium-238	12.9			12.0	pCi/g		93.5	(75%-125%)			
	Uncertainty			+/-0.821							
QC1204555897 MB											
Uranium-233/234				0.428	pCi/g					05/09/20	13:07
	Uncertainty			+/-0.164							
Uranium-235/236				0.0679	pCi/g						
	Uncertainty			+/-0.0763							
Uranium-238			U	0.0889	pCi/g						
	Uncertainty			+/-0.0914							
Batch 1995912											
QC1204558442 510581002 DUP											
Uranium-233/234		8310		8000	pCi/g	3.74		(0%-20%)	HAKB	05/11/20	11:59
	Uncertainty	+/-213		+/-253							
Uranium-235/236		465		379	pCi/g	20.5*		(0%-20%)			
	Uncertainty	+/-56.2		+/-61.4							
Uranium-238		1620		1420	pCi/g	13.5		(0%-20%)			
	Uncertainty	+/-94.3		+/-107							

QC Summary

Workorder: **510581**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1995912										
QC1204558443 LCS										
Uranium-233/234				162	pCi/g				HAKB	05/11/20 11:59
	Uncertainty			+/-27.6						
Uranium-235/236				17.4	pCi/g					
	Uncertainty			+/-10.6						
Uranium-238	160			168	pCi/g		105	(75%-125%)		
	Uncertainty			+/-28.1						
QC1204558441 MB										
Uranium-233/234			U	-1.59	pCi/g					05/11/20 11:59
	Uncertainty			+/-2.31						
Uranium-235/236			U	-0.163	pCi/g					
	Uncertainty			+/-2.70						
Uranium-238			U	0.176	pCi/g					
	Uncertainty			+/-3.14						
Rad Liquid Scintillation										
Batch 1994733										
QC1204556036 510581001 DUP										
Technetium-99	U	0.447	U	0.433	pCi/g	N/A		N/A	JJ3	05/10/20 07:52
	Uncertainty	+/-1.94		+/-2.00						
QC1204556037 LCS										
Technetium-99	57.1			49.8	pCi/g		87.1	(75%-125%)		05/10/20 08:14
	Uncertainty			+/-3.28						
QC1204556035 MB										
Technetium-99			U	2.16	pCi/g					05/10/20 07:30
	Uncertainty			+/-2.07						

Notes:

Counting Uncertainty is 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

QC Summary

Workorder: **510581**

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

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

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.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance 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.
* Indicates that a Quality Control parameter was not within specifications.
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.

Technical Case Narrative
Westinghouse Electric Co, LLC
SDG #: 510581

General Chemistry

Product: **Ion Chromatography**
Analytical Method: SW846 9056A
Analytical Procedure: GL-GC-E-086 REV# 27
Analytical Batches: 1994861 and 1994849

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

GEL Sample ID#	Client Sample Identification
510581001	HF1-B1-(1-2)
510581002	HF1-B1-(2-4)
510581003	HF1-B1-(4-6)
510581004	HF1-B1-(6-8)
510581005	HF1-B1-(8-10)
1204556270	Method Blank (MB)
1204556271	Laboratory Control Sample (LCS)
1204556272	510581001(HF1-B1-(1-2)) Sample Duplicate (DUP)
1204556273	510581001(HF1-B1-(1-2)) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" 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

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The percent recoveries (%R) obtained from the spike analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity.

Analyte	Sample	Value
Fluoride	1204556273 (HF1-B1-(1-2)MS)	46.8* (75%-125%)

Technical Information

Sample Dilutions
The following samples 1204556272 (HF1-B1-(1-2)DUP), 1204556273 (HF1-B1-(1-2)MS), 510581001 (HF1-B1-(1-2)), 510581002 (HF1-B1-(2-4)), 510581003 (HF1-B1-(4-6)), 510581004 (HF1-B1-(6-8)) and 510581005 (HF1-B1-(8-10)) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	510581				
	001	002	003	004	005
Fluoride	1X	20X	50X	25X	10X
Nitrate	5X	20X	50X	25X	10X

Product: **pH**
Analytical Method: SW846 9045D
Analytical Procedure: GL-GC-E-008 REV# 24
Analytical Batch: 1994735

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

GEL Sample ID#	Client Sample Identification
510581001	HF1-B1-(1-2)
510581002	HF1-B1-(2-4)
510581003	HF1-B1-(4-6)
510581004	HF1-B1-(6-8)
510581005	HF1-B1-(8-10)
1204556042	Laboratory Control Sample (LCS)
1204556044	510581001(HF1-B1-(1-2)) Sample Duplicate (DUP)

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

Holding Times
Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1204556044 (HF1-B1-(1-2)DUP)		Received 05-MAY-20, out of holding 04-MAY-20
510581001 (HF1-B1-(1-2))		Received 05-MAY-20, out of holding 04-MAY-20
510581002 (HF1-B1-(2-4))		Received 05-MAY-20, out of holding 04-MAY-20
510581003 (HF1-B1-(4-6))		Received 05-MAY-20, out of holding 04-MAY-20
510581004 (HF1-B1-(6-8))		Received 05-MAY-20, out of holding 04-MAY-20
510581005 (HF1-B1-(8-10))		Received 05-MAY-20, out of holding 04-MAY-20

Radiochemistry

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 27
Analytical Batch: 1994680

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1994664

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

GEL Sample ID#	Client Sample Identification
510581001	HF1-B1-(1-2)
510581004	HF1-B1-(6-8)
510581005	HF1-B1-(8-10)
1204555897	Method Blank (MB)
1204555898	510581001(HF1-B1-(1-2)) Sample Duplicate (DUP)
1204555899	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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

Method Blank Criteria
The blank result (See Below) is greater than the MDC but less than the required detection limit.

Sample	Analyte	Value
1204555897 (MB)	Uranium-233/234	Result: 0.428 pCi/g > MDA: 0.138 pCi/g <= RDL: 0.500 pCi/g
	Uranium-235/236	Result: 0.0679 pCi/g > MDA: 0.0509 pCi/g <= RDL: 0.500 pCi/g

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
1204555898 (HF1-B1-(1-2)DUP)	Uranium-235/236	RPD 36.1* (0.00%-20.00%) RER 1.24 (0-3)
	Uranium-238	RPD 34.6* (0.00%-20.00%) RER 2.31 (0-3)

Technical Information

Recounts
Samples 1204555897 (MB) and 510581001 (HF1-B1-(1-2)) were recounted due to high MDCs. The recounts are reported.

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 27
Analytical Batch: 1995912

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1994664

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

GEL Sample ID#	Client Sample Identification
510581002	HF1-B1-(2-4)
510581003	HF1-B1-(4-6)
1204558441	Method Blank (MB)
1204558442	510581002(HF1-B1-(2-4)) Sample Duplicate (DUP)
1204558443	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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
1204558442 (HF1-B1-(2-4)DUP)	Uranium-235/236	RPD 20.5* (0.00%-20.00%) RER 1.05 (0-3)

RDL Met
The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204558441 (MB)	Uranium-233/234	Result -1.59 < MDA 7.84 > RDL 0.5 pCi/g
	Uranium-235/236	Result -0.163 < MDA 5.72 > RDL 0.5 pCi/g
	Uranium-238	Result 0.176 < MDA 6.81 > RDL 0.5 pCi/g

Technical Information

Sample Re-prep/Re-analysis
Samples were reprepped due to low carrier/tracer yield. The re-analysis is being reported.

Product: **Dry Weight**
Preparation Method: ASTM D 2216 (Modified)
Preparation Procedure: GL-OA-E-020 REV# 13
Preparation Batch: 1994664

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1994664

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

GEL Sample ID#	Client Sample Identification
510581001	HF1-B1-(1-2)
510581002	HF1-B1-(2-4)
510581003	HF1-B1-(4-6)
510581004	HF1-B1-(6-8)
510581005	HF1-B1-(8-10)
1204555869	510581001(HF1-B1-(1-2)) Sample Duplicate (DUP)

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: 1994733

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

GEL Sample ID#	Client Sample Identification
510581001	HF1-B1-(1-2)
510581002	HF1-B1-(2-4)
510581003	HF1-B1-(4-6)
510581004	HF1-B1-(6-8)
510581005	HF1-B1-(8-10)
1204556035	Method Blank (MB)

1204556036	510581001(HF1-B1-(1-2)) Sample Duplicate (DUP)
1204556037	Laboratory Control Sample (LCS)

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.

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

GEL Quote #:

COC Number (1):

PO Number: 4500778461, ENV-CONSENTA

510581

GEL Laboratories LLC

gel.com Chemistry | Radiochemistry | Radiobioassay | Specialty Analytics

Chain of Custody and Analytical Request

GEL Work Order Number:

GEL Project Manager:

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

Client Name: Westinghouse Phone # 803.497.7062

Project/Site Name: Project # HF Spiking Station #1 Soil Sampling Fax #

Address: 5801 Bluff Road, Hopkins, SC 29061

Collected By: R. Crews RCrews Send Results To: joynerdp@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	pH	Fluoride	moisture content	Nitrate	Isotopic U (alpha spec)	Tc-99					<-- Preservative Type (6)
HF1-B1-(1-2)	5/4/2020	1313		N/A	SO			1	X	X	X	X	X	X					Comments Note: extra sample is required for sample specific QC
HF1-B1-(2-4)	5/4/2020	1343		N/A	SO			1	X	X	X	X	X	X					
HF1-B1-(4-6)	5/4/2020	1458		N/A	SO			1	X	X	X	X	X	X					Please note that MDC for Tc-99 should be 1 pCi/g
HF1-B1-(6-8)	5/4/2020	1610		N/A	SO			1	X	X	X	X	X	X					
HF1-B1-(8-10)	5/4/2020	1702		N/A	SO			1	X	X	X	X	X	X					

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	Randy Crews RCrews	5/5/2020	0643	Ray Bates RBates	5/5/2020	0643
2	Ray Bates RBates	5/5/2020	8:43	R. Bates 5/5/20		8:43
3				3		

TAT Requested: **Normal: X** **Rush:** _____ **Specify:** _____ **(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:*** 1 °C

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

***Sample Collection Time Zone*:** [X] 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

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

TSCA Regulated
PCB = Polychlorinated

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

KG

SAMPLE RECEIPT & REVIEW FORM

Client: WNVC	**SDG/AR/COC/Work Order:** 510581
Received By: AA	**Date Received:** 5/5/20
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): Ø 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)?*	✓			Preservation Method: (Wet Ice) Ice Packs Dry ice (None) Other: rchem-21° *all temperatures are recorded in Celsius TEMP: soils-1°
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR4-16 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?	✓			
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 NFG Date 5/6/20 Page 1 of 1

GL-CHL-SR-001 Rev 6

List of current GEL Certifications as of 28 May 2020

State	Certification
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	SC000122020−1
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	T104704235−20−17
Utah NELAP	SC000122020−32
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

GEL Laboratories LLC
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gel.com

June 01, 2020

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

Re: Soil and Vegetation Analysis
Work Order: 510757

Dear Ms. Logsdon:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 06, 2020. 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. 4707.

Sincerely,

Katelyn Gray

Katelyn Gray
Project Manager

Purchase Order: 4500799254
Enclosures

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

Certificate of Analysis Report
for

WNUC008 Westinghouse Electric Co, LLC (4500775170)

Client SDG: 510757 GEL Work Order: 510757

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

H Analytical holding time was exceeded

J See case narrative for an explanation

J Value is estimated

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, Katelyn Gray.

Reviewed by Katelyn Gray

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

Certificate of Analysis

Report Date: June 1, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(1-2)
Project: WNUC00821
Sample ID: 510757001
Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 09:12
Receive Date: 06-MAY-20
Collector: Client
Moisture: 8.89%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		1.28	0.376	1.11	mg/kg	10.1	1	LXA2	05/07/20	0024	1995237	1
Nitrate-N		76.5	0.730	2.21	mg/kg	10.1	2	LXA2	05/07/20	1557	1995237	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.38	0.0100	0.100	SU		1	RXB5	05/07/20	1453	1994735	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/06/20	1859	1995236

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(2-4)
Project: WNUC00821
Sample ID: 510757002
Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 09:40
Receive Date: 06-MAY-20
Collector: Client
Moisture: 7.14%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride	J	0.623	0.365	1.07	mg/kg	9.98	1	LXA2	05/07/20	0157	1995237	1
Nitrate-N		90.8	1.77	5.37	mg/kg	9.98	5	LXA2	05/07/20	1730	1995237	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.16	0.0100	0.100	SU		1	RXB5	05/07/20	1456	1994735	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/06/20	1859	1995236

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(4-6)
Project: WNUC00821
Sample ID: 510757003
Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 10:43
Receive Date: 06-MAY-20
Collector: Client
Moisture: 8.79%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride	U	ND	0.372	1.09	mg/kg	9.98	1	LXA2	05/07/20	0227	1995237	1
Nitrate-N		94.0	1.80	5.47	mg/kg	9.98	5	LXA2	05/07/20	1800	1995237	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.05	0.0100	0.100	SU		1	RXB5	05/07/20	1457	1994735	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/06/20	1859	1995236

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(6-8)
Project: WNUC00821
Sample ID: 510757004
Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 11:30
Receive Date: 06-MAY-20
Collector: Client
Moisture: 9.81%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride	U	ND	0.375	1.10	mg/kg	9.95	1	LXA2	05/07/20	0400	1995237	1
Nitrate-N		45.9	0.364	1.10	mg/kg	9.95	1					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.98	0.0100	0.100	SU		1	RXB5	05/07/20	1459	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/06/20	1859	1995236

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Company : Westinghouse Electric Company, LLC
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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(8-10)
Project: WNUC00821
Sample ID: 510757005
Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 12:30
Receive Date: 06-MAY-20
Collector: Client
Moisture: 13.1%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride	J	0.800	0.388	1.14	mg/kg	9.93	1	LXA2	05/07/20	0431	1995237	1
Nitrate-N		23.4	0.377	1.14	mg/kg	9.93	1					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.17	0.0100	0.100	SU		1	RXB5	05/07/20	1500	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/06/20	1859	1995236

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(1-2)
Project: WNUC00821
Sample ID: 510757006
Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 14:13
Receive Date: 06-MAY-20
Collector: Client
Moisture: 7.09%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		6.24	0.370	1.09	mg/kg	10.1	1	LXA2	05/14/20	2320	1996294	1
Nitrate-N		285	3.59	10.9	mg/kg	10.1	10	LXA2	05/14/20	2347	1996294	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.82	0.0100	0.100	SU		1	RXB5	05/07/20	1502	1994735	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/14/20	2018	1996293

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(2-4)
Sample ID: 510757007
Matrix: Soil
Collect Date: 05-MAY-20 14:44
Receive Date: 06-MAY-20
Collector: Client
Moisture: 8.9%

Project: WNUC00821
Client ID: WNUC008

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		683	18.7	55.0	mg/kg	10.0	50	LXA2	05/15/20	0229	1996294	1
Nitrate-N		589	18.2	55.0	mg/kg	10.0	50					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.08	0.0100	0.100	SU		1	RXB5	05/07/20	1501	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/14/20	2018	1996293

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(4-6)
Sample ID: 510757008
Matrix: Soil
Collect Date: 05-MAY-20 15:35
Receive Date: 06-MAY-20
Collector: Client
Moisture: 13.9%

Project: WNUC00821
Client ID: WNUC008

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		1020	19.9	58.7	mg/kg	10.1	50	LXA2	05/15/20	0417	1996294	1
Nitrate-N		1290	19.4	58.7	mg/kg	10.1	50					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	3.96	0.0100	0.100	SU		1	RXB5	05/07/20	1502	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/14/20	2018	1996293

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(6-8)
Sample ID: 510757009
Matrix: Soil
Collect Date: 05-MAY-20 16:20
Receive Date: 06-MAY-20
Collector: Client
Moisture: 12.3%

Project: WNUC00821
Client ID: WNUC008

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		546	9.79	28.8	mg/kg	10.1	25	LXA2	05/15/20	0511	1996294	1
Nitrate-N		700	9.50	28.8	mg/kg	10.1	25					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.11	0.0100	0.100	SU		1	RXB5	05/07/20	1504	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/14/20	2018	1996293

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(8-10)
Sample ID: 510757010
Matrix: Soil
Collect Date: 05-MAY-20 17:22
Receive Date: 06-MAY-20
Collector: Client
Moisture: 12.6%

Project: WNUC00821
Client ID: WNUC008

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		343	3.91	11.5	mg/kg	10.1	10	LXA2	05/15/20	0605	1996294	1
Nitrate-N		398	3.80	11.5	mg/kg	10.1	10					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.25	0.0100	0.100	SU		1	RXB5	05/07/20	1505	1994735	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/14/20	2018	1996293

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(1-2) Project: WNUC00821
Sample ID: 510757001 Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 09:12
Receive Date: 06-MAY-20
Collector: Client
Moisture: 8.89%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		4.65	+/-0.740	0.316	0.500	pCi/g			BXA4	05/09/20	0839	1995261	1
Uranium-235/236		0.455	+/-0.268	0.201	0.500	pCi/g							
Uranium-238		1.39	+/-0.409	0.228	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.41	+/-1.95	3.51	5.00	pCi/g			JJ3	05/12/20	0610	1995247	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	05/06/20	1726	1995223

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			99.6	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			99.5	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(2-4) Project: WNUC00821
Sample ID: 510757002 Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 09:40
Receive Date: 06-MAY-20
Collector: Client
Moisture: 7.14%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		0.847	+/-0.345	0.285	0.500	pCi/g			BXA4	05/09/20	0839	1995261	1
Uranium-235/236	U	0.107	+/-0.154	0.186	0.500	pCi/g							
Uranium-238		0.785	+/-0.321	0.206	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-0.842	+/-2.14	3.79	5.00	pCi/g			JJ3	05/12/20	0626	1995247	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	05/06/20	1726	1995223

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			87	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			97.6	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(4-6)
Sample ID: 510757003
Matrix: Soil
Collect Date: 05-MAY-20 10:43
Receive Date: 06-MAY-20
Collector: Client
Moisture: 8.79%

Project: WNUC00821
Client ID: WNUC008

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.50	+/-0.493	0.341	0.500	pCi/g			BXA4	05/09/20	0839	1995261	1
Uranium-235/236	U	0.0943	+/-0.162	0.141	0.500	pCi/g							
Uranium-238		0.955	+/-0.391	0.251	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-2.60	+/-1.99	3.66	5.00	pCi/g			JJ3	05/12/20	0643	1995247	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	05/06/20	1726	1995223

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			90.6	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			97.2	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 1, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(6-8) Project: WNUC00821
Sample ID: 510757004 Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 11:30
Receive Date: 06-MAY-20
Collector: Client
Moisture: 9.81%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		0.926	+/-0.396	0.327	0.500	pCi/g			BXA4	05/09/20	0839	1995261	1
Uranium-235/236	U	0.0131	+/-0.137	0.286	0.500	pCi/g							
Uranium-238		0.218	+/-0.198	0.182	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.00658	+/-2.05	3.57	5.00	pCi/g			JJ3	05/12/20	0659	1995247	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	05/06/20	1726	1995223

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			86	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			97.2	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 1, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B2-(8-10) Project: WNUC00821
Sample ID: 510757005 Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 12:30
Receive Date: 06-MAY-20
Collector: Client
Moisture: 13.1%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.52	+/-0.453	0.248	0.500	pCi/g			BXA4	05/09/20	0839	1995261	1
Uranium-235/236	U	0.0407	+/-0.114	0.122	0.500	pCi/g							
Uranium-238		0.421	+/-0.253	0.231	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-2.27	+/-2.18	3.97	5.00	pCi/g			JJ3	05/12/20	0716	1995247	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	05/06/20	1726	1995223

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			87.2	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.7	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 1, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(1-2)
Project: WNUC00821
Sample ID: 510757006
Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 14:13
Receive Date: 06-MAY-20
Collector: Client
Moisture: 7.09%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		3.52	+/-0.714	0.281	0.500	pCi/g			BXA4	05/09/20	0839	1995261	1
Uranium-235/236	U	0.0795	+/-0.156	0.217	0.500	pCi/g							
Uranium-238		1.13	+/-0.414	0.256	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-0.758	+/-2.03	3.59	5.00	pCi/g			JJ3	05/12/20	0732	1995247	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	05/06/20	1726	1995223

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			74.2	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			101	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 1, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(2-4)
Project: WNUC00821
Sample ID: 510757007
Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 14:44
Receive Date: 06-MAY-20
Collector: Client
Moisture: 8.9%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		3510	+/-99.5	5.06	0.500	pCi/g			MP2	05/19/20	1147	1997576	1
Uranium-235/236		159	+/-23.6	2.72	0.500	pCi/g							
Uranium-238		582	+/-40.5	3.73	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-0.638	+/-2.39	4.21	5.00	pCi/g			JJ3	05/12/20	0429	1995246	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	05/06/20	1723	1995224

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			66.5	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			93.3	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 1, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(4-6) Project: WNUC00821
Sample ID: 510757008 Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 15:35
Receive Date: 06-MAY-20
Collector: Client
Moisture: 13.9%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		5600	+/-137	6.49	0.500	pCi/g			MP2	05/19/20	1147	1997576	1
Uranium-235/236		264	+/-33.1	5.06	0.500	pCi/g							
Uranium-238		948	+/-56.3	3.66	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-0.0340	+/-2.23	3.89	5.00	pCi/g			JJ3	05/12/20	0445	1995246	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	05/06/20	1723	1995224

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			61.5	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			93	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 1, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(6-8) Project: WNUC00821
Sample ID: 510757009 Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 16:20
Receive Date: 06-MAY-20
Collector: Client
Moisture: 12.3%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		2790	+/-98.0	5.36	0.500	pCi/g			MP2	05/19/20	1147	1997576	1
Uranium-235/236		171	+/-27.1	3.32	0.500	pCi/g							
Uranium-238		632	+/-46.6	4.21	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.07	+/-2.20	3.92	5.00	pCi/g			JJ3	05/12/20	0502	1995246	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	05/06/20	1723	1995224

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			50.9	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.8	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 1, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B3-(8-10) Project: WNUC00821
Sample ID: 510757010 Client ID: WNUC008
Matrix: Soil
Collect Date: 05-MAY-20 17:22
Receive Date: 06-MAY-20
Collector: Client
Moisture: 12.6%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		2600	+/-83.9	5.25	0.500	pCi/g			MP2	05/19/20	1147	1997576	1
Uranium-235/236		139	+/-21.6	3.66	0.500	pCi/g							
Uranium-238		636	+/-41.5	4.19	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-2.17	+/-2.15	3.92	5.00	pCi/g			JJ3	05/12/20	0518	1995246	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	05/06/20	1723	1995224

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			64.6	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.1	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

QC Summary

Report Date: June 1, 2020

Westinghouse Electric Company, LLC
PO Drawer R
Columbia, South Carolina

Contact: **Ms. Cynthia Logsdon**

Workorder: **510757**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 1995237										
QC1204557123 510757001 DUP										
Fluoride		1.28	J	0.471	mg/kg	92.1 ^		(+/-1.10)	LXA2	05/07/20 00:55
Nitrate-N		76.5		103	mg/kg	29.9		(0%-104%)		05/07/20 16:28
QC1204557122 LCS										
Fluoride	25.1			27.1	mg/kg		108	(90%-110%)		05/06/20 22:20
Nitrate-N	25.1			26.6	mg/kg		106	(90%-110%)		
QC1204557121 MB										
Fluoride			U	ND	mg/kg					05/06/20 21:49
Nitrate-N			U	ND	mg/kg					
QC1204557125 510757001 MS										
Fluoride	27.4	1.28		10.7	mg/kg		34.2 *	(75%-125%)		05/07/20 01:26
Nitrate-N	27.4	76.5		108	mg/kg		116	(75%-125%)		05/07/20 16:59
Batch 1996294										
QC1204559298 510757006 DUP										
Fluoride		6.24		5.79	mg/kg	7.5		(0%-109%)	LXA2	05/15/20 00:14
Nitrate-N		285		278	mg/kg	2.37		(0%-104%)		05/15/20 00:41
QC1204559297 LCS										
Fluoride	24.7			24.8	mg/kg		100	(90%-110%)		05/14/20 22:51
Nitrate-N	24.7			25.0	mg/kg		101	(90%-110%)		

QC Summary

Workorder: **510757**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 1996294										
QC1204559296 MB										
Fluoride			U	ND	mg/kg				LXA2	05/14/20 21:55
Nitrate-N			U	ND	mg/kg					
QC1204559300 510757006 MS										
Fluoride	26.8	6.24		12.7	mg/kg		24.1*	(75%-125%)		05/15/20 01:08
Nitrate-N	26.8	285		302	mg/kg		N/A	(75%-125%)		05/15/20 01:35
Titration and Ion Analysis										
Batch 1994735										
QC1204556044 510581001 DUP										
Corrosivity	H	4.81	H	5.15	SU	6.83		(0%-10%)	RXB5	05/07/20 14:47
QC1204556042 LCS										
Corrosivity	7.00			7.00	SU		100	(95%-105%)		05/07/20 14:42

Notes:

The Qualifiers in this report are defined as follows:

- < Result is less than value reported
- > Result is greater than value reported
- B The target analyte was detected in the associated blank.
- E General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
- H Analytical holding time was exceeded
- J See case narrative for an explanation
- J Value is estimated
- 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 Per section 9.3.4.1 of Method 1664 Revision B, due to matrix spike recovery issues, this result may not be reported or used for regulatory compliance purposes.
- R Sample results are rejected

QC Summary

Workorder: **510757**

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

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

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Z Paint Filter Test--Particulates passed through the filter, however no free liquids were observed.

^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

d 5-day BOD--The 2:1 depletion requirement was not met for this sample

e 5-day BOD--Test replicates show more than 30% difference between high and low values. The data is qualified per the method and can be used for reporting purposes

h Preparation or preservation holding time was exceeded

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.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance 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.
* Indicates that a Quality Control parameter was not within specifications.
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.

QC Summary

Report Date: June 1, 2020

Westinghouse Electric Company, LLC
PO Drawer R
Columbia, South Carolina

Contact: **Ms. Cynthia Logsdon**

Workorder: **510757**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1995261										
QC1204557184 510752001 DUP										
Uranium-233/234		1.56		1.31	pCi/g	17.7		(0% - 100%)	BXA4	05/09/20 08:39
	Uncertainty	+/-0.476		+/-0.436						
Uranium-235/236	U	0.0219	U	0.0496	pCi/g	N/A		N/A		
	Uncertainty	+/-0.122		+/-0.136						
Uranium-238		1.60		1.06	pCi/g	40.4*		(0%-20%)		
	Uncertainty	+/-0.470		+/-0.376						
QC1204557186 LCS										
Uranium-233/234				11.9	pCi/g					05/09/20 08:39
	Uncertainty			+/-1.09						
Uranium-235/236				0.344	pCi/g					
	Uncertainty			+/-0.228						
Uranium-238	12.5			13.2	pCi/g		106	(75%-125%)		
	Uncertainty			+/-1.15						
QC1204557183 MB										
Uranium-233/234			U	-0.0435	pCi/g					05/09/20 08:39
	Uncertainty			+/-0.0855						
Uranium-235/236			U	-0.0501	pCi/g					
	Uncertainty			+/-0.0808						
Uranium-238			U	0.0146	pCi/g					
	Uncertainty			+/-0.0813						
Batch 1997576										
QC1204562383 510757007 DUP										
Uranium-233/234		3510		2820	pCi/g	21.9*		(0%-20%)	MP2	05/19/20 11:47
	Uncertainty	+/-99.5		+/-85.0						
Uranium-235/236		159		128	pCi/g	21.6*		(0%-20%)		
	Uncertainty	+/-23.6		+/-20.2						
Uranium-238		582		417	pCi/g	33*		(0%-20%)		
	Uncertainty	+/-40.5		+/-32.7						

QC Summary

Workorder: **510757**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1997576										
QC1204562384 LCS										
Uranium-233/234				71.6	pCi/g				MP2	05/19/20 11:47
	Uncertainty			+/-16.2						
Uranium-235/236				4.52	pCi/g					
	Uncertainty			+/-5.03						
Uranium-238	97.3			97.1	pCi/g		99.8	(75%-125%)		
	Uncertainty			+/-18.7						
QC1204562382 MB										
Uranium-233/234			U	0.523	pCi/g					05/19/20 11:47
	Uncertainty			+/-1.70						
Uranium-235/236			U	0.147	pCi/g					
	Uncertainty			+/-1.49						
Uranium-238			U	-0.153	pCi/g					
	Uncertainty			+/-0.856						
Rad Liquid Scintillation										
Batch 1995246										
QC1204557146 510757007 DUP										
Technetium-99	U	-0.638	U	-1.41	pCi/g	N/A		N/A	JJ3	05/12/20 05:51
	Uncertainty	+/-2.39		+/-2.24						
QC1204557147 LCS										
Technetium-99	59.9			52.9	pCi/g		88.3	(75%-125%)		05/12/20 06:08
	Uncertainty			+/-3.84						
QC1204557145 MB										
Technetium-99			U	-1.73	pCi/g					05/12/20 05:35
	Uncertainty			+/-2.25						
Batch 1995247										
QC1204557150 510757001 DUP										
Technetium-99	U	-1.41	U	-0.0762	pCi/g	N/A		N/A	JJ3	05/12/20 08:22
	Uncertainty	+/-1.95		+/-2.19						
QC1204557151 LCS										
Technetium-99	57.2			57.2	pCi/g		100	(75%-125%)		05/12/20 08:38
	Uncertainty			+/-3.64						
QC1204557148 MB										
Technetium-99			U	-1.52	pCi/g					05/12/20 07:49
	Uncertainty			+/-1.89						

QC Summary

Workorder: **510757**

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

Notes:

Counting Uncertainty is 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

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.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance 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.
* Indicates that a Quality Control parameter was not within specifications.
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.

Technical Case Narrative
Westinghouse Electric Co, LLC
SDG #: 510757

General Chemistry

Product: **Ion Chromatography**
Analytical Method: SW846 9056A
Analytical Procedure: GL-GC-E-086 REV# 27
Analytical Batches: 1995237 and 1995236

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

GEL Sample ID#	Client Sample Identification
510757001	HF1-B2-(1-2)
510757002	HF1-B2-(2-4)
510757003	HF1-B2-(4-6)
510757004	HF1-B2-(6-8)
510757005	HF1-B2-(8-10)
1204557121	Method Blank (MB)
1204557122	Laboratory Control Sample (LCS)
1204557123	510757001(HF1-B2-(1-2)) Sample Duplicate (DUP)
1204557125	510757001(HF1-B2-(1-2)) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" 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

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The percent recoveries (%R) obtained from the spike analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity.

Analyte	Sample	Value
Fluoride	1204557125 (HF1-B2-(1-2)MS)	34.2* (75%-125%)

Technical Information

Sample Dilutions
The following samples 1204557123 (HF1-B2-(1-2)DUP), 1204557125 (HF1-B2-(1-2)MS), 510757001 (HF1-B2-(1-2)), 510757002 (HF1-B2-(2-4)) and 510757003 (HF1-B2-(4-6)) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	510757		
	001	002	003
Nitrate	2X	5X	5X

Product: **Ion Chromatography**
Analytical Method: SW846 9056A
Analytical Procedure: GL-GC-E-086 REV# 27
Analytical Batches: 1996294 and 1996293

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

GEL Sample ID#	Client Sample Identification
510757006	HF1-B3-(1-2)
510757007	HF1-B3-(2-4)
510757008	HF1-B3-(4-6)
510757009	HF1-B3-(6-8)
510757010	HF1-B3-(8-10)
1204559296	Method Blank (MB)
1204559297	Laboratory Control Sample (LCS)
1204559298	510757006(HF1-B3-(1-2)) Sample Duplicate (DUP)
1204559300	510757006(HF1-B3-(1-2)) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" 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

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The percent recoveries (%R) obtained from the spike analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The matrix spike recovered outside of the established acceptance limits due to matrix interference and/or non-homogeneity.

Analyte	Sample	Value
Fluoride	1204559300 (HF1-B3-(1-2)MS)	24.1* (75%-125%)

Technical Information

Sample Dilutions
The following samples 1204559298 (HF1-B3-(1-2)DUP), 1204559300 (HF1-B3-(1-2)MS), 510757006 (HF1-B3-(1-2)), 510757007 (HF1-B3-(2-4)), 510757008 (HF1-B3-(4-6)), 510757009 (HF1-B3-(6-8)) and 510757010 (HF1-B3-(8-10)) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	510757				
	006	007	008	009	010
Fluoride	1X	50X	50X	25X	10X
Nitrate	10X	50X	50X	25X	10X

Product: **pH**
Analytical Method: SW846 9045D
Analytical Procedure: GL-GC-E-008 REV# 24
Analytical Batch: 1994735

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

GEL Sample ID#	Client Sample Identification
510757001	HF1-B2-(1-2)
510757002	HF1-B2-(2-4)
510757003	HF1-B2-(4-6)
510757004	HF1-B2-(6-8)
510757005	HF1-B2-(8-10)
510757006	HF1-B3-(1-2)
510757007	HF1-B3-(2-4)
510757008	HF1-B3-(4-6)
510757009	HF1-B3-(6-8)
510757010	HF1-B3-(8-10)
1204556042	Laboratory Control Sample (LCS)
1204556044	510581001(HF1-B1-(1-2)) Sample Duplicate (DUP)

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

Holding Times
Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1204556044 (HF1-B1-(1-2)DUP)		Received 05-MAY-20, out of holding 04-MAY-20
510757001 (HF1-B2-(1-2))		Received 06-MAY-20, out of holding 05-MAY-20
510757002 (HF1-B2-(2-4))		Received 06-MAY-20, out of holding 05-MAY-20
510757003 (HF1-B2-(4-6))		Received 06-MAY-20, out of holding 05-MAY-20
510757004 (HF1-B2-(6-8))		Received 06-MAY-20, out of holding 05-MAY-20
510757005 (HF1-B2-(8-10))		Received 06-MAY-20, out of holding 05-MAY-20
510757006 (HF1-B3-(1-2))		Received 06-MAY-20, out of holding 05-MAY-20

510757007 (HF1-B3-(2-4))		Received 06-MAY-20, out of holding 05-MAY-20
510757008 (HF1-B3-(4-6))		Received 06-MAY-20, out of holding 05-MAY-20
510757009 (HF1-B3-(6-8))		Received 06-MAY-20, out of holding 05-MAY-20
510757010 (HF1-B3-(8-10))		Received 06-MAY-20, out of holding 05-MAY-20

Radiochemistry

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 27
Analytical Batch: 1995261

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1995223

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

GEL Sample ID#	Client Sample Identification
510757001	HF1-B2-(1-2)
510757002	HF1-B2-(2-4)
510757003	HF1-B2-(4-6)
510757004	HF1-B2-(6-8)
510757005	HF1-B2-(8-10)
510757006	HF1-B3-(1-2)
1204557183	Method Blank (MB)
1204557184	510752001(NonSDG) Sample Duplicate (DUP)
1204557186	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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
1204557184 (Non SDG 510752001DUP)	Uranium-238	RPD 40.4* (0.00%-20.00%) RER 1.6 (0-3)

Miscellaneous Information

Manual Integration
Manual integration of alpha spectroscopy spectra 510757003 (HF1-B2-(4-6)) was performed to fully separate counts in Regions of Interest which would have been biased.

Additional Comments
The tracer peak centroid for sample 510757003 (HF1-B2-(4-6)) is greater than 50 keV from the expected library energy value for the tracer; however, the tracer yield requirement was met and the tracer peak is within the tracer region of interest.

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 27
Analytical Batch: 1997576

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1995224

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

GEL Sample ID#	Client Sample Identification
510757007	HF1-B3-(2-4)
510757008	HF1-B3-(4-6)
510757009	HF1-B3-(6-8)
510757010	HF1-B3-(8-10)
1204562382	Method Blank (MB)
1204562383	510757007(HF1-B3-(2-4)) Sample Duplicate (DUP)
1204562384	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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
1204562383 (HF1-B3-(2-4)DUP)	Uranium-233/234	RPD 21.9* (0.00%-20.00%) RER 1.48 (0-3)

	Uranium-235/236	RPD 21.6* (0.00%-20.00%) RER 1.18 (0-3)
	Uranium-238	RPD 33* (0.00%-20.00%) RER 2.09 (0-3)

RDL Met
The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204562382 (MB)	Uranium-233/234	Result 0.523 < MDA 3.21 > RDL 0.5 pCi/g
	Uranium-235/236	Result 0.147 < MDA 3.13 > RDL 0.5 pCi/g
	Uranium-238	Result -0.153 < MDA 2.16 > RDL 0.5 pCi/g

Product: **Dry Weight**
Preparation Method: ASTM D 2216 (Modified)
Preparation Procedure: GL-OA-E-020 REV# 13
Preparation Batch: 1995223

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1995223

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

GEL Sample ID#	Client Sample Identification
510757001	HF1-B2-(1-2)
510757002	HF1-B2-(2-4)
510757003	HF1-B2-(4-6)
510757004	HF1-B2-(6-8)
510757005	HF1-B2-(8-10)
510757006	HF1-B3-(1-2)
1204557002	510752001(NonSDG) Sample Duplicate (DUP)

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: **Dry Weight**
Preparation Method: ASTM D 2216 (Modified)
Preparation Procedure: GL-OA-E-020 REV# 13
Preparation Batch: 1995224

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1995224

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

GEL Sample ID#	Client Sample Identification
510757007	HF1-B3-(2-4)
510757008	HF1-B3-(4-6)
510757009	HF1-B3-(6-8)
510757010	HF1-B3-(8-10)
1204557003	510757007(HF1-B3-(2-4)) Sample Duplicate (DUP)

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: 1995246

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

GEL Sample ID#	Client Sample Identification
510757007	HF1-B3-(2-4)
510757008	HF1-B3-(4-6)
510757009	HF1-B3-(6-8)
510757010	HF1-B3-(8-10)
1204557145	Method Blank (MB)
1204557146	510757007(HF1-B3-(2-4)) Sample Duplicate (DUP)
1204557147	Laboratory Control Sample (LCS)

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: 1995247

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

GEL Sample ID#	Client Sample Identification
510757001	HF1-B2-(1-2)
510757002	HF1-B2-(2-4)
510757003	HF1-B2-(4-6)
510757004	HF1-B2-(6-8)
510757005	HF1-B2-(8-10)
510757006	HF1-B3-(1-2)
1204557148	Method Blank (MB)
1204557150	510757001(HF1-B2-(1-2)) Sample Duplicate (DUP)
1204557151	Laboratory Control Sample (LCS)

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.

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

GEL Quote #:

COC Number (1):

PO Number: 4500778461, ENV-CONSENTA

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

Chain of Custody and Analytical Request

510757
GEL Work Order Number:

GEL Project Manager:

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

Client Name: Westinghouse — Phone # 803.497.7062

Project/Site Name: Project # HF Spiking Station #1 Soil Sampling — Fax #

Address: 5801 Bluff Road, Hopkins, SC 29061

Collected By: R. Crews RCrews — Send Results To: joynerdp@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	pH	Fluoride	moisture content	Nitrate	Isotopic U (alpha spec)	Tc-99					<-- Preservative Type (6)
HF1-B2-(1-2)	5/5/2020	0912		N/A	SO			1	X	X	X	X	X	X					**Comments** Note: extra sample is required for sample specific QC
HF1-B2-(2-4)	5/5/2020	0940		N/A	SO			1	X	X	X	X	X	X					
HF1-B2-(4-6)	5/5/2020	1043		N/A	SO			1	X	X	X	X	X	X					
HF1-B2-(6-8)	5/5/2020	1130		N/A	SO			1	X	X	X	X	X	X					
HF1-B2-(8-10)	5/5/2020	1230		N/A	SO			1	X	X	X	X	X	X					Please note that MDC for Tc-99 should be 1 pCi/g
HF1-B3-(1-2)	5/5/2020	1413		N/A	SO			1	X	X	X	X	X	X					
HF1-B3-(2-4)	5/5/2020	1444		N/A	SO			1	X	X	X	X	X	X					
HF1-B3-(4-6)	5/5/2020	1535		N/A	SO			1	X	X	X	X	X	X					
HF1-B3-(6-8)	5/5/2020	1620		N/A	SO			1	X	X	X	X	X	X					
HF1-B3-(8-10)	5/5/2020	1722		N/A	SO			1	X	X	X	X	X	X					

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1 Randy Crews RCrews	5/6/2020	1020	1 Secure Location	5/6/2020	1020
2 Secure Location	5/6/2020	HF 1522	2 A. Allmen	5/6/20	HF 15:23
3	5/6/20		3		

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

TAT Requested: **Normal:** X **Rush:** ____ **Specify:** ____ **(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:*** 1 °C

***Sample Collection Time Zone*:** [X] 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

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

TSCA Regulated
PCB = Polychlorinated

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

KG

SAMPLE RECEIPT & REVIEW FORM

Client: WNVC	SDG/AR/COC/Work Order: 510757
Received By: AA	Date Received: 5/6/20
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): 800 (CPM) mR/Hr Classified as: (Rad 1) Rad 2 Rad 3 HF1-B3-(6-8), HF1-B3-(4-6), HF1-B3-(2-4), & HF1-B3-(8-10)
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)?*	✓			Preservation Method: (Wet Ice) Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: 1°
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR4-16 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?			✓	
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 NRG Date 5/7/20 Page 1 of 1

List of current GEL Certifications as of 01 June 2020

State	Certification
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	SC000122020−1
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	T104704235−20−17
Utah NELAP	SC000122020−32
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

June 04, 2020

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

Re: Soil and Vegetation Analysis
Work Order: 510807

Dear Ms. Logsdon:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 07, 2020. 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. 4707.

Sincerely,

Samuel Hogan for
Katelyn Gray
Project Manager

Purchase Order: 4500799254
Enclosures

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

Certificate of Analysis Report
for

WNUC008 Westinghouse Electric Co, LLC (4500775170)

Client SDG: 510807 GEL Work Order: 510807

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

H Analytical holding time was exceeded

J See case narrative for an explanation

J Value is estimated

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, Katelyn Gray.

Reviewed by _____

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

Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B4-(1-2)
Sample ID: 510807001
Matrix: Soil
Collect Date: 06-MAY-20 08:23
Receive Date: 07-MAY-20
Collector: Client
Moisture: 1.89%

Project: WNUC00821
Client ID: WNUC008

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		65.8	1.72	5.05	mg/kg	9.90	5	JLD1	05/13/20	1033	1995671	1
Nitrate-N		69.3	1.67	5.05	mg/kg	9.90	5					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.46	0.0100	0.100	SU		1	RXB5	05/28/20	1438	1995459	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B4-(2-4)
Project: WNUC00821
Sample ID: 510807002
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 08:35
Receive Date: 07-MAY-20
Collector: Client
Moisture: 1.71%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Nitrate-N		70.4	1.68	5.10	mg/kg	10.0	5	JLD1	05/14/20	0218	1995671	1
Fluoride		335	3.47	10.2	mg/kg	10.0	10	JLD1	05/14/20	1038	1995671	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	3.97	0.0100	0.100	SU		1	RXB5	05/28/20	1443	1995459	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B4-(4-5.33) Project: WNUC00821
Sample ID: 510807003 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 08:55
Receive Date: 07-MAY-20
Collector: Client
Moisture: 4.19%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		359	3.56	10.5	mg/kg	10.0	10	JLD1	05/14/20	0350	1995671	1
Nitrate-N		82.5	3.45	10.5	mg/kg	10.0	10					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	3.29	0.0100	0.100	SU		1	RXB5	05/28/20	1446	1995459	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(1-2)
Project: WNUC00821
Sample ID: 510807004
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 09:47
Receive Date: 07-MAY-20
Collector: Client
Moisture: 8.03%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		1.55	0.372	1.09	mg/kg	10.1	1	JLD1	05/13/20	0423	1995671	1
Nitrate-N		232	3.61	10.9	mg/kg	10.1	10	JLD1	05/14/20	0421	1995671	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.07	0.0100	0.100	SU		1	RXB5	05/28/20	1447	1995459	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(2-4)
Project: WNUC00821
Sample ID: 510807005
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 10:15
Receive Date: 07-MAY-20
Collector: Client
Moisture: 7.57%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		135	3.72	11.0	mg/kg	10.1	10	JLD1	05/14/20	0452	1995671	1
Nitrate-N		288	3.62	11.0	mg/kg	10.1	10					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.39	0.0100	0.100	SU		1	RXB5	05/28/20	1448	1995459	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(4-6)
Project: WNUC00821
Sample ID: 510807006
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 10:45
Receive Date: 07-MAY-20
Collector: Client
Moisture: 14.3%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		21.7	0.396	1.16	mg/kg	9.98	1	JLD1	05/13/20	0525	1995671	1
Nitrate-N		440	9.60	29.1	mg/kg	9.98	25	JLD1	05/14/20	1312	1995671	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.28	0.0100	0.100	SU		1	RXB5	05/28/20	1448	1995459	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(6-8)
Project: WNUC00821
Sample ID: 510807007
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 11:51
Receive Date: 07-MAY-20
Collector: Client
Moisture: 11.4%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride	U	ND	0.377	1.11	mg/kg	9.83	1	JLD1	05/13/20	0556	1995671	1
Nitrate-N		150	1.83	5.55	mg/kg	9.83	5	JLD1	05/14/20	0656	1995671	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.67	0.0100	0.100	SU		1	RXB5	05/28/20	1449	1995459	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(8-10) Project: WNUC00821
Sample ID: 510807008 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 13:40
Receive Date: 07-MAY-20
Collector: Client
Moisture: 12.6%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride	J	0.879	0.393	1.16	mg/kg	10.1	1	JLD1	05/13/20	0626	1995671	1
Nitrate-N		54.3	0.381	1.16	mg/kg	10.1	1					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.35	0.0100	0.100	SU		1	RXB5	05/28/20	1450	1995459	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID:	HF1-B6-(0-2)	Project:	WNUC00821
Sample ID:	510807009	Client ID:	WNUC008
Matrix:	Soil		
Collect Date:	06-MAY-20 14:20		
Receive Date:	07-MAY-20		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	8.09	0.0100	0.100	SU		1	RXB5	05/28/20	1450	1995459	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B6-(2-4)
Project: WNUC00821
Sample ID: 510807010
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 14:40
Receive Date: 07-MAY-20
Collector: Client
Moisture: 3.15%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		5.67	0.348	1.02	mg/kg	9.90	1	JLD1	05/13/20	0657	1995671	1
Nitrate-N		14.5	0.337	1.02	mg/kg	9.90	1					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.35	0.0100	0.100	SU		1	RXB5	05/28/20	1452	1995459	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B6-(4-5.67) Project: WNUC00821
Sample ID: 510807011 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 15:25
Receive Date: 07-MAY-20
Collector: Client
Moisture: 4.47%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		43.8	0.350	1.03	mg/kg	9.83	1	JLD1	05/13/20	0728	1995671	1
Nitrate-N		38.0	0.339	1.03	mg/kg	9.83	1					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.22	0.0100	0.100	SU		1	RXB5	05/28/20	1454	1995459	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B7-(0-2)
Project: WNUC00821
Sample ID: 510807012
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 15:53
Receive Date: 07-MAY-20
Collector: Client
Moisture: 3.63%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		40.4	0.349	1.03	mg/kg	9.90	1	JLD1	05/13/20	0759	1995671	1
Nitrate-N		127	1.70	5.14	mg/kg	9.90	5	JLD1	05/14/20	0726	1995671	2
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.72	0.0100	0.100	SU		1	RXB5	05/28/20	1455	1995459	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

GEL LABORATORIES LLC
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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B7-(2-4)
Project: WNUC00821
Sample ID: 510807013
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 16:13
Receive Date: 07-MAY-20
Collector: Client
Moisture: 3.49%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		158	3.51	10.3	mg/kg	9.98	10	JLD1	05/14/20	0757	1995671	1
Nitrate-N		178	3.41	10.3	mg/kg	9.98	10					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.41	0.0100	0.100	SU		1	RXB5	05/28/20	1456	1995459	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B7-(4-5.42)
Sample ID: 510807014
Matrix: Soil
Collect Date: 06-MAY-20 16:31
Receive Date: 07-MAY-20
Collector: Client
Moisture: 2.69%

Project: WNUC00821
Client ID: WNUC008

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		121	1.76	5.19	mg/kg	10.1	5	JLD1	05/14/20	0828	1995671	1
Nitrate-N		83.0	1.71	5.19	mg/kg	10.1	5					
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.21	0.0100	0.100	SU		1	RXB5	05/28/20	1457	1995459	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9056A	SW846 9056A Total Anions in Soil	CJ2	05/12/20	2001	1995670

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

Company :	Westinghouse Electric Company, LLC
Address :	PO Drawer R
	Columbia, South Carolina 29205
Contact:	Ms. Cynthia Logsdon
Project:	Soil and Vegetation Analysis

Client Sample ID:	HF1-B7-Refusal	Project:	WNUC00821
Sample ID:	510807015	Client ID:	WNUC008
Matrix:	Soil		
Collect Date:	06-MAY-20 16:31		
Receive Date:	07-MAY-20		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.58	0.0100	0.100	SU		1	RXB5	05/28/20	1458	1995459	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9045D	

Notes:

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B4-(1-2) Project: WNUC00821
Sample ID: 510807001 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 08:23
Receive Date: 07-MAY-20
Collector: Client
Moisture: 1.89%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		563	+/-16.4	0.997	0.500	pCi/g			MP2	05/11/20	1421	1995498	1
Uranium-235/236		29.0	+/-4.16	0.937	0.500	pCi/g							
Uranium-238		110	+/-7.26	0.595	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-0.924	+/-2.26	4.01	1.00	pCi/g			JJ3	05/17/20	0509	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			25.9	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			95.1	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Company : Westinghouse Electric Company, LLC
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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B4-(2-4) Project: WNUC00821
Sample ID: 510807002 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 08:35
Receive Date: 07-MAY-20
Collector: Client
Moisture: 1.71%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		511	+/-14.7	0.721	0.500	pCi/g			MP2	05/11/20	1421	1995498	1
Uranium-235/236		22.1	+/-3.41	0.408	0.500	pCi/g							
Uranium-238		105	+/-6.66	0.771	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.171	+/-2.45	4.26	1.00	pCi/g			JJ3	05/17/20	0525	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			24.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			89.2	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B4-(4-5.33) Project: WNUC00821
Sample ID: 510807003 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 08:55
Receive Date: 07-MAY-20
Collector: Client
Moisture: 4.19%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		700	+/-17.4	0.789	0.500	pCi/g			MP2	05/11/20	1421	1995498	1
Uranium-235/236		31.9	+/-4.14	0.668	0.500	pCi/g							
Uranium-238		139	+/-7.78	0.790	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	2.60	+/-2.27	3.78	1.00	pCi/g			JJ3	05/17/20	0542	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			25.4	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			91.7	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(1-2) Project: WNUC00821
Sample ID: 510807004 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 09:47
Receive Date: 07-MAY-20
Collector: Client
Moisture: 8.03%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		9.36	+/-0.963	0.221	0.500	pCi/g			MP2	05/11/20	1421	1995498	1
Uranium-235/236		0.396	+/-0.242	0.233	0.500	pCi/g							
Uranium-238		2.56	+/-0.505	0.141	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-2.14	+/-2.33	4.21	1.00	pCi/g			JJ3	05/17/20	0559	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			109	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			92.4	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Address : PO Drawer R

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(2-4) Project: WNUC00821
Sample ID: 510807005 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 10:15
Receive Date: 07-MAY-20
Collector: Client
Moisture: 7.57%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1520	+/-51.1	2.49	0.500	pCi/g			MP2	05/11/20	1421	1995498	1
Uranium-235/236		82.8	+/-13.3	2.81	0.500	pCi/g							
Uranium-238		246	+/-20.6	2.55	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.79	+/-2.17	3.91	1.00	pCi/g			JJ3	05/17/20	0615	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			17.9	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.9	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(4-6) Project: WNUC00821
Sample ID: 510807006 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 10:45
Receive Date: 07-MAY-20
Collector: Client
Moisture: 14.3%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1250	+/-36.4	1.81	0.500	pCi/g			MP2	05/11/20	1421	1995498	1
Uranium-235/236		50.9	+/-8.19	1.84	0.500	pCi/g							
Uranium-238		224	+/-15.4	1.70	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.41	+/-2.27	4.05	1.00	pCi/g			JJ3	05/17/20	0632	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			25.9	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			92.8	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(6-8) Project: WNUC00821
Sample ID: 510807007 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 11:51
Receive Date: 07-MAY-20
Collector: Client
Moisture: 11.4%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		9.67	+/-1.23	0.417	0.500	pCi/g			MP2	05/11/20	1410	1995498	1
Uranium-235/236		0.587	+/-0.346	0.147	0.500	pCi/g							
Uranium-238		1.61	+/-0.510	0.277	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-2.28	+/-2.21	4.02	1.00	pCi/g			JJ3	05/17/20	0648	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			89.5	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			95.2	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B5-(8-10) Project: WNUC00821
Sample ID: 510807008 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 13:40
Receive Date: 07-MAY-20
Collector: Client
Moisture: 12.6%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		2.65	+/-0.665	0.327	0.500	pCi/g			MP2	05/11/20	1410	1995498	1
Uranium-235/236		0.294	+/-0.267	0.245	0.500	pCi/g							
Uranium-238		1.02	+/-0.424	0.306	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-2.91	+/-2.17	3.98	1.00	pCi/g			JJ3	05/17/20	0705	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			81.8	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.7	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B6-(2-4) Project: WNUC00821
Sample ID: 510807010 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 14:40
Receive Date: 07-MAY-20
Collector: Client
Moisture: 3.15%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		403	+/-12.7	0.905	0.500	pCi/g			MP2	05/11/20	1410	1995498	1
Uranium-235/236		19.3	+/-3.11	0.618	0.500	pCi/g							
Uranium-238		78.5	+/-5.62	0.808	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.66	+/-2.31	4.14	1.00	pCi/g			JJ3	05/17/20	0721	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			32.9	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.7	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B6-(4-5.67) Project: WNUC00821
Sample ID: 510807011 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 15:25
Receive Date: 07-MAY-20
Collector: Client
Moisture: 4.47%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		226	+/-9.28	0.962	0.500	pCi/g			MP2	05/11/20	1410	1995498	1
Uranium-235/236		9.66	+/-2.16	0.805	0.500	pCi/g							
Uranium-238		41.6	+/-3.99	0.858	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.09	+/-2.26	4.01	1.00	pCi/g			JJ3	05/17/20	0738	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			34.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			97.1	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B7-(0-2)
Project: WNUC00821
Sample ID: 510807012
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 15:53
Receive Date: 07-MAY-20
Collector: Client
Moisture: 3.63%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		2140	+/-68.1	4.07	0.500	pCi/g			MP2	05/21/20	1152	1998535	1
Uranium-235/236		93.5	+/-15.9	2.09	0.500	pCi/g							
Uranium-238		313	+/-26.1	2.92	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.90	+/-2.17	3.91	1.00	pCi/g			JJ3	05/17/20	0754	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			90.4	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			97	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B7-(2-4) Project: WNUC00821
Sample ID: 510807013 Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 16:13
Receive Date: 07-MAY-20
Collector: Client
Moisture: 3.49%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		2020	+/-59.9	3.64	0.500	pCi/g			MP2	05/21/20	1152	1998535	1
Uranium-235/236		92.0	+/-14.3	2.73	0.500	pCi/g							
Uranium-238		355	+/-25.1	1.97	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	3.15	+/-2.40	3.97	1.00	pCi/g			JJ3	05/17/20	0811	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			94.8	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			97.3	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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

Certificate of Analysis

Report Date: June 4, 2020

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

Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF1-B7-(4-5.42)
Project: WNUC00821
Sample ID: 510807014
Client ID: WNUC008
Matrix: Soil
Collect Date: 06-MAY-20 16:31
Receive Date: 07-MAY-20
Collector: Client
Moisture: 2.69%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		799	+/-26.9	1.88	0.500	pCi/g			MP2	05/11/20	1410	1995498	1
Uranium-235/236		46.5	+/-7.24	1.37	0.500	pCi/g							
Uranium-238		158	+/-12.0	1.40	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.627	+/-2.37	4.09	1.00	pCi/g			JJ3	05/17/20	0827	1995744	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	05/07/20	1252	1995477

The following Analytical Methods were performed:

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

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Soil/Veg "Dry Weight Corrected"			29.4	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.1	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

QC Summary

Report Date: June 4, 2020

Westinghouse Electric Company, LLC
PO Drawer R
Columbia, South Carolina

Contact: **Ms. Cynthia Logsdon**

Workorder: **510807**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 1995671										
QC1204557905 510807001 DUP										
Fluoride		65.8		65.1	mg/kg	1.06		(0%-109%)	JLD1	05/13/20 11:04
Nitrate-N		69.3		68.5	mg/kg	1.27		(0%-104%)		
QC1204557906 510807002 DUP										
Fluoride		335		340	mg/kg	1.66		(0%-109%)		05/14/20 11:08
Nitrate-N		70.4		70.3	mg/kg	0.148		(0%-104%)		05/14/20 02:49
QC1204557904 LCS										
Fluoride	25.1			25.0	mg/kg		99.4	(90%-110%)		05/12/20 22:44
Nitrate-N	25.1			24.4	mg/kg		97.2	(90%-110%)		
QC1204557903 MB										
Fluoride			U	ND	mg/kg					05/12/20 22:13
Nitrate-N			U	ND	mg/kg					
QC1204557907 510807001 MS										
Fluoride	25.1	65.8		94.2	mg/kg		113	(75%-125%)		05/13/20 11:35
Nitrate-N	25.1	69.3		95.2	mg/kg		103	(75%-125%)		
QC1204557908 510807002 MS										
Fluoride	25.7	335		353	mg/kg		N/A	(75%-125%)		05/14/20 12:41
Nitrate-N	25.7	70.4		95.9	mg/kg		99.6	(75%-125%)		05/14/20 03:20

QC Summary

Workorder: **510807**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Titration and Ion Analysis											
Batch 1995459											
QC1204557582 510807001 DUP											
Corrosivity	H	5.46	H	6.08	SU	10.7*		(0%-10%)	RXB5	05/28/20	14:40
QC1204557583 510807002 DUP											
Corrosivity	H	3.97	H	3.98	SU	0.252		(0%-10%)		05/28/20	14:44
QC1204557581 LCS											
Corrosivity	7.00			7.00	SU		100	(95%-105%)		05/28/20	14:38

Notes:

The Qualifiers in this report are defined as follows:

<	Result is less than value reported
>	Result is greater than value reported
B	The target analyte was detected in the associated blank.
E	General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
H	Analytical holding time was exceeded
J	See case narrative for an explanation
J	Value is estimated
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	Per section 9.3.4.1 of Method 1664 Revision B, due to matrix spike recovery issues, this result may not be reported or used for regulatory compliance purposes.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Z	Paint Filter Test--Particulates passed through the filter, however no free liquids were observed.
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
d	5-day BOD--The 2:1 depletion requirement was not met for this sample
e	5-day BOD--Test replicates show more than 30% difference between high and low values. The data is qualified per the method and can be used for reporting purposes
h	Preparation or preservation holding time was exceeded

QC Summary

Workorder: **510807**

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.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance 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.
* Indicates that a Quality Control parameter was not within specifications.
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.

QC Summary

Report Date: June 4, 2020

Westinghouse Electric Company, LLC
PO Drawer R
Columbia, South Carolina

Contact: **Ms. Cynthia Logsdon**

Workorder: **510807**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1995498										
QC1204557617 510807001 DUP										
Uranium-233/234		563		534	pCi/g	5.32		(0%-20%)	MP2	05/11/20 14:10
	Uncertainty	+/-16.4		+/-18.5						
Uranium-235/236		29.0		22.9	pCi/g	23.7*		(0%-20%)		
	Uncertainty	+/-4.16		+/-4.29						
Uranium-238		110		98.1	pCi/g	11.7		(0%-20%)		
	Uncertainty	+/-7.26		+/-7.94						
QC1204557618 LCS										
Uranium-233/234				11.6	pCi/g					05/11/20 14:10
	Uncertainty			+/-1.29						
Uranium-235/236				0.461	pCi/g					
	Uncertainty			+/-0.321						
Uranium-238	12.3			12.1	pCi/g		98.8	(75%-125%)		
	Uncertainty			+/-1.31						
QC1204557616 MB										
Uranium-233/234			U	0.0886	pCi/g					05/11/20 14:10
	Uncertainty			+/-0.216						
Uranium-235/236			U	0.151	pCi/g					
	Uncertainty			+/-0.191						
Uranium-238			U	0.211	pCi/g					
	Uncertainty			+/-0.209						
Batch 1998535										
QC1204564487 510807012 DUP										
Uranium-233/234		2140		1770	pCi/g	19		(0%-20%)	MP2	05/21/20 11:52
	Uncertainty	+/-68.1		+/-56.9						
Uranium-235/236		93.5		81.2	pCi/g	14.1		(0%-20%)		
	Uncertainty	+/-15.9		+/-13.6						
Uranium-238		313		276	pCi/g	12.6		(0%-20%)		
	Uncertainty	+/-26.1		+/-22.5						

QC Summary

Workorder: **510807**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1998535										
QC1204564488 LCS										
Uranium-233/234				104	pCi/g				MP2	05/21/20 09:49
	Uncertainty			+/-11.8						
Uranium-235/236				4.86	pCi/g					
	Uncertainty			+/-3.01						
Uranium-238	109			101	pCi/g		92.4	(75%-125%)		
	Uncertainty			+/-11.6						
QC1204564486 MB										
Uranium-233/234			U	-0.479	pCi/g					05/21/20 11:52
	Uncertainty			+/-0.824						
Uranium-235/236			U	0.500	pCi/g					
	Uncertainty			+/-1.39						
Uranium-238			U	-0.104	pCi/g					
	Uncertainty			+/-0.812						
Rad Liquid Scintillation										
Batch 1995744										
QC1204558065 510807001 DUP										
Technetium-99	U	-0.924	U	-0.568	pCi/g	N/A		N/A	JJ3	05/17/20 09:01
	Uncertainty	+/-2.26		+/-2.24						
QC1204558066 LCS										
Technetium-99	55.0			49.6	pCi/g		90.2	(75%-125%)		05/17/20 09:17
	Uncertainty			+/-3.46						
QC1204558064 MB										
Technetium-99			U	-1.71	pCi/g					05/17/20 08:44
	Uncertainty			+/-1.93						

Notes:

Counting Uncertainty is 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

QC Summary

Workorder: **510807**

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

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

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.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance 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.
* Indicates that a Quality Control parameter was not within specifications.
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.

Technical Case Narrative
Westinghouse Electric Co, LLC
SDG #: 510807

General Chemistry

Product: **Ion Chromatography**
Analytical Method: SW846 9056A
Analytical Procedure: GL-GC-E-086 REV# 27
Analytical Batches: 1995671 and 1995670

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

GEL Sample ID#	Client Sample Identification
510807001	HF1-B4-(1-2)
510807002	HF1-B4-(2-4)
510807003	HF1-B4-(4-5.33)
510807004	HF1-B5-(1-2)
510807005	HF1-B5-(2-4)
510807006	HF1-B5-(4-6)
510807007	HF1-B5-(6-8)
510807008	HF1-B5-(8-10)
510807010	HF1-B6-(2-4)
510807011	HF1-B6-(4-5.67)
510807012	HF1-B7-(0-2)
510807013	HF1-B7-(2-4)
510807014	HF1-B7-(4-5.42)
1204557903	Method Blank (MB)
1204557904	Laboratory Control Sample (LCS)
1204557905	510807001(HF1-B4-(1-2)) Sample Duplicate (DUP)
1204557906	510807002(HF1-B4-(2-4)) Sample Duplicate (DUP)
1204557907	510807001(HF1-B4-(1-2)) Matrix Spike (MS)
1204557908	510807002(HF1-B4-(2-4)) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" 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

Sample Dilutions
The following samples 1204557905 (HF1-B4-(1-2)DUP), 1204557906 (HF1-B4-(2-4)DUP), 1204557907 (HF1-B4-(1-2)MS), 1204557908 (HF1-B4-(2-4)MS), 510807001 (HF1-B4-(1-2)), 510807002 (HF1-B4-(2-4)), 510807003 (HF1-B4-(4-5.33)), 510807004 (HF1-B5-(1-2)), 510807005 (HF1-B5-(2-4)), 510807006 (HF1-B5-(4-6)), 510807007 (HF1-B5-(6-8)), 510807012 (HF1-B7-(0-2)), 510807013 (HF1-B7-(2-4)) and 510807014 (HF1-B7-(4-5.42)) were diluted because target analyte concentrations exceeded the calibration range. Dilutions may be required for many reasons, including to minimize matrix interferences or to bring over range target analyte concentrations into the linear calibration range.

Analyte	510807									
	001	002	003	004	005	006	007	012	013	014
Fluoride	5X	10X	10X	1X	10X	1X	1X	1X	10X	5X
Nitrate	5X	5X	10X	10X	10X	25X	5X	5X	10X	5X

Sample Re-analysis
Sample510807006 (HF1-B5-(4-6)) was re-analyzed to verify the result.

Product: pH
Analytical Method: SW846 9045D
Analytical Procedure: GL-GC-E-008 REV# 24
Analytical Batch: 1995459

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

GEL Sample ID#	Client Sample Identification
510807001	HF1-B4-(1-2)
510807002	HF1-B4-(2-4)
510807003	HF1-B4-(4-5.33)
510807004	HF1-B5-(1-2)
510807005	HF1-B5-(2-4)
510807006	HF1-B5-(4-6)
510807007	HF1-B5-(6-8)
510807008	HF1-B5-(8-10)
510807009	HF1-B6-(0-2)
510807010	HF1-B6-(2-4)
510807011	HF1-B6-(4-5.67)
510807012	HF1-B7-(0-2)
510807013	HF1-B7-(2-4)
510807014	HF1-B7-(4-5.42)
510807015	HF1-B7-Refusal
1204557581	Laboratory Control Sample (LCS)
1204557582	510807001(HF1-B4-(1-2)) Sample Duplicate (DUP)
1204557583	510807002(HF1-B4-(2-4)) Sample Duplicate (DUP)

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

Duplicate Relative Percent Difference (RPD) Statement
The Relative Percent Difference (RPD) between the sample and duplicate falls outside of the established acceptance limits because of the heterogeneous matrix of the sample:

Analyte	Sample	Value

Corrosivity	1204557582 (HF1-B4-(1-2)DUP)	10.7* (0%-10%)

Technical Information

Holding Times
Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1204557582 (HF1-B4-(1-2)DUP)		Received 07-MAY-20, out of holding 06-MAY-20
1204557583 (HF1-B4-(2-4)DUP)		Received 07-MAY-20, out of holding 06-MAY-20
510807001 (HF1-B4-(1-2))		Received 07-MAY-20, out of holding 06-MAY-20
510807002 (HF1-B4-(2-4))		Received 07-MAY-20, out of holding 06-MAY-20
510807003 (HF1-B4-(4-5.33))		Received 07-MAY-20, out of holding 06-MAY-20
510807004 (HF1-B5-(1-2))		Received 07-MAY-20, out of holding 06-MAY-20
510807005 (HF1-B5-(2-4))		Received 07-MAY-20, out of holding 06-MAY-20
510807006 (HF1-B5-(4-6))		Received 07-MAY-20, out of holding 06-MAY-20
510807007 (HF1-B5-(6-8))		Received 07-MAY-20, out of holding 06-MAY-20
510807008 (HF1-B5-(8-10))		Received 07-MAY-20, out of holding 06-MAY-20
510807009 (HF1-B6-(0-2))		Received 07-MAY-20, out of holding 06-MAY-20
510807010 (HF1-B6-(2-4))		Received 07-MAY-20, out of holding 06-MAY-20
510807011 (HF1-B6-(4-5.67))		Received 07-MAY-20, out of holding 06-MAY-20
510807012 (HF1-B7-(0-2))		Received 07-MAY-20, out of holding 06-MAY-20
510807013 (HF1-B7-(2-4))		Received 07-MAY-20, out of holding 06-MAY-20
510807014 (HF1-B7-(4-5.42))		Received 07-MAY-20, out of holding 06-MAY-20
510807015 (HF1-B7-Refusal)		Received 07-MAY-20, out of holding 06-MAY-20

Radiochemistry

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 27
Analytical Batch: 1995498

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1995477

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

GEL Sample ID#	Client Sample Identification
510807001	HF1-B4-(1-2)
510807002	HF1-B4-(2-4)
510807003	HF1-B4-(4-5.33)
510807004	HF1-B5-(1-2)
510807005	HF1-B5-(2-4)
510807006	HF1-B5-(4-6)
510807007	HF1-B5-(6-8)
510807008	HF1-B5-(8-10)
510807010	HF1-B6-(2-4)
510807011	HF1-B6-(4-5.67)
510807014	HF1-B7-(4-5.42)
1204557616	Method Blank (MB)
1204557617	510807001(HF1-B4-(1-2)) Sample Duplicate (DUP)
1204557618	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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
1204557617 (HF1-B4-(1-2)DUP)	Uranium-235/236	RPD 23.7* (0.00%-20.00%) RER 1.08 (0-3)

Miscellaneous Information

Manual Integration
Manual integration of alpha spectroscopy spectra 510807014 (HF1-B7-(4-5.42)) was performed to fully separate counts in Regions of Interest which would have been biased.

Additional Comments
The tracer peak centroid for sample 510807014 (HF1-B7-(4-5.42)) is greater than 50 keV from the expected library energy value for the tracer; however, the tracer yield requirement was met and the tracer peak is within the tracer region of interest.

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified

Analytical Procedure: GL-RAD-A-011 REV# 27
Analytical Batch: 1998535

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1995477

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

GEL Sample ID#	Client Sample Identification
510807012	HF1-B7-(0-2)
510807013	HF1-B7-(2-4)
1204564486	Method Blank (MB)
1204564487	510807012(HF1-B7-(0-2)) Sample Duplicate (DUP)
1204564488	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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

RDL Met
The blank (See Below) did not meet the detection limit due to keeping the blank volume consistent with the other sample aliquots.

Sample	Analyte	Value
1204564486 (MB)	Uranium-233/234	Result -0.479 < MDA 2.7 > RDL 0.5 pCi/g
	Uranium-235/236	Result 0.5 < MDA 1.5 > RDL 0.5 pCi/g
	Uranium-238	Result -0.104 < MDA 1.93 > RDL 0.5 pCi/g

Product: **Dry Weight**
Preparation Method: ASTM D 2216 (Modified)
Preparation Procedure: GL-OA-E-020 REV# 13
Preparation Batch: 1995477

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1995477

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

GEL Sample ID#	Client Sample Identification
510807001	HF1-B4-(1-2)
510807002	HF1-B4-(2-4)
510807003	HF1-B4-(4-5.33)
510807004	HF1-B5-(1-2)
510807005	HF1-B5-(2-4)
510807006	HF1-B5-(4-6)
510807007	HF1-B5-(6-8)
510807008	HF1-B5-(8-10)
510807010	HF1-B6-(2-4)
510807011	HF1-B6-(4-5.67)
510807012	HF1-B7-(0-2)
510807013	HF1-B7-(2-4)
510807014	HF1-B7-(4-5.42)
1204557593	510807001(HF1-B4-(1-2)) Sample Duplicate (DUP)

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: 1995744

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

GEL Sample ID#	Client Sample Identification
510807001	HF1-B4-(1-2)
510807002	HF1-B4-(2-4)
510807003	HF1-B4-(4-5.33)
510807004	HF1-B5-(1-2)
510807005	HF1-B5-(2-4)
510807006	HF1-B5-(4-6)
510807007	HF1-B5-(6-8)
510807008	HF1-B5-(8-10)
510807010	HF1-B6-(2-4)
510807011	HF1-B6-(4-5.67)
510807012	HF1-B7-(0-2)
510807013	HF1-B7-(2-4)
510807014	HF1-B7-(4-5.42)
1204558064	Method Blank (MB)
1204558065	510807001(HF1-B4-(1-2)) Sample Duplicate (DUP)
1204558066	Laboratory Control Sample (LCS)

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.

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 2

GEL Quote #:

COC Number (1):

PO Number: 4500799254

510807

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

Chain of Custody and Analytical Request

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

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

Client Name: Westinghouse Phone # 803.497.7062

Project/Site Name: Project # HF Spiking Station #1 Soil Sampling Fax #

Address: 5801 Bluff Road, Hopkins, SC 29061

Collected By: R. Crews RCrews Send Results To: joynerdp@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	pH	Fluoride	moisture content	Nitrate	Isotopic U (alpha spec)	Tc-99					<-- Preservative Type (6)
HF1-B4-(1-2)	5/6/2020	0823		N/A	SO			1	X	X	X	X	X	X					Comments Note: extra sample is required for sample specific QC
HF1-B4-(2-4)	5/6/2020	0835		N/A	SO			1	X	X	X	X	X	X					
HF1-B4-(4-5.33)	5/6/2020	0855		N/A	SO			1	X	X	X	X	X	X					
HF1-B5-(1-2)	5/6/2020	0947		N/A	SO			1	X	X	X	X	X	X					
HF1-B5-(2-4)	5/6/2020	1015		N/A	SO			1	X	X	X	X	X	X					Please note that MDC for Tc-99 should be 5 pCi/g
HF1-B5-(4-6)	5/6/2020	1045		N/A	SO			1	X	X	X	X	X	X					
HF1-B5-(6-8)	5/6/2020	1151		N/A	SO			1	X	X	X	X	X	X					
HF1-B5-(8-10)	5/6/2020	1340		N/A	SO			1	X	X	X	X	X	X					

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1 Randy Crews RCrews	5/7/2020	1015	1 Stacy Bowen	5/7/20	1015
2			2		
3			3		

TAT Requested: **Normal:** X **Rush:** ____ **Specify:** ____ **(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:*** 4 °C

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

Sample Collection Time Zone: [X] 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.)*

Page: 2 of 2

GEL Quote #: _____

COC Number (1): _____

PO Number: 4500799254

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

Chain of Custody and Analytical Request

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

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407

Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: Westinghouse Phone # 803.497.7062

Project/Site Name: Project # HF Spiking Station #1 Soil Sampling Fax #

Address: 5801 Bluff Road, Hopkins, SC 29061

Collected By: R. Crews RCrews Send Results To: joynerdp@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	pH	Fluoride	moisture content	Nitrate	Isotopic U (alpha spec	Tc-99					<-- Preservative Type (6)
HF1-B6-(0-2)	5/6/2020	1420		N/A	SO			1	X										
HF1-B6-(2-4)	5/6/2020	1440		N/A	SO			1	X	X	X	X	X	X					
HF1-B6-(4-5.67)	5/6/2020	1525		N/A	SO			1	X	X	X	X	X	X					
HF1-B7-(0-2)	5/6/2020	1553		N/A	SO			1	X	X	X	X	X	X					
HF1-B7-(2-4)	5/6/2020	1613		N/A	SO			1	X	X	X	X	X	X					
HF1-B7-(4-5.42)	5/6/2020	1631		N/A	SO			1	X	X	X	X	X	X					
HF1-B7-Refusal	5/6/2020	1631		N/A	SO			1	X										

Comments
Note: extra sample is required for sample specific QC

Please note that MDC for Tc-99 should be 5 pCi/g

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1 Randy Crews	RCrews 5/7/2020	1015	1 Stacy Boone	5/7/20	1015
2			2		
3			3		

TAT Requested: **Normal: X** **Rush: ____** **Specify: _____** **(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:*** 4 °C

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

***Sample Collection Time Zone*:** [X] 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

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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**).

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RCRA Metals
As = Arsenic **Hg**= Mercury
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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

Client: WNUC	SDG/AR/COC/Work Order: 510807
Received By: S L BOONE	Date Received: MAY 7, 2020
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)?*	✓			Preservation Method: Wet Ice Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: 4 °C
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR1-19 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?	✓			
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 NRG Date 5/7/20 Page 1 of 1

GL-CHL-SR-001 Rev 6

List of current GEL Certifications as of 04 June 2020

State	Certification
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	SC000122020−1
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	T104704235−20−17
Utah NELAP	SC000122020−32
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Technical Basis Document

Evaluation of Dose and Risk from Uranium in Soil at HF Spiking Station #1 at the Westinghouse Columbia Fuel Fabrication Facility (CFFF)

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

Kevin M Harris, PE
Sr. Environmental Engineer

July 2020

PURPOSE

The purpose of this Technical Basis Document (TBD) is to evaluate the risk and dose to the industrial worker at Spiking Station #1 resulting from residual uranium beneath the concrete floor.

Since the WCFFF is an operating manufacturing plant, the levels do not need to be reflective of an unrestricted use area (10 CFR 20.1402), as would be required for decommissioning, but rather, should be established to protect the workers, be as low as reasonably achievable (ALARA), and be protective of the environment to prevent leaching of residual uranium into groundwater.

HF Spiking Station #1:

In May of 2020, as part of the floor replacement beneath Spiking Station #1, soil samples were collected to evaluate the subsurface conditions. Samples were taken from 2-foot intervals from 7 locations beneath the concrete floor of Spiking Station #1. Soil was collected to a depth of 10 feet, except in cases where the sampling device encountered refusal (HF1-B4, -B6, and B7). Two of the sample locations were set at an angle to intercept the known footing (HF1-B6 and –B7). Soil samples were submitted to GEL Laboratories for isotopic Uranium (U) and Technetium -99 (Tc-99) analysis along with corrosivity, fluoride, nitrate, and moisture content. This report focuses on the radiological contaminants U and Tc-99; however, it was noted that neither fluoride nor nitrate exceeded the CFFF action levels (Procedure RA-433) shown in Table 1 below.

Table 1. CFFF Action Levels from Procedure RA-433

Contaminant	Action Level	Basis of Action Level
Uranium – 234	3,310 pCi/g	NUREG 1757, Appendix H[1]
Uranium – 235	39 pCi/g	NUREG 1757, Appendix H[1]
Uranium – 238	179 pCi/g	NUREG 1757, Appendix H[1]
Technetium – 99	89,400 pCi/g	NUREG 1757, Appendix H[1]
Tetrachloroethylene (PCE)	100 mg/kg	EPA Regional Screening Levels[2]
Fluoride	3,100 mg/kg	EPA Regional Screening Levels[3]
Nitrate	130,000 mg/kg	EPA Regional Screening Levels[3]

[1] NUREG Vol. 1, Rev. 2, Consolidated Decommissioning Guide, Appendix H: Memorandum of Understanding between the Environmental Protection Agency and the Nuclear Regulatory Commission, Final Report, September 2006. The individual isotope limits are based on carcinogenic risk.

[2] USEPA Regional Screening Level, Summary Table, Industrial Soil Standard (TR=1E-06, HQ=1), November 2018.

[3] USEPA Regional Screening Level, Summary Table, Residential Soil Standard (TR=1E-06, HQ=1), November 2018.

Tc-99 results were non-detect and further evaluation of Tc-99 was not warranted. Uranium results showed exceedances of the CFFF action levels triggering an evaluation of the residual contamination.

Because multiple isotopes of uranium were detected in the soil samples, a “sum of fractions” or SOF approach was used to determined compliance. The Sum of Fractions screening was initially compared to the SSLs presented in Table 2 of Procedure RA-433. Six of the seven sample locations contained sample intervals with SOF calculations exceeding 1.0. Therefore, the laboratory results for each samples were then compared to the action levels provided in Table 1 above [from Table 4 of procedure RA-433 (Section 5.2.4

E)]. The SOF for each soil sample was calculated using the concentration for each isotope and the Action Level for each isotope. The calculation for each unique sample used the following equation:

$$SOF = \frac{conc.\ of\ U234}{3{,}310} + \frac{conc.of\ U235}{39} + \frac{conc.of\ U238}{179}$$

A SOF result exceeding 1.0 indicates that the action levels have not been met. SOF calculations for each sample interval are shown in Table 2, with SOF calculations exceeding 1.0 in bold. All sample locations, with the exception of HF1-B2, had at least one sample interval where the SOF exceeded 1.0. Since both individual isotopes exceeded action levels and sample locations exceeded an SOF of 1.0, further evaluation of the effects of leaving residual uranium beneath the spiking station was warranted.

Per RA-433, further evaluation included:

- Calculation of dose and risk under the current circumstances (industrial worker scenario);
- Evaluation of the potential for off-site impacts if the contamination is left in place; and
- Assessment of the site conditions and future use of the area.

CALCULATION OF DOSE AND RISK

RESRAD-ONSITE Version 7.2 was used to calculate potential dose and risk to the evaluated receptor. 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).

Uranium was detected in all the samples collected from the soil under Spiking Station #1. Three of the seven sample locations (HF1-B2, HF1-B4, and HF1-B6) did not have samples that exceeded the Action Level. The remaining four locations (HF1-B1, HF1-B3, HF1-B5, and HF1-B7) had at least one sample interval where the levels of uranium exceeded the action level for at least one isotope. Figure 1 below shows the sample locations within the HSFF#1 footprint. Table 2 below contains the isotopic uranium results for the samples collected. Exceedances of the action levels are shown in bold typeface.

Figure 1. Location of Samples for Spiking Station #1

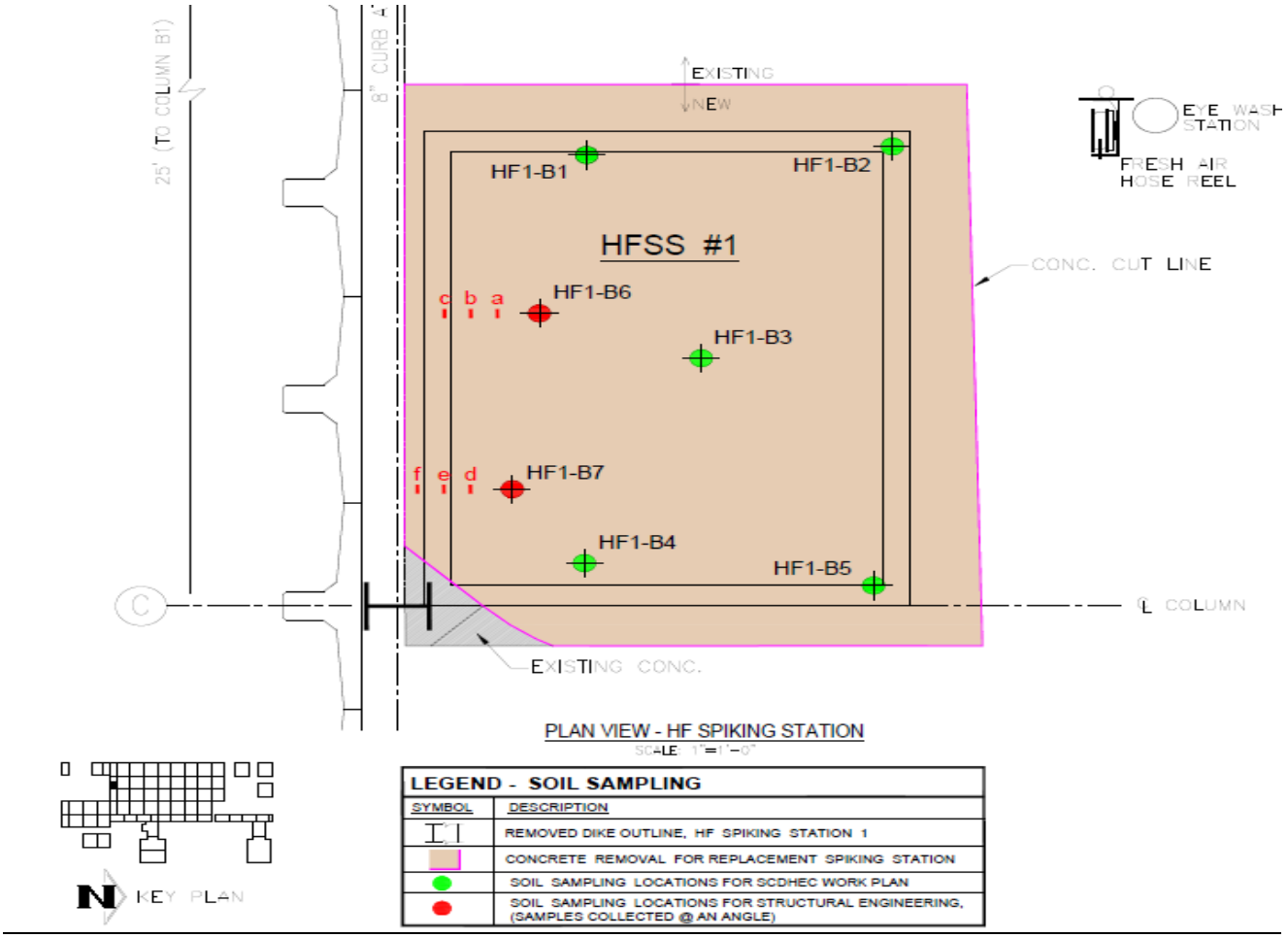

Table 2. Uranium Results from Soil beneath Spiking Station #1

	Analyte	Uranium-233/234	Uranium-235/236	Uranium-238	Calculated
	Unit	pCi/g	pCi/g	pCi/g	SOF
Location	**Depth BSS**	Action Level = 3310	Action Level = 39	Action Level = 179	
HF1-B1	**1 - 2 ft**	13.2	0.828	3.22	0.04
	2 - 4 ft	**8310**	**465**	**1620**	**23.48**
	4 - 6 ft	**10100**	**436**	**1680**	**23.62**
	6 - 8 ft	**4500**	**252**	**802**	**12.30**
	8 - 10 ft	1440	**79.4**	**263**	**3.94**
HF1-B2	**1 - 2 ft**	4.65	0.455	1.39	0.02
	2 - 4 ft	0.847	0.107 U	0.785	0.01
	4 - 6 ft	1.5	0.0943 U	0.955	0.01
	6 - 8 ft	0.926	0.0131 U	0.218	0.00
	8 - 10 ft	1.52	0.0407 U	0.421	0.00
HF1-B3	**1 - 2 ft**	3.52	0.0795 U	1.13	0.01
	2 - 4 ft	**3510**	**159**	**582**	**8.39**
	4 - 6 ft	**5600**	**264**	**948**	**13.76**
	6 - 8 ft	2790	**171**	**632**	**8.76**
	8 - 10 ft	2600	**139**	**636**	**7.90**
HF1-B4	**1 - 2 ft**	563	29	110	**1.53**
	2 - 4 ft	511	22.1	105	**1.31**
	4 - 5.33 ft	700	31.9	139	**1.81**
HF1-B5	**1 - 2 ft**	9.36	0.396	2.56	0.03
	2 - 4 ft	1520	**82.8**	**246**	**3.96**
	4 - 6 ft	1250	**50.9**	**224**	**2.93**
	6 - 8 ft	9.67	0.587	1.61	0.03
	8 - 10 ft	2.65	0.294	1.02	0.01
HF1-B6	**"b" 1.90-3.79 ft**	403	19.3	78.5	0.00
	"c" 3.79-5.37 ft	226	9.66	41.6	**1.06**
HF1-B7	**"d" 0 – 1.88 ft**	2140	**93.5**	**313**	0.55
	"e" 1.88-3.75 ft	2020	**92**	**355**	**4.79**
	"f" 3.75-5.08 ft	799	**46.5**	158	**4.95**

Contaminated Zone:

In order to calculate the dose and risk using RESRAD-ONSITE, an estimate of the residual contamination needed to be calculated. Because the contamination is not homogeneous either vertically or horizontally, it was determined that the model would be based on 2 foot thick layers of impacted soil. The residual U in each layer was conservatively estimated by calculating the 95% Upper Confidence Level (UCL) for each 2-foot interval. The 95% UCL provides a reasonable confidence that the true concentration average will not be underestimated. This is important given the heterogeneity of the material and the variability of the sampling results. The RESRAD-ONSITE model was then executed for each 2-foot layer and the dose and risk contribution from each layer was summed to account for a total dose and risk. The 95% UCL concentrations of U-isotopes used for each 2-foot layer are shown in Table 3.

Table 3. 95% UCL Calculation for Each Soil Layer

Layer	U -234 (pCi/g) 95% UCL	U -235 (pCi/g) 95% UCL	U -238 (pCi/g) 95% UCL
0 – 2 feet	1352.42	60.0	203.87
2 – 4 feet	5004.15	269.56	946.10
4 – 6 feet	6175.21	273.27	1036.23
6 – 8 feet	5348.61	306.94	1026.03
8 – 10 feet	3012.18	162.07	703.33

Protective Cover

At HF Spiking Station #1, the residual concentrations of U are beneath a minimum 6-inch layer of concrete, which forms the floor beneath the spiking station. As each layer was modeled, the protective cover included the 6-inch concrete layer and the depth of overlying soil. For example, the 0 to 2-foot interval was modeled with only the concrete floor as a cover, while the 2-4 foot layer was modeled with the concrete floor plus 2 feet of soil. This process was continued until the final layer (8-10 feet) was modeled with the concrete and 8 feet of soil.

Additionally, the concrete floor within the spiking station diked area will have a chemical resistant non-permeable coating covering the floor and the dike once restored. This coating will be a Milimar Coatings 6200 FS, which is a highly chemical resistant, multi-layered Novolac Vinyl Ester laminate flooring system, built up to approximately ¼ inch (250 mils) thick. The monolithic surface is resistant to concentrated chemicals, thermal shock and abrasion. This coating creates not only a barrier for chemical migration downward into the concrete, but also prevents upward radon migration through the concrete floor and into the indoor air. However, for conservativeness, no credit was taken for this coating during the dose and risk calculations for the spiking station.

The radon pathway was set as active for the dose and risk modeling. It is understood that there are relative uncertainties of the model predictions for radon; however, the predictions are still valuable in estimating the protectiveness. RESRAD-ONSITE does contain parameters that can be adjusted to specific building design characteristics, but actual radon migration does not necessarily adhere to the parameters and transport mechanisms within the model. Indoor radon concentrations are driven by meteorological conditions, indoor heating and air conditioning practices, local geological characteristics, structural air spaces and airflow conduits, seasonal variances, and other factors. For this TBD, the default RESRAD parameters for radon were used with the exception of the air changes per hour, and wind speed. Spiking Station #1 is located in an area of the facility that is kept under negative air pressure. The actual air changes with the area are maintained at a minimum of 6 per hour, versus the default of 0.5 air changes per hour in the RESRAD model. Also, the wind speed parameter, found on the "Cover and Contaminated Zone Hydrological Data" window within the program model, is used for radon dose calculation. The default for wind speed is 2 meters per second and is based on outdoor conditions. Since the spiking station is indoors, the wind speed was reduced from 2 meters per second to 0.15 meters per second. This deviation from the default wind speed was a more conservative approach because overall airflow is created by designed ventilation systems.

Although not accounted for in the model, the chemical resistant coating will provide additional means of preventing radon migration from the soil through the floor slab. Accounting for the coating would reduce the overall cover permeability and the emanation coefficient for radon, thereby lowering the calculated risk. As these parameters could not be definitively assessed, the default numbers were used in the model, leading to another layer of conservativeness.

The spiking station itself is contained within a building structure, which prevents any precipitation from providing a migration driver for the residual contamination to the underlying groundwater. Additionally, the floor of the spiking station is raised approximately 4 feet above the natural ground surface, providing approximately 12 feet of unsaturated material between the base of the spiking station and the groundwater. With no mode of force driving the residual U vertically, the building and concrete floor provide an impervious engineered barrier. The concrete floor covering also provides a protective barrier between the industrial worker and the residual U, lowering any potential risk. If conditions change, such that sub-slab excavation and work becomes necessary, the utility worker scenario will require evaluation.

Tables 4 and 5 present the dose and risk calculations from the RESAD model for each 2-foot layer and modeled duration. The individual 2-foot layer results are then added to determine the total dose (Table 4) and risk (Table 5) for each modeled year. Based on the results of the RESRAD model, shown in Tables 4 and 5 above, the residual U does not currently pose a threat to human health and the environment, nor will it pose a threat over the next 100 years. Over the course of the 100-year timeframe that was modeled, the highest dose was calculated at 0.324 mRem/year and the highest Total Excess Cancer Risk (TR) was calculated at 6.470E-6. Both of these maximums occur at year 100. Based on these model results, it is acceptable to leave the material in place beneath a 6-in concrete cover at present time and at least for the next 100 years. Currently, the life span of the facility is not known, but can be reasonably assumed to be less than 100 years. At the time of facility decommissioning, the soil beneath the process building, including soil at this location, will be removed and disposed of off-site as outlined in the Westinghouse CFFF Decommissioning Funding Plan (WDD-PD-00591-CFFF).

Table 4. Dose Calculations (mRem/yr) - RESRAD Model

Modeled Year	0-2 Feet	2-4 feet	4-6 feet	6-8 feet	8+feet	**TOTAL**
Current	0.2063	3.14E-04	1.75E-07	2.21E-08	6.64E-09	**0.206614**
1	0.2074	3.15E-04	4.78E-07	1.54E-07	4.65E-08	**0.207715**
10	0.2172	3.36E-04	1.68E-05	7.27E-06	2.19E-06	**0.217562**
20	0.2283	3.97E-04	6.37E-05	2.77E-05	8.34E-06	**0.228797**
40	0.2505	6.36E-04	2.47E-04	1.08E-04	3.25E-05	**0.251523**
60	0.2732	1.03E-03	5.50E-04	2.40E-04	7.22E-05	**0.27509**
80	0.2962	1.57E-03	9.71E-04	4.23E-04	1.28E-04	**0.299294**
100	0.3193	2.27E-03	1.51E-03	6.57E-04	1.98E-04	**0.323933**

Dose Threshold = 25mRem/year;

Table 5. Risk Calculations (max. annual) - RESRAD Model

Modeled Year	0-2 feet	2-4 feet	4-6 feet	6-8 feet	8+feet	**TOTAL**
Current	4.08E-06	7.76E-09	1.56E-09	6.77E-10	2.04E-10	**4.09E-06**
1	4.10E-06	8.01E-09	1.75E-09	7.62E-10	2.30E-10	**4.11E-06**
10	4.28E-06	1.11E-08	4.16E-09	1.81E-09	5.47E-10	**4.30E-06**
20	4.49E-06	1.64E-08	8.25E-09	3.59E-09	1.08E-09	**4.52E-06**
40	4.91E-06	3.26E-08	2.09E-08	9.08E-09	2.74E-09	**4.97E-06**
60	5.33E-06	5.64E-08	3.93E-08	1.71E-08	5.16E-09	**5.45E-06**
80	5.76E-06	8.76E-08	6.35E-08	2.77E-08	8.34E-09	**5.95E-06**
100	6.20E-06	1.26E-07	9.35E-08	4.07E-08	1.23E-08	**6.47E-06**

Total Excess Cancer Risk Threshold = 1.0E-05;

POTENTIAL FOR MIGRATION AND OFF-SITE IMPACTS

If the contamination is left in-place, there is no potential for off-site impacts. In its current configuration, there is not a mode of force to cause migration of the uranium vertically into the groundwater. Additionally, the potential for uranium to migrate with groundwater has been shown to be limited at the CFFF site. If monitoring, as described below, indicates that migration or uranium from beneath the process building is occurring, it will be corrected/remediated before it reaches the facility boundary.

The primary mechanism for contaminant transport is migration with water. Contaminants generally move as a solution in water, based on solubility, and their rates of migration are controlled by both water migration rates and by sorption and desorption reactions involving the surrounding soils. Some contaminants are strongly sorbed on soils, thus migration is significantly retarded. The equilibrium distribution coefficient (K_d [cm^3/g]) is defined as the amount of contaminant absorbed into soil divided by the amount remaining in solution. Contaminants with a low K_d are more readily transported through the soil than those with a high K_d.

Site-specific K_d values for contaminants at CFFF have not been established. It may be prudent to conduct site-specific studies prior to the final decommissioning, when unrestricted release criteria will be met, but in the interim, literature values, combined with knowledge of site geology will be sufficient as they are generally lower (more conservative) than the site-specific values and therefore predict greater mobility than would actually occur.

Soil type has a significant impact on the published values of K_d. NUREG/CR-6697 separates K_d values by soil type based on Sheppard and Thibault (1990). The Sheppard and Thibault ranges grouped by soil type for uranium are: Sand – 0.03 to 2,200 cm^3/g (mean 35); Loam – 0.22 to 4,500 cm^3/g (mean 15); Clay – 46-395,100 cm^3/g (mean 1,600); and Organic – 33 to 7,350 cm^3/g (mean 410).

Further literature review provided the following distribution coefficients (K_d) for Uranium across all soil types. (Source Table 3-13, EPA 402-R-96-011A).

- EPA Best Case – 15 cm^3/g
- RESRAD Version 7.2 Default – 50 cm^3/g
- NUREG/CR-5512 Default – 15 cm^3/g
- Proposed EPA Median Value – 220 cm^3/g

Based on the Remedial Investigation Report (AECOM 2013), the uppermost geologic formation is composed of a stratified, but poorly sorted, mixture of alluvial clay, silt, sand, and gravel. These layers can generally be differentiated into an upper firm clay/silty sand and a lower loose sand/silty sand unit. Potentiometric surface maps indicate that the unsaturated zone is the firm clay/silty sand with the saturated zone being primarily the loose sand/silty sand layers. Based on this interpretation, the residual impact at CFFF is within the clay/silty sand and would need to migrate downward into the saturated zone to have a detrimental impact on the groundwater within the loose sand/silty sand layer. Due to the spiking station being beneath a building roof and concrete floor, there is not infiltration from precipitation creating a mode of force. Using the RESRAD default K_d for uranium is appropriate until the site enters into decommissioning, at which time a site-specific study may be performed.

The oxidizing and pH conditions also affect the mobility of contamination with the subsurface. Under oxidizing conditions, anticipated to be similar to the surface soils at CFFF, dissolved U is predicted to exist as a cation up to a pH of approximately 6; as a neutral hydroxide species from a pH of 6 to 8, and as an anionic carbonate above a pH of 8 (PNL 1995). This suggests that U would sorb, via cation exchange, under conditions observed at CFFF, resulting in a higher K_d, indicating that the migration of U is significantly retarded. Comingling of contamination, such as nitrate, can have an effect on the transport of U; however, the nitrate contamination at CFFF is not collocated with U. If a nitrate plume or other conditions, such as pH extremes, are identified in the future, a re-evaluation may be required.

Verification that there are no off-site impacts will be confirmed through monitoring and inspection. Monitoring of the groundwater downgradient from HF Spiking Station #1 will be conducted on a regular basis as part of the site-wide groundwater-monitoring program. The results will be reviewed and compared to historic levels to detect any increases in U that could be attributed to the residual U beneath Spiking Station #1. Monitoring wells have been installed around the east, south, and west sides of the process building to monitor potential contaminant migration from beneath the process building, including contamination beneath the spiking station. These wells serve as an early detection system of groundwater impacts from the residual U beneath HF Spiking Station #1 as well as any potential future releases.

An inspection program is in place to evaluate the status of engineered controls at HF Spiking Station #1. The program is designed to ensure that the concrete floor which provides a protective cover, remains in place and is functional. In addition, the chemical resistant coating on the concrete in the diked area will also be inspected on an annual basis.

RESIDUAL URANIUM AND ENGINEERING CONTROL REGISTRY

The results of the current soil sampling event will be kept in the site registry until the time of site decommissioning. This registry will be included in the WCFFF site procedure (RA-137 Decommissioning Recordkeeping) and will conform to the requirements of 10 CFR 20.1501. The registry should include a description of the location and nature of the residual U, the concentrations remaining, an estimate of the mass remaining, the controls necessary to retain protectiveness, and a list of the downgradient wells used to monitor for potential migration.

CONCLUSIONS AND RECOMMENDATIONS

Based on the operating configuration of the HF Spiking Station, the concrete floor slab provides an adequate barrier between the residual U and an industrial worker under current conditions. Over the course of the 100 year timeframe that was modeled, the highest dose was calculated at 0.324 mRem/year and the highest Total Excess Cancer Risk (TR) was calculated at 6.47E-6. Both of these occur at year 100. Based on these model results, it is acceptable to leave the material in place beneath a 6-in concrete cover at present time and for the next 100 years. Since the facility will likely be decommissioned prior to this timeframe, there is no need to remove the contaminated soil at this time. The current decommissioning cost estimate includes funding for the removal of material beneath the process-building slab, including the area of each HF Spiking Station.

RESRAD-ONSITE Non-Default Input Parameters

Category	Parameter	Industrial Worker Value	Basis for Value
Physical Parameters	Area of Contaminated Zone (m^2)	9.51	Based on sketch of Spiking Station 10.5 ft by 9.5 ft.
	Thickness of Contaminated Zone (m)	1.22	Average depth of contamination was between 2-6 feet below the floor slab based on sampling.
	Length Parallel to Aquifer Flow (m)	3.2	Based on side of Area of Contaminated Zone.
	Cover Depth (m)	0.15 – concrete floor; 0.60 for each 2-foot soil layer	The floor slab provides 6 inches of concrete cover for each layer. A 2-foot soil layer is added for each layer in depth.
	Density of Cover Material (g/cm^3)	2.4/1.51	Building foundation material density in *Data Collection Handbook to Support Modeling Impacts of Radioactive Material in Soil and Building Structures* (ANL 2015). Concrete density of 2.4 and soil density of 1.51. A calculated average density was used for each subsequent layer.
	Cover Erosion Rate (m/yr)	0	Building foundation provides cover
	Density of Contaminated Zone (g/cm^3)	1.51	ANL 2015 identifies NUREG-6697 this value for silty clay loam, which is the site soil type.
Hydrological Data	Evapotranspiration Coefficient	0	Building foundation provides cover.
	Wind Speed (m/second)	0.15	The default value was reduced from the default of 2 m/s as the air movement indoors is solely from ventilation. However, the areas is under negative pressure and the building has 6 air exchanges per hour; therefore, the wind speed (air movement) may be greater.
	Precipitation (m/year)[e]	0.001	Conservatively assumes some source of moisture even though the building foundation provides cover.
	Irrigation (m/year)	0	Building foundation provides cover.
	Runoff Coefficient	0	Building foundation provides cover.
	Contaminated Zone Erosion Rate (m/year)[g]	0	Building foundation provides cover.

RESRAD-ONSITE Non-Default Input Parameters

Category	Parameter	Industrial Worker Value	Basis for Value
	Unsaturated Zone Thickness (m)	2.7	Based on location-specific depth of 9 ft to saturated soil at high water table.
Exposure Parameters	Inhalation Rate (m^3/year)	10,550	The inhalation rate of 1.2 m^3 per hour is from Table 6.23 of Volume 1 of NUREG/CR-5512 (NRC 1992). The annual inhalation rate = 1.2 m^3/hour x 8,760 hours/year = 10,550 m^3/year.
	Mass Loading for Inhalation (g/m^3)	0.0002	Section 35.2 of the *Data Collection Handbook to Support Modeling Impacts Of Radioactive Material in Soil* (ANL 1993).
	Exposure Duration (year)	25	EPA OSWER Directive 9285.6-03 established an exposure duration of 25 years for the industrial receptor.
	Indoor Time Fraction	0.2112	Assumed to annually spend 1,600 hours indoors and 400 hours outdoors, plus 250 hours (1 hours/day x 250 days) indoors to account for eating lunch on site, early daily arrival, and late daily departure. The fraction of time indoors per year for the industrial worker = (1,850 hours/year) / (24 hours/day x 365 days/year) = 0.2112.
	Outdoor Time Fraction	0.04566	Assume 400 hrs time outdoors per year for the industrial worker = (400 hours/year) / (24 hours/day x 365 days/year) = 0.04566.
	Soil Ingestion (g/year)	18.25	ANL 2015 identifies EPA documentation for 50 mg/d for adults (50 mg/d x 365 d/yr x 0.001 g/mg = 18.25 g/yr). Conservatively ignores concrete slab over the contaminated soil.

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