Enclosure 15 to
LTR-RAC-20-94
Date: December 18, 2020

Enclosure 15

Response to Request for Additional Information

LTR-RAC-18-81 HF Spiking Station #2 Summary Westinghouse Nuclear Fuel Facility Hopkins, SC

Westinghouse Electric Company LLC
Nuclear Fuel
Columbia Fuel Site
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Our Ref: LTR-RAC-18-81

Date: November 30, 2018

Subject: HF Spiking Station #2 Summary
Westinghouse Nuclear Fuels Facility
Hopkins, SC

Dear Ms. Kuhn,

Attached for your review and approval is the Westinghouse Columbia Fuel Fabrication Facility (WCFFF) assessment report for the Hydrofluoric Acid Spiking Station #2 (HFSS2) release that was verbally reported to the South Carolina Department of Health and Environmental Control (SCDHEC) on July 12, 2018. This assessment was completed per the work plan approved by SCDHEC on August 3, 2018 and the subsequent discussions between WCFFF and SCDHEC. This letter and its associated attachments document the findings to date and provide recommendations for SCDHEC's consideration.

Since the notification to SCDHEC, WCFFF has undertaken significant investigation and remediation efforts. Removal of impacted soil and concrete to an excavation depth of approximately 9 to 12 feet is underway to eliminate the potential for future impacts.

The attached *HF Spiking Station #2 Assessment Report* dated November 30, 2018 prepared by AECOM Technical Services (AECOM), an environmental consultant for WCFFF, documents the investigation activities, results and conclusions from the multi-phase environmental assessment. The attached *Technical Basis Document* dated November 30, 2018 prepared by Leidos, an engineering firm with considerable radiation investigation and remediation experience, provides a technical basis for the WCFFF's conclusions and proposed actions to address radiological contamination. These documents propose next steps for SCDHEC's approval to provide added assurance against potential future impacts.

Background

The HFSS2 operation is contained within a concrete secondary containment system lined with an impermeable membrane. Spiking Station operators, as part of normal operations, conduct routine visual inspections for leaks. Additionally, the integrity of the secondary containment is leak tested annually by filling it with water and monitoring for leaks. The annual leak test conducted on HFSS2 in March 2018 did not indicate the presence of a leak in the containment. On June 16, 2018, during a routine shift inspection, an operator noticed a small patch of leaked solution (uranyl nitrate and hydrofluoric acid) outside the secondary containment area, which was cleaned up. The unit was immediately shutdown for further investigation. On June 26, 2018, the Spiking Station equipment was removed to allow for

inspection of the membrane and the concrete floor beneath the membrane. The inspection of the secondary containment concrete floor identified a small crack. Soil samples taken directly beneath the area in question were found to be impacted by the leak.

Initial Investigation
WCFFF sampled and found no impacts in the closest downgradient monitoring well, approximately 188 feet from the leak. Quarterly monitoring of this well was initiated. WCFFF also contracted AECOM to develop a sampling plan and conduct a subsurface investigation of the HFSS2 in August 2018. *HF Spiking Station #2 Assessment Report* prepared by AECOM and dated November 30, 2018 is attached. During the period August 20 – 22, 2018, AECOM obtained hand auger samples at 12 locations within the secondary containment area to a depth of approximately 6 feet below concrete surface (bcs) or auger refusal. The floor of the building that includes the Spiking Station is approximately 4 feet above natural grade. Soil samples were collected at 2 foot intervals. Samples were analyzed for fluoride, uranium (U), technetium 99 (Tc-99) and pH. Sample analysis indicated the presence of fluoride and U at various depths as well as low pH (<5 standard units).

Subsequent Investigation
On September 6, 7, and 12, 2018, AECOM collected samples to a depth of 12 feet bcs at five locations that had not encountered auger refusal and one location where concrete was able to be removed. SCDHEC also requested three additional borings located outside of the HFSS2 footprint. In addition to the analytes sampled in the initial investigation, nitrate was also analyzed during this subsequent investigation at the request of SCDHEC. Analysis of the soil samples did not identify impact from the release at depths below 9 feet bcs within the boundaries of the HFSS2 footprint, with the exception of soil samples from borehole HF-B1. At this location, U and nitrate were detected at a depth up to the 11-12 foot bcs interval. Samples collected from the three locations external to the HFSS2 footprint also indicated the presence of analytes at various depths.

Remedial Activities
WCFFF contracted Leidos to develop a *Technical Basis Document* to determine target cleanup levels using computer software, RESRAD-ONSITE Version 7.2. Additionally, Leidos evaluated Nuclear Regulatory Commission (NRC) decommissioning guidance, which provides remediation levels for exposure to industrial workers. The identified practical depth of impact based on these levels varies from approximately 9 feet to 12 feet bcs. This allows for removal of soil to concentrations well below the target cleanup level, eliminates risk to employees and minimizes the risk of potential future migration to groundwater. Therefore, WCFFF elected to remediate soils to the practical excavation depth. Remedial activities were initiated in October 2018 and will be completed as soon as feasible, while safely controlling work activities.

Additionally, to eliminate future issues at the HF Spiking Station and similar systems in the plant, the following actions are underway at WCFFF:

- Develop and implement an improved design for both spiking station systems and diked areas to prevent spills of process solution from impacting the concrete and to guard against undetected deterioration of the concrete floor (e.g., reducing potential leak locations, modifying piping, installing new equipment with improved preventative maintenance, and eliminating failure modes in the system and dike).
- Develop and implement an improved preventive maintenance procedure(s) for the spiking station system and diked area, including additional inspection criteria to guard against undetected deterioration of the concrete floor.

- Conduct a formal Design Review of the improved spiking station system, diked area and maintenance procedure(s). The Design Review shall use a Design Failure Mode and Effect Analysis (DFMEA) that will assist in identifying and mitigating risks.
- Assess similar design configurations where there is a liner/environmental barrier relied on for secondary containment to ensure proper preventive and post maintenance procedures are in place.
- Conduct an extent of condition to verify maintenance procedures have been established throughout the facility for couplings similar to those used in the spiking station.
- Complete an evaluation of the environmental protection program including a review of environmental protection design requirements. If issues are identified, ensure prompt compensatory measures are put in place and a long term improvement plan is developed and implemented through the Corrective Action Program.

Conclusions and Further Environmental Evaluation

Based on the data provided in the *HF Spiking Station #2 Assessment Report* and the *Technical Basis Document*, WCFFF concludes the following:

- Some of the soil below the concrete floor within the HFSS2 area is impacted with fluoride, nitrate, and U, and has localized areas of low pH (<5 standard units).
- With the exception of soil from borehole HF-B1, the analytes do not indicate impact below 7-9 feet bcs within the HFSS2 footprint. In borehole HF-B1 impacted soil was detected to a depth of 11-12 feet bcs.
- U below the concrete floor exists outside of the HFSS2 footprint, in HF-B15, but does not appear to be associated with the HFSS2 release. These results are likely due to past impacts which WCFFF proposes to address through the development of a Conceptual Site Model.
- WCFFF is in the process of removing impacted soil below the HFSS2 to a practical excavation depth of approximately 9 to 12 feet to eliminate risk to the WCFFF employees and risk of potential future migration to the groundwater. Soil samples from the bottom of the excavation will be collected and analyzed to confirm completion of the remedial activities.

Based on these conclusions, WCFFF proposes to implement the following additional activities:

- Fill the area underneath the HFSS2, where the impacted soil was removed, with a suitable fill material.
- Dispose of the impacted soil in an approved facility and submit copies of the waste disposal manifests to SCDHEC.
- Develop and implement a Conceptual Site Model to assist WCFFF in developing and implementing monitoring and remediation strategies as needed for constituents of interest. WCFFF anticipates this model will result in a proposed recommendation for SCDHEC's approval to install a series of monitoring wells oriented east-west along the southern side of the manufacturing area and north-south along the eastern side of the manufacturing area to act as detection monitoring wells. Collectively, the Conceptual Site Model and this proposed well network, in conjunction with the existing groundwater monitoring network will form a robust groundwater monitoring and release detection program for potential impacts from past or future manufacturing operations for the life of the plant.

This additional monitoring will ensure that the facility detection monitoring system is capable of early detection of potential future releases. These data can be used to determine the need for additional assessment and remediation, if needed, to protect human health and the environment.

Closing

We look forward to continuing to work with SCDHEC to finalize the next steps based on this assessment. WCFFF is committed to protecting the safety of its employees, the community, and the environment, and we appreciate SCDHEC's input into this process. 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 of my staff at (803) 647-3338 or parrnb@westinghouse.com.

Yours very truly,

Michael Annacone
Columbia Fuels Operations Vice President

Attachments:

1. *HF Spiking Station #2 Assessment Report* dated November 30, 2018 prepared by AECOM
2. *Technical Basis Document* dated November 30, 2018 prepared by Leidos

cc: E. Wills, Environmental Health & Safety Manager
V. Kelmeckis, Corporate Environmental Manager
J. Pricener, Counsel for Environmental Health & Safety
D. Joyner, Principal Environmental Engineer
N. Parr, Licensing Manager
ENOVIA records

HF Spiking Station #2 Assessment Report

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

Prepared for:
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AECOM Project No. 60577539

November 30, 2018

HF Spiking Station #2 Assessment Report

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

Prepared By Jeremy Grant, P.G., Senior Project Manager

Reviewed By Chuck Suddeth, P.G., Project Manager

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LIST OF ACRONYMS

AECOM	AECOM Technical Services, Inc.
bcs	below concrete surface
WCFFF	Columbia Fuel Fabrication Facility
GEL	GEL Laboratories, LLC
HF	hydrofluoric acid
PPM	parts per million
SCDHEC	South Carolina Department of Health and Environmental Control

1.0 INTRODUCTION

The Westinghouse Columbia Fuel Fabrication Facility (WCFFF or Westinghouse) uses two spiking stations where hydrofluoric acid (HF) is mixed with uranyl nitrate for the Conversion process. A release of low pH liquid containing uranium occurred within the manufacturing plant and was documented in the July 18, 2018 5-day Notification of HF Spiking Station #2 Dike Leak letter (Westinghouse, 2018) and the subsequent July 30, 2018 well W28 data e-mail to South Carolina Department of Health and Environmental Control (SCDHEC). On July 27, 2018, Mr. G. Kenneth Taylor of SCDHEC issued a letter to Ms. Nancy Parr of Westinghouse requesting that WCFFF define the extent of impacted soil from this release.

According to the 5-day Notification of HF Spiking Station #2 Dike Leak letter, "*The spiking stations are located within diked areas that are additionally lined with polypropylene material to contain any leakage. The liner integrity is inspected annually by filling it with water and then monitoring for leakage. This integrity testing was last performed for spiking station #2 in March of 2018 and the liner passed the inspection."* When a system leak was discovered in June 2018, a small amount of liquid was observed immediately adjacent to the dike. The polypropylene liner was removed to inspect this area of the dike. Inspection of the area revealed a small crack in the epoxy coating covering the diked area.

Upon removal of the liner, maintenance noticed a small hole about the size of a quarter in the epoxy coating over the concrete. Prodding to investigate further resulted in a ~3 inch hole in the concrete surface. Westinghouse personnel obtained subsurface soils directly below this hole to a depth of 67 inches below the dike surface for analysis by the WCFFF Chemistry Lab. Westinghouse personnel reported that subsurface soils at the total depth of this borehole consisted of a grey clay. As documented in the 5-day Notification of HF Spiking Station #2 Dike Leak letter, uranium, fluoride and low pH (lowest measurement 2.84 standard units) were detected in the subsurface soils.

1.1 Site Background

1.1.1 Site Description

The site is located at 5801 Bluff Road (SC Hwy 48) in a rural portion of Richland County near Hopkins, South Carolina (**Figure 1**) and consists of approximately 1,200 acres. The plant building is located approximately 2,700 feet southwest of Bluff Road on the northern portion of the property.

A manmade dam approximately 1,850 feet south of HF Spiking Station #2 backs up water in Mill Creek, creating Lower Sunset Lake. A second manmade dam cuts across Mill Creek creating Upper Sunset Lake. Upper and lower Sunset Lake are located approximately 1,250 feet southwest of the HF Spiking Station #2 (**Figure 2**) within a natural oxbow. A small, man-made pond is also located approximately 900 feet southwest of HF Spiking Station #2.

The southern portion of the property, including the pond, Mill Creek, and both portions of Sunset Lake are located within the floodplain of Mill Creek and 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 WCFFF plant was constructed in 1969. Prior to construction the site consisted of farmland, woodlands, and floodplain. The main manufacturing activity at the site has been the assembly of fuel rods for the nuclear power industry.

1.2 Site Investigation Objective

Westinghouse desires to understand the horizontal and vertical extent of the impact from the July 2018 release at the HF Spiking Station #2.

2.0 SITE INVESTIGATION ACTIVITIES

This section discusses the rationale and methods used during the soil investigation.

2.1 Field Investigation Activities

Field investigation activities included the following:

- Initial installation of 12 hand auger borings to collect soil samples; and
- Subsequent installation of: 1) four additional hand auger borings and 2) collection of additional soil samples from some of the existing 12 borings at deeper depths.

2.1.1 Initial Soil Assessment

To protect workers outside of the HF Spiking Station #2 study area from potential exposure to dust during concrete removal and to soil with potentially low pH and uranium during hand augering, a tented structure was set up around the station. An inflatable berm was also installed on the floor to keep potential spills from outside of the study area from reaching the exposed subslab soil.

AECOM personnel installed 12 borings (HF-B1 through HF-B12) within the HF Spiking Station #2 study area from August 20, 2018 through August 22, 2018 (**Figure 3**). These borings were advanced to hand auger refusal or a depth of 6 feet below concrete surface (bcs), whichever was less. The maximum boring depth of 6 feet was based on the report of a clay layer at this depth during the initial subsurface soil screening by Westinghouse personnel. AECOM, Westinghouse and SCDHEC personnel did not want to breach this clay layer if it existed contiguously below the spiking station area, thereby potentially creating a migration pathway to the water table.

Boreholes HF-B2 through HF-B5, HF-B7, HF-B8, HF-B10 and HF-B12 encountered hand auger refusal at depths ranging from 2.5 feet to 5.5 feet during the initial soil assessment. Based upon historical Westinghouse documents, subsurface structures in this area include a former shipment receiving bay, a scale used to weigh materials being delivered to the facility and existing/former building footers. The clay layer was not encountered in the 12 boreholes.

Composite soil samples were collected from the following intervals: 1-2 feet bcs, 3-4 feet bcs and 5-6 bcs, with the exception of borings where hand auger refusal was encountered at shallower depths. To ensure 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 sample depths. Soil from the top of the hand auger bucket were emptied into 3-gallon plastic bags until the measured length of soil remained within the hand auger bucket.

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

Subsurface lithology from each borehole was logged by a SC professional geologist. Boring logs are included in **Appendix A**.

2.1.2 Initial Soil Analytical Results

Composite soil samples were submitted to GEL Laboratories, LLC (GEL) for analysis of percent moisture using ASTM D 2216 (Modified), fluoride using EPA Method 9056A, isotopic uranium using EPA Method 3050B/6020A and DOE EML HASL-300 (U-02-RC Modified), technetium 99 using DOE EML HASL-300 (Tc-02-RC Modified) and pH using EPA Method 9045D. Soil analytical results are summarized in **Table 1,** displayed on **Figure 3** and contained in **Appendix B**.

Soil from the upper 6 feet in borings HF-B1, HF-B3, HF-B4, HF-B5, HF-B8, HF-B9, HF-B10, HF-B11 and HF-B12 contained uranium and fluoride as well as low pH indicating impact from the release. Composite soil samples from borehole HF-B6 did not indicate impact by the release above the “free releasable” limit of 11 parts per million (PPM) of uranium. Free releasable soils are soils that can be used as clean fill dirt without restrictions on its usage (ANSI/HSP, 2013).

AECOM and Westinghouse personnel met with SCDHEC personnel on August 27, 2018 to discuss the initial soil sampling observations and analytical results. The parties agreed that additional vertical assessment was appropriate. SCDHEC requested one additional borehole (HF-B16) be installed within the area of removed concrete. Three additional boreholes (HF-B13 through HF-B15) were also agreed upon to further assess the vertical and horizontal extent of this release.

2.1.3 Subsequent Soil Assessment

AECOM personnel collected additional soil samples from the boreholes that did not encounter hand auger refusal during the initial soil sampling (HF-B1, HF-B6, HF-B9 and HF-B11) and the additional borehole (HF-B16) requested by SCDHEC in this same area on September 6-7, 2018. Soil samples from boreholes HF-B13 through HF-B15 were collected on September 12, 2018.

These borings were advanced to a depth of 12 feet bcs or hand auger refusal. The maximum depth of 12 feet for these boreholes was selected based upon the approximate historical seasonal high water table of 12-13 feet bcs. The manufacturing building floor is 4 feet above land surface. If the clay layer was encountered during the advancement of these boreholes, SCDHEC requested that on-site personnel call to discuss how to proceed. The clay layer was not encountered during the advancement of these boreholes.

Boreholes HF-B14 and HF-B16 encountered hand auger refusal at depths of 5.3 feet and 5 feet, respectively. Due to an inadequate volume of soil, a sample was not obtained below 4 feet in HF-B16. These boreholes are in the areas of the subsurface structures described in **Section 2.1.1**.

Composite soil samples were collected from the following intervals in HF-B1, HF-B6, HF-B9, and HF-B-11: 7-8 feet bcs, 9-10 feet bcs and 11-12 bcs. Composite soil samples were collected from the following intervals in HF-B13 and HF-B-15: 1-2 feet bcs, 3-4 feet bcs, 5-6 feet bcs, 7-8 feet bcs, 9-10 feet bcs and

11-12 bcs. In the borings (HF-B14 and HF-B16) where hand auger refusal was encountered, composite samples were collected at the following intervals: 1-2 feet bcs and 3-4 feet bcs; with the exception of boring HF-B14 where a composite soil sample was also collected from the 5-5.3 feet interval. Composite soil samples were collected and homogenized in the same manner as described in **Section 2.1.1**.

Subsurface lithology from each borehole was logged by a SC professional geologist. Boring logs are contained in **Appendix A**.

2.1.4 Subsequent Soil Analytical Results

Composite soil samples were submitted to GEL for analysis of percent moisture using ASTM D 2216 (Modified), fluoride using EPA Method 9056A, isotopic uranium using EPA Method 3050B/6020A and DOE EML HASL-300 (U-02-RC Modified), technetium 99 using DOE EML HASL-300 (Tc-02-RC Modified) and pH using EPA Method 9045D. During the August 27, 2018 meeting, SCDHEC personnel requested that the subsequent soil samples also be analyzed for nitrate. GEL analyzed the subsequent composite soil samples for nitrate using EPA Method 9056A. Soil analytical results are summarized in **Table 1**, displayed on **Figure 3** and contained in **Appendix B**.

Composite soil samples from borehole HF-B13 did not contain evidence of impact related to the release above the free releasable limit of 11 PPM of uranium. Uranium, fluoride, and nitrate as well as low pH were detected in composite soil samples from HF-B14 in the 3-4 feet bcs and 5-5.3 feet bcs intervals. Composite soil samples from boring HF-B15 contained uranium, fluoride, and nitrate as well as low pH in the 3-4 feet bcs, 5-6 feet bcs and 7-8 feet bcs intervals. Within the area of removed concrete, composite soil samples from boring HF-B16 contained uranium, fluoride, and nitrate as well as low pH in the 1-2 feet bcs and 3-4 feet bcs intervals.

3.0 CONCLUSIONS

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

- Some of the soil below the concrete floor within the HF Spiking Station #2 area is impacted with fluoride, nitrate, and uranium, and has localized areas of low pH (<5 standard units).
- With the exception of soil from borehole HF-B1, the soil does not contain uranium concentrations above the releasable limit of 11 PPM below 7-8 feet bcs within the HF Spiking Station #2 footprint. In boreholes HF-B1 impacted soil was detected to a depth of 11-12 feet bcs.
- Uranium below the concrete floor exists outside of the HF Spiking Station #2 footprint, particularly in HF-B15, but does not appear to be associated with the HF Spiking Station #2 release.

4.0 REFERENCES

ANSI/HPS N13.12: Surface and Volume Radioactivity Standards for Clearance, 2013.

Westinghouse to SCDHEC, July 10, 2018, 5-day Notification of HF Spiking Station #2 Dike Leak.

TABLES

Table 1
Westinghouse Columbia Fuel Fabrication Facility
HF Spiking Station #2 Assessment
Soil Analytical Results

Sample Location	Date Collected			Reported Values (ICPMS)				PPM	Alpha Spec				Liquid Scint		
		F mg/kg	Nitrate mg/kg	U234 ug/kg	U235 ug/kg	U238 ug/kg	Total U ug/kg	Total U mg/kg	U233/34 pCi/g	U235/36 pCi/g	U238 pCi/g	Total U pCi/g	Tc-99 pCi/g	pH	% moisture
HF-B1-(1-2)	8/20/2018	7.62	NA	<10.3	134	4,350	4,484	4.48	4.92	0.281	2.5	7.70	3.85	6.84	7.41
HF-B1-(3-4)	8/20/2018	143	NA	985	108,000	2,890,000	**2,998,985**	**2,999**	7,420	375	1,310	**9,105**	14.6	4.59	7.27
HF-B1-(5-6)	8/20/2018	374	NA	1,000	115,000	3,120,000	**3,236,000**	**3,236**	8,750	402	1,640	**10,792**	6.24	4.04	7.66
HF-B1-(7-8)	9/6/2018	341	717	954	106,000	2,750,000	**2,856,954**	**2,857**	5,650	267	1,030	**6,947**	24.7	3.76	9.77
HF-B1-(9-10)	9/6/2018	5.21	351	72.7	4,910	122,000	**126,983**	**127**	417	22.1	73.4	**512.5**	0.685	4.18	11.9
HF-B1-(11-12)	9/6/2018	0.4J	104	20.5	3,600	91,100	**94,721**	**94.7**	316	17.8	61.3	**395.1**	4.91	4.78	12.6
HF-B2-(1-2)	8/20/2018	12.0	NA	<10.2	230	8,440	8,670	8.67	12.6	0.638	2.96	16.20	14.7	8.84	4.75
HF-B3-(1-2)	8/20/2018	22.0	NA	<9.46	16.1	665	681.1	0.68	1.49	0.195	0.811	2.50	-16.8	4.23	1.04
HF-B3-(3-4)	8/20/2018	50.4	NA	70.8	8,210	196,000	**204,281**	**204**	745	36.1	121	**902**	-2.68	4.29	0.876
HF-B3-(4.5-5)	8/20/2018	118	NA	36.6	4,360	115,000	**119,397**	**119**	311	13.6	51.5	**376**	-1.24	5.19	1.46
HF-B4-(1-2)	8/21/2018	10.8	NA	112	13,600	429,000	**442,712**	**443**	793	43.6	173	**1,009**	15.5	5.30	1.02
HF-B4-(3-4)	8/21/2018	10.8	NA	132	16,600	512,000	**528,732**	**529**	999	54.5	224	**1,277**	5.15	5.30	1.27
HF-B4-(5-5.5)	8/21/2018	22.8	NA	33.2	3,800	109,000	**112,833**	**113**	237	9.91	49.8	**296**	2.51	5.18	2.01
HF-B5-(1-2)	8/21/2018	6.27	NA	4.7J	577	20,400	**20,977**	**21.0**	17.1	1.02	4.59	22.71	-1.15	8.01	4.58
HF-B6-(1-2)	8/21/2018	0.514J	NA	<10.3	12.4J	941	953	0.95	1.31	-0.00756	1.00	2.31	3.23	6.66	7.83
HF-B6-(3-4)	8/21/2018	0.915J	NA	<10.1	8.29J	915	923	0.92	0.945	-0.0102	0.700	1.65	19.0	4.72	7.88
HF-B6-(5-6)	8/21/2018	<1.11	NA	<11.0	9.74J	1,170	1,180	1.18	1.16	0.114	0.912	2.19	3.57	5.92	10.3
HF-B6-(7-8)	9/6/2018	<1.10	29.4	<10.6	28.0	1,090	1,118	1.12	1.28	0.0785	0.444	1.80	13.5	6.18	9.27
HF-B6-(9-10)	9/6/2018	<1.14	16.8	<11.2	10.3J	909	919	0.92	0.907	0.0969	0.548	1.55	16.5	6.18	13.0
HF-B6-(11-12)	9/6/2018	<1.13	12.7	<11.1	13.9J	1,030	1044	1.04	1.43	0.142	1.28	2.85	2.94	5.97	12.4
HF-B7-(1-2)	8/21/2018	4.48	NA	<9.84	185	6,340	6,525	6.53	9.68	0.597	2.70	12.98	15.4	8.92	2.14
HF-B8-(1-2)	8/21/2018	5.30	NA	31.2	4,210	131,000	**135,241**	**135**	12.8	0.422	2.79	16.01	12.7	9.30	3.86
HF-B9-(1-2)	8/21/2018	0.414J	NA	<10.3	14.1J	1,170	1,184	1.18	1.68	0.146	0.999	2.83	10.7	5.75	7.36
HF-B9-(3-4)	8/21/2018	305	NA	466	53,000	1,410,000	**1,463,466**	**1,463**	3690	202	637	**4,529**	23.1	4.04	7.23
HF-B9-(5-6)	8/21/2018	111	NA	64.7	7,680	183,000	**190,745**	**191**	478	28.3	81.1	**587**	7.95	3.95	11.5
HF-B9-(7-8)	9/6/2018	<1.12	167	<11.1	24.0	1,240	1,264	1.26	1.65	0.0806	0.728	2.46	11.0	5.81	10.8
HF-B9-(9-10)	9/6/2018	<1.12	43.9	<11.1	17.3	1,060	1,077	1.08	1.56	0.147	0.576	2.28	-3.91	6.15	11.2
HF-B9-(11-12)	9/6/2018	<1.15	19.3	<11.3	80.4	2,970	3,050	3.05	6.6	0.527	2.25	9.38	2.81	6.02	13.4
HF-B10-(1-2)	8/21/2018	13.3	NA	53.9	7,020	217,000	**224,074**	**224**	430	23.4	96.9	**550**	16.1	6.40	5.09
HF-B10-(3-4)	8/21/2018	17.6	NA	181	22,300	669,000	**691,481**	**691**	1460	74.7	290	**1,825**	6.99	4.55	2.11
HF-B11-(1-2)	8/22/2018	47.6	NA	12.2	1,470	44,900	**46,382**	**46.4**	80.0	4.52	17.1	**101.6**	20.5	4.48	1.18
HF-B11-(3-4)	8/22/2018	295	NA	400	46,600	1,250,000	**1,297,000**	**1,297**	3,300	175	618	**4,093**	3.24	4.13	3.16
HF-B11-(5-6)	8/22/2018	1180	NA	1,680	192,000	5,600,000	**5,793,680**	**5,794**	12,500	630	2,320	**15,450**	-1.18	3.65	13.3
HF-B11-(7-8)	9/7/2018	497	729	1,550	152,000	3,910,000	**4,063,550**	**4,064**	6,650	343	1,170	**8,163**	13.9	4.06	11.9
HF-B11-(9-10)	9/7/2018	2.59	188	<10.6	286	8,180	8,466	8.47	11.4	0.523	2.78	14.70	11.5	5.83	11.9
HF-B11-(11-12)	9/7/2018	<1.13	34.6	<10.9	323	8,620	8,943	8.94	36.0	2.06	7.19	**45.25**	-1.17	5.64	12.2
HF-B12-(1-2)	8/22/2018	43.6	NA	399	85,600	10,100,000	**10,185,999**	**10,186**	5,170	249	841	**6,260**	0.935	6.86	2.71
HF-B12-(3-4)	8/22/2018	467	NA	1,010	119,000	2,750,000	**2,870,010**	**2,870**	5,900	291	978	**7,169**	19.4	4.17	4.42

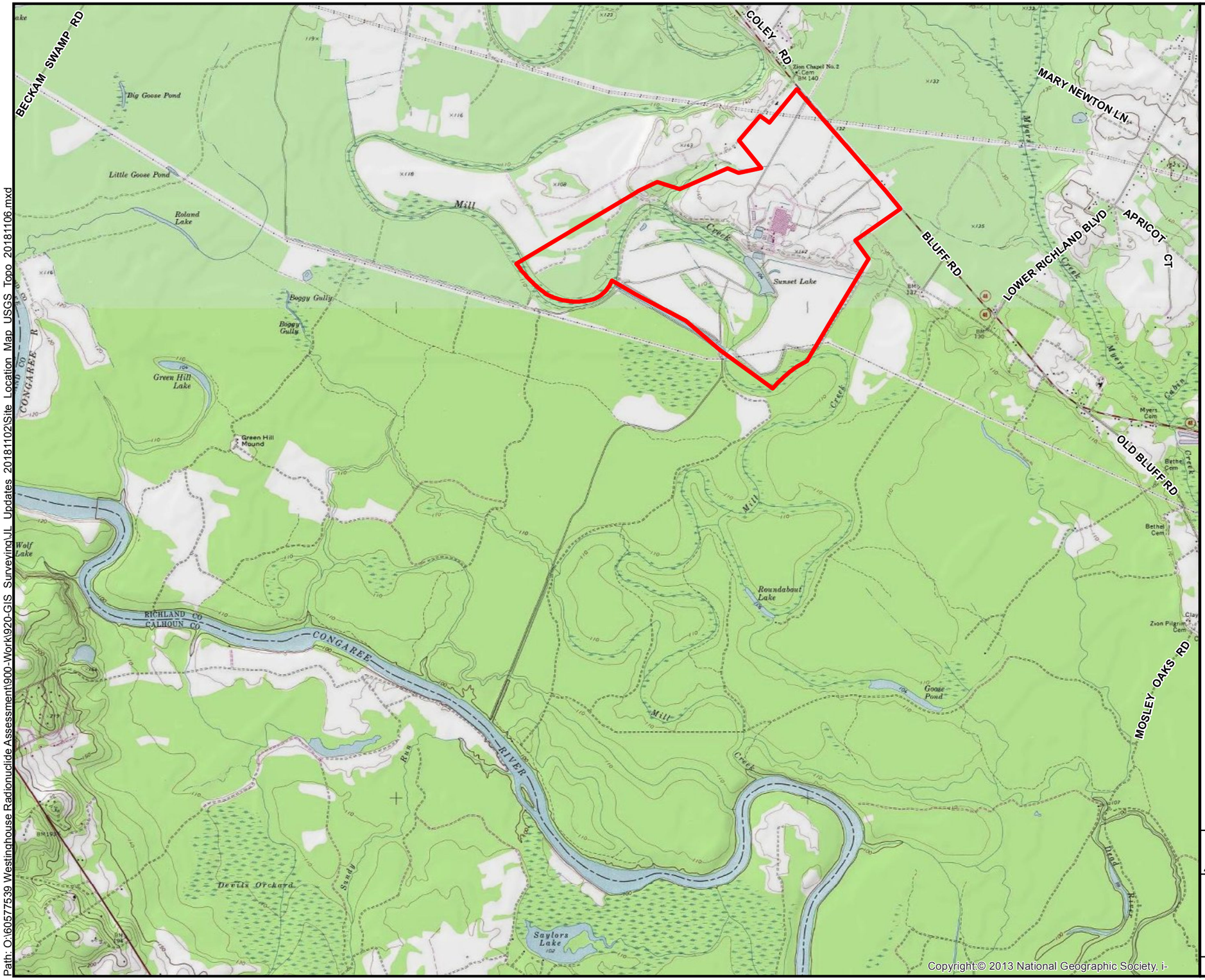
Table 1
Westinghouse Columbia Fuel Fabrication Facility
HF Spiking Station #2 Assessment
Soil Analytical Results

Sample Location	Date Collected			Reported Values (ICPMS)				PPM	Alpha Spec				Liquid Scint		
		F mg/kg	Nitrate mg/kg	U234 ug/kg	U235 ug/kg	U238 ug/kg	Total U ug/kg	Total U mg/kg	U233/34 pCi/g	U235/36 pCi/g	U238 pCi/g	Total U pCi/g	Tc-99 pCi/g	pH	% moisture
HF-B13-(1-2)	9/12/2018	<1.09	70.8	<10.5	11.4	1,140	1,151	1.15	1.17	0.353	1.16	2.683	11.7	6.18	8.69
HF-B13-(3-4)	9/12/2018	0.99J	67.0	<10.8	10.3J	985	1,000	1.00	0.689	0.178	1.11	1.98	-7.42	4.67	7.83
HF-B13-(5-6)	9/12/2018	<1.09	57.4	<10.5	11J	1,090	1,101	1.10	1.39	0.427	0.981	2.80	-1.48	5.50	8.70
HF-B13-(7-8)	9/12/2018	<1.12	33.6	<11.0	8.28J	914	922	0.92	1.43	0.452	0.581	2.46	0.736	5.05	11.9
HF-B13-(9-10)	9/12/2018	<1.14	29.0	<10.9	7.34J	759	766	0.77	1.38	0.203	1.04	2.62	-0.00596	4.52	12.9
HF-B13-(11-12)	9/12/2018	<1.14	14.6	<10.5	13.8J	824	838	0.84	1.48	0.540	1.14	3.16	2.49	5.22	12.8
HF-B14-(1-2)	9/12/2018	<1.01	6.90	<9.86	4.85	346	341	0.34	0.709	0.205	0.454	1.37	7.11	5.88	1.31
HF-B14-(3-4)	9/12/2018	2.51	8.34	12.3	1,340	33,200	**34,552**	**34.55**	94.4	5.00	18.7	**118.1**	-0.389	5.09	1.17
HF-B14-(5-5.3)	9/12/2018	139	57.8	58.2	6,160	168,000	**174,218**	**174**	366	21.3	69.8	**457**	-2.65	4.64	1.82
HF-B15-(1-2)	9/12/2018	1.18	24.7	<9.42	7.7J	479	487	0.49	1.59	0.280	0.390	2.26	6.64	8.17	0.958
HF-B15-(3-4)	9/12/2018	201	382	529	116,000	3,260,000	**3,376,529**	**3,377**	4,760	268	989	**6,017**	31.6	4.46	6.88
HF-B15-(5-6)	9/12/2018	288	384	531	119,000	3,450,000	**3,569,531**	**3,570**	6,560	416	1,480	**8,456**	-6.56	4.41	7.97
HF-B15-(7-8)	9/12/2018	0.80J	111	10.1J	1,160	31,100	**32,270**	**32.27**	101	6.84	23.7	**132**	10.4	5.12	9.61
HF-B15-(9-10)	9/12/2018	<1.15	40.1	<11.0	34.4	1,580	1,614	1.61	8.04	0.359	2.03	10.43	-1.57	5.1	12.9
HF-B15-(11-12)	9/12/2018	<1.14	14.5	6.01J	642	19,500	**20,148**	**20.15**	23.8	2.14	6.52	**32.46**	3.30	5.29	14.1
HF-B16-(1-2)	9/7/2018	33.7	236	86.7	9,690	284,000	**293,777**	**294**	450	23.2	99.1	**572**	13.2	4.26	5.77
HF-B16-(3-4)	9/7/2018	122	114	1,230	140,000	3,660,000	**3,801,230**	**3,801**	7,980	409	1,420	**9,809**	17.2	4.53	8.38
Free Releasable Uranium Limit		N/A	N/A	N/A	N/A	N/A	11000	11	N/A	N/A	N/A	30	N/A	N/A	N/A

Notes:

ICPMS - Inductively coupled plasma mass spectometry
PPM - units converted to parts per million
F - Fluoride
mg/kg - milligrams per kilogram
U - Uranium
ug/kg - micrograms per kilogram
pCi/L - Picocuries per liter
NA - Not analyzed
J - Concentratoin is above the method detection limit but below the reporting limit
BOLD values indicates concentration above the free releasable soil limit (11,000 ug/kg or 30 pCi/g)
N/A - Not applicable

FIGURES



N

Legend

Facility Property Boundary

Source:
Seamless, USGS Topographic Map obtained ArcGIS Map Service.
(http://services.arcgisonline.com)

3,000 0 3,000 Feet

1:36,000

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

Datum: North American 1983

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Columbia, SC 29203-9389
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SITE LOCATION MAP

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60577539	JDL	November 2018	**FIGURE 1**

Path: O:\60577539 Westinghouse Radionuclide Assessment\900-Work\920-GIS Surveying\JL Updates 20181102\Site Location Map USGS Topo 20181106.mxd

N

Legend

- Shallow Aquifer Monitoring Well Location
- Intermediate Aquifer Monitoring Well Location
- Black Mingo Aquifer Monitoring Well Location
- Ditch
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

300 150 0 300 Feet

1:2,780

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

Datum: North American 1983

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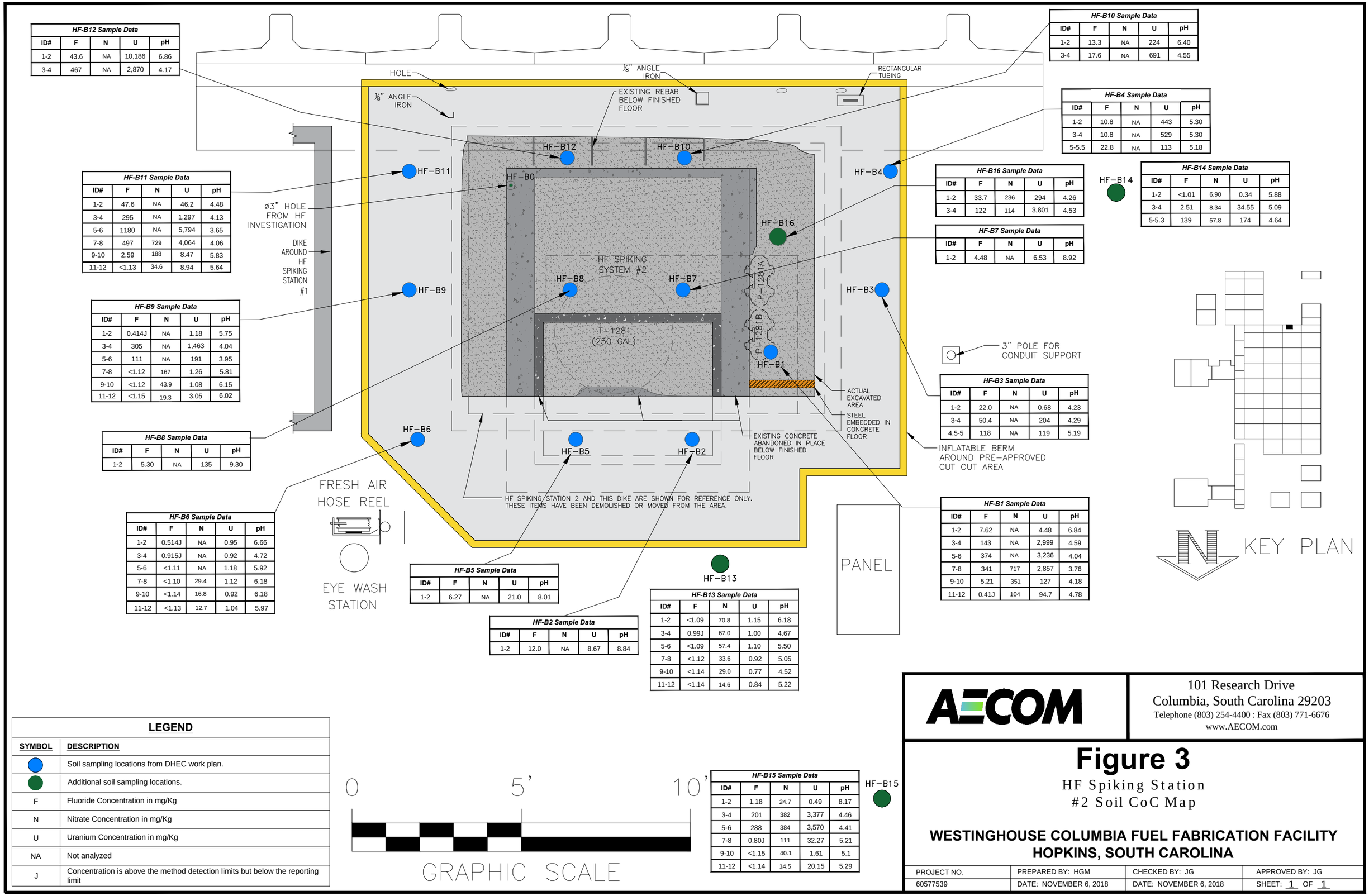
Site Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60577539	JDL	November 2018	**FIGURE 2**

Path: O:\60577539 Westinghouse Radionuclide Assessment\900-Work\920-GIS_Surveying\JL_Updates_20181102\CWWLine_SiteMap_20181106.mxd



HF-B12 Sample Data

ID#	F	N	U	pH
1-2	43.6	NA	10,186	6.86
3-4	467	NA	2,870	4.17

HF-B10 Sample Data

ID#	F	N	U	pH
1-2	13.3	NA	224	6.40
3-4	17.6	NA	691	4.55

HF-B4 Sample Data

ID#	F	N	U	pH
1-2	10.8	NA	443	5.30
3-4	10.8	NA	529	5.30
5-5.5	22.8	NA	113	5.18

HF-B11 Sample Data

ID#	F	N	U	pH
1-2	47.6	NA	46.2	4.48
3-4	295	NA	1,297	4.13
5-6	1180	NA	5,794	3.65
7-8	497	729	4,064	4.06
9-10	2.59	188	8.47	5.83
11-12	<1.13	34.6	8.94	5.64

HF-B16 Sample Data

ID#	F	N	U	pH
1-2	33.7	236	294	4.26
3-4	122	114	3,801	4.53

HF-B14 Sample Data

ID#	F	N	U	pH
1-2	<1.01	6.90	0.34	5.88
3-4	2.51	8.34	34.55	5.09
5-5.3	139	57.8	174	4.64

HF-B7 Sample Data

ID#	F	N	U	pH
1-2	4.48	NA	6.53	8.92

HF-B9 Sample Data

ID#	F	N	U	pH
1-2	0.414J	NA	1.18	5.75
3-4	305	NA	1,463	4.04
5-6	111	NA	191	3.95
7-8	<1.12	167	1.26	5.81
9-10	<1.12	43.9	1.08	6.15
11-12	<1.15	19.3	3.05	6.02

HF-B3 Sample Data

ID#	F	N	U	pH
1-2	22.0	NA	0.68	4.23
3-4	50.4	NA	204	4.29
4.5-5	118	NA	119	5.19

HF-B8 Sample Data

ID#	F	N	U	pH
1-2	5.30	NA	135	9.30

HF-B1 Sample Data

ID#	F	N	U	pH
1-2	7.62	NA	4.48	6.84
3-4	143	NA	2,999	4.59
5-6	374	NA	3,236	4.04
7-8	341	717	2,857	3.76
9-10	5.21	351	127	4.18
11-12	0.41J	104	94.7	4.78

HF-B6 Sample Data

ID#	F	N	U	pH
1-2	0.514J	NA	0.95	6.66
3-4	0.915J	NA	0.92	4.72
5-6	<1.11	NA	1.18	5.92
7-8	<1.10	29.4	1.12	6.18
9-10	<1.14	16.8	0.92	6.18
11-12	<1.13	12.7	1.04	5.97

HF-B5 Sample Data

ID#	F	N	U	pH
1-2	6.27	NA	21.0	8.01

HF-B2 Sample Data

ID#	F	N	U	pH
1-2	12.0	NA	8.67	8.84

HF-B13 Sample Data

ID#	F	N	U	pH
1-2	<1.09	70.8	1.15	6.18
3-4	0.99J	67.0	1.00	4.67
5-6	<1.09	57.4	1.10	5.50
7-8	<1.12	33.6	0.92	5.05
9-10	<1.14	29.0	0.77	4.52
11-12	<1.14	14.6	0.84	5.22

HF-B15 Sample Data

ID#	F	N	U	pH
1-2	1.18	24.7	0.49	8.17
3-4	201	382	3,377	4.46
5-6	288	384	3,570	4.41
7-8	0.80J	111	32.27	5.21
9-10	<1.15	40.1	1.61	5.1
11-12	<1.14	14.5	20.15	5.29

LEGEND

SYMBOL	DESCRIPTION
●	Soil sampling locations from DHEC work plan.
●	Additional soil sampling locations.
F	Fluoride Concentration in mg/Kg
N	Nitrate Concentration in mg/Kg
U	Uranium Concentration in mg/Kg
NA	Not analyzed
J	Concentration is above the method detection limits but below the reporting limit

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Figure 3

HF Spiking Station
#2 Soil CoC Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY: HGM	CHECKED BY: JG	APPROVED BY: JG
60577539	DATE: NOVEMBER 6, 2018	DATE: NOVEMBER 6, 2018	SHEET: 1 OF 1

O:\60577539 WESTINGHOUSE RADIONUCLIDE ASSESSMENT\900-WORK\910-CAD\20-SHEETS\FIGURE 3.DWG 11/6/2018 11:39:03 AM

APPENDIX A
BORING LOGS

Test Boring Report

AECOM

BORING NO. HF-B1
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 8/20/2018
DATE FINISH: 9/6/2018
DRILLER: E. Harrington
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
					Tan medium grain sand. Loose.
					Brown fine to medium grained silty sand. Firm.
					Redish brown fine to medium grained clayey sand.
					Light brown fine to medium grained sand.
5.0					Tan fine grained sand. Slightly moist.
					Yellowish brown fine sand with some silt. Slighty moist.
10.0					Yellowish brown to tan medium to coarse grained silty sand. Few mica, slightly moist.
					Yellowish brown and grey coarse grained silty sand. Moist, few pebbles, few mica.
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

Test Boring Report

BORING NO. HF-B2

PAGE 1 OF 1

PROJECT: HF Spiking Station #2

CLIENT: Westinghouse

CONTRACTOR: AECOM

EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539

LOCATION: Hopkins, SC

ELEVATION:

NORTHING:

EASTING:

DATE START: 8/20/2018

DATE FINISH: 8/20/2018

DRILLER: E. Harrington

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
					Tan fine to medium grained sand with some gravel. Dry, loose, few mica. Refusal at 28 inches.
5.0					
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

Test Boring Report

AECOM

BORING NO. HF-B3
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 8/20/2018
DATE FINISH: 8/20/2018
DRILLER: E. Harrington
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
					Tan fine to medium grained sand. Dry, loose, few mica.
5.0					Refusal at 5 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

Test Boring Report

AECOM

BORING NO. HF-B4
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 8/21/2018
DATE FINISH: 8/21/2018
DRILLER: E. Harrington
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
					Tan fine to medium grained sand. Dry, loose, few mica.
5.0					Refusal at 5.5 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

Test Boring Report

BORING NO. HF-B5

PAGE 1 OF 1

PROJECT: HF Spiking Station #2

CLIENT: Westinghouse

CONTRACTOR: AECOM

EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539

LOCATION: Hopkins, SC

ELEVATION:

NORTHING:

EASTING:

DATE START: 8/21/2018

DATE FINISH: 8/21/2018

DRILLER: E. Harrington

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
					Tan fine to medium grained sand with some black gravel. Dry, loose, few mica.
					Refusal at 2.5 feet
5.0					
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

Test Boring Report

AECOM

BORING NO. HF-B6
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 8/21/2018
DATE FINISH: 9/6/2018
DRILLER: E. Harrington
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
					Brown fine to medium grained sand, few silt. Dry.
					Brown fine to medium grained silty sand. Dry.
					Tan fine grained sand. Slightly moist.
5.0					Yellowish brown fine to medium grained silty sand. Slightly moist.
					Light tan fine to medium grained silty sand. Slightly moist.
					Light yellow fine to medium grain sand. Slightly moist.
					Light brown and light grey medium to coarse grained clayey sand. Slightly moist, few mica.
10.0					Light brown and light grey medium to coarse grained silty sand. Slightly moist, few mica.
					Yellow medium to coarse grained sand with some silt. Moist, few mica.
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

Test Boring Report

AECOM

BORING NO. HF-B7
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 8/21/2018
DATE FINISH: 8/21/2018
DRILLER: E. Harrington
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
					Tan fine to medium grained sand with some gravel and pebbles. Dry, loose.
					Refusal at 2.5 feet
5.0					
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

Test Boring Report

AECOM

BORING NO. HF-B8

PAGE 1 OF 1

PROJECT: HF Spiking Station #2

CLIENT: Westinghouse

CONTRACTOR: AECOM

EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539

LOCATION: Hopkins, SC

ELEVATION:

NORTHING:

EASTING:

DATE START: 8/21/2018

DATE FINISH: 8/21/2018

DRILLER: E. Harrington

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
					Tan fine to medium grained sand with some gravel and pebbles. Dry, loose.
					Refusal at 2.5 feet
5.0					
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

Test Boring Report

BORING NO. HF-B9
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 8/21/2018
DATE FINISH: 9/6/2018
DRILLER: E. Harrington
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
					Brown fine to medium grained sand, few silt. Dry.
					Brown fine to medium grained silty sand. Dry.
					Tan fine grained sand. Slightly moist.
5.0					
					Yellowish brown fine to medium grained sandy silt. Slightly moist
					Yellow fine grained sand, few silt. Slightly moist, few mica.
10.0					Yellow fine to medium grained silty sand. Slightly moist, few mica.
					Light brown and light grey medium to coarse grained silty sand. Slightly moist, few mica.
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

Test Boring Report

AECOM

BORING NO. HF-B10
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 8/21/2018
DATE FINISH: 8/21/2018
DRILLER: E. Harrington
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
					Tan fine to medium grained sand. Dry, loose.
					Brown fine to medium grained silty sand. Slightly moist.
					Yellow fine to medium grained sand. Slightly moist. Refusal at 4.7 feet.
5.0					
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

Test Boring Report

AECOM

BORING NO. HF-B11
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 8/22/2018
DATE FINISH: 9/7/2018
DRILLER: E. Harrington
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
					Tan fine to medium grained sand. Dry, loose, few mica.
					Tan fine to medium grained sand. Loose, dry, few mica. Slightly moist at 4.25 feet.
5.0					Yellowish brown fine to medium grained silty sand. Slightly moist.
					Yellowish brown fine to medium grained sandy silt. Slightly moist.
					Yellowish brown fine to medium grained silty sand. Slightly moist.
					Yellowish brown and light yellow fine to medium grained silty sand. Slightly moist, few mica.
10.0					Light yellow and grey medium to coarse grained silty sand. Moist, few mica, few quartz pebbles.
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

Test Boring Report

BORING NO. HF-B12

PAGE 1 OF 1

PROJECT: HF Spiking Station #2

CLIENT: Westinghouse

CONTRACTOR: AECOM

EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539

LOCATION: Hopkins, SC

ELEVATION:

NORTHING:

EASTING:

DATE START: 8/22/2018

DATE FINISH: 8/22/2018

DRILLER: E. Harrington

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
					Tan fine to medium grained sand. Dry, loose, few mica.
					Brown fine to medium grained silty sand. Slightly moist.
					Tan fine to medium grained sand. Firm, slightly moist. Refusal at 4.5 ft
5.0					
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

Test Boring Report

AECOM

BORING NO. HF-B13
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 9/12/2018
DATE FINISH: 9/12/2018
DRILLER: E. Harrington
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
					Tan fine to medium grained sand. Dry, loose, few mica.
					Light brown fine to medium grained silty sand. Slightly moist.
					Brown fine to medium grained sandy clay. Slightly moist, tight.
5.0					Light brown fine to medium grained sand, few silt. Slightly moist.
					Yellowish brown fine to medium grained silty sand. Slightly moist.
10.0					Grey and yellowish brown fine to medium grained silty sand. Slightly moist, few mica.
					Grey and yellowish brown medium to coarse grained silty sand. Moist, few mica, few quartz pebbles.
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

Test Boring Report

BORING NO. HF-B14

PAGE 1 OF 1

PROJECT: HF Spiking Station #2

CLIENT: Westinghouse

CONTRACTOR: AECOM

EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539

LOCATION: Hopkins, SC

ELEVATION:

NORTHING:

EASTING:

DATE START: 9/12/2018

DATE FINISH: 9/12/2018

DRILLER: E. Harrington

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
					Tan fine to medium grained sand. Dry, loose, few mica.
					Light tan fine grained sand.
5.0					Refusal at 64 inches.
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

Test Boring Report

AECOM

BORING NO. HF-B15
PAGE 1 OF 1

PROJECT: HF Spiking Station #2
CLIENT: Westinghouse
CONTRACTOR: AECOM
EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539
LOCATION: Hopkins, SC
ELEVATION:
NORTHING:
EASTING:
DATE START: 9/12/2018
DATE FINISH: 9/12/2018
DRILLER: E. Harrington
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
					Tan fine to medium grained sand. Dry, loose, few mica.
					Light tan fine grained sand. Dry, loose.
					Tan fine to medium grained sand. Slightly moist, few mica.
					Light brown fine grained silty sand. Slightly moist.
5.0					Light brown fine grained sandy silt. Slightly moist
					Light tan fine grained sand. Slightly moist, few mica.
					Yellowish brown fine to medium grained silty sand. Slightly moist.
					Grey and yellowish brown fine to medium grained sandy silt, some clay. Slightly moist, few mica.
10.0					Grey coarse grained silty sand. Moist, few mica.
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

Test Boring Report

BORING NO. HF-B16

PAGE 1 OF 1

PROJECT: HF Spiking Station #2

CLIENT: Westinghouse

CONTRACTOR: AECOM

EQUIPMENT: Stainless Steel Hand Auger

PROJECT NO: 60577539

LOCATION: Hopkins, SC

ELEVATION:

NORTHING:

EASTING:

DATE START: 9/7/2018

DATE FINISH: 9/7/2018

DRILLER: E. Harrington

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 yellow fine to medium grained sand. Loose, dry.
					Brown fine to medium grained sand, few silt. Slightly moist.
					Brown to reddish brown fine to medium grained silty sand. Slightly moist.
					Dark brown fine to medium grained sand, few silt. Slightly moist.
					Light brown fine grained sand, few silt. Slightly moist.
5.0					Auger refusal at 5 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

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

September 06, 2018

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

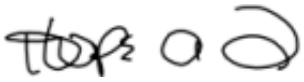
Re: Soil and Vegetation Analysis
Work Order: 457991

Dear Ms. Logsdon:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 23, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4778.

Sincerely,



Hope Taylor
Project Manager

Purchase Order: 4500745037
Enclosures

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

Certificate of Analysis Report
for

WNUC007 Westinghouse Electric Co, LLC

Client SDG: 457991 GEL Work Order: 457991

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

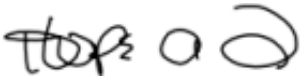
J Value is estimated

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, Hope Taylor.

Reviewed by 

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

Certificate of Analysis

Report Date: September 6, 2018

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: HF-B1-(1-2) Soil Boring
Sample ID: 457991001
Matrix: Soil
Collect Date: 20-AUG-18 14:26
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.41%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		7.62	0.366	1.08	mg/kg	9.98	1	MAR1	08/28/18	2107	1796417	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234	U	ND	2.05	10.3	ug/Kg	95.1	2	PRB	08/29/18	1025	1796296	2
Uranium-235		134	2.05	14.4	ug/Kg	95.1	2	PRB	08/29/18	1347	1796296	3
Uranium-238		4350	13.6	41.1	ug/Kg	95.1	2					
Uranium		4540	13.6	41.1	ug/Kg	95.1	2	PRB	08/29/18	1712	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.84	0.010	0.100	SU		1	RXB5	08/24/18	1706	1794362	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	1042	1796416

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: HF-B1-(3-4) Soil Boring
Sample ID: 457991002
Matrix: Soil
Collect Date: 20-AUG-18 14:50
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.27%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		143	1.82	5.36	mg/kg	9.95	5	MAR1	08/28/18	1558	1796414	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		985	20.7	103	ug/Kg	96.0	20	PRB	08/29/18	1032	1796296	2
Uranium-235		108000	2070	14500	ug/Kg	96.0	2000	PRB	08/29/18	1355	1796296	3
Uranium-238		2890000	13700	41400	ug/Kg	96.0	2000					
Uranium		3030000	13700	41400	ug/Kg	96.0	2000	PRB	08/29/18	1721	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.59	0.010	0.100	SU		1	RXB5	08/24/18	1708	1794362	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	0722	1796413

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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
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Columbia, South Carolina 29205
Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF-B1-(5-6) Soil Boring
Sample ID: 457991003
Matrix: Soil
Collect Date: 20-AUG-18 15:30
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.66%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		374	3.65	10.7	mg/kg	9.93	10	MAR1	08/28/18	2137	1796417	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		1000	20.3	101	ug/Kg	93.6	20	PRB	08/29/18	1034	1796296	2
Uranium-235		115000	2030	14200	ug/Kg	93.6	2000	PRB	08/29/18	1357	1796296	3
Uranium-238		3120000	13400	40600	ug/Kg	93.6	2000					
Uranium		3200000	13400	40600	ug/Kg	93.6	2000	PRB	08/29/18	1722	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.04	0.010	0.100	SU		1	RXB5	08/24/18	1709	1794362	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	1042	1796416

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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
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Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF-B2-(1-2) Soil Boring
Sample ID: 457991004
Matrix: Soil
Collect Date: 20-AUG-18 17:01
Receive Date: 23-AUG-18
Collector: Client
Moisture: 4.75%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		12.0	0.356	1.05	mg/kg	9.98	1	MAR1	08/28/18	2208	1796417	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234	U	ND	2.03	10.2	ug/Kg	96.7	2	PRB	08/29/18	1039	1796296	2
Uranium-235		230	10.2	71.1	ug/Kg	96.7	10	PRB	08/29/18	1404	1796296	3
Uranium-238		8440	13.4	40.6	ug/Kg	96.7	2	PRB	08/29/18	1402	1796296	4
Uranium		8970	13.4	40.6	ug/Kg	96.7	2	PRB	08/29/18	1728	1796296	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	8.84	0.010	0.100	SU		1	RXB5	08/24/18	1709	1794362	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	1042	1796416

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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
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SQL: Sample Quantitation Limit

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

Client Sample ID: HF-B3-(1-2) Soil Boring
Sample ID: 457991005
Matrix: Soil
Collect Date: 21-AUG-18 08:40
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.04%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		22.0	0.342	1.01	mg/kg	9.95	1	MAR1	08/28/18	2239	1796417	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234	U	ND	1.89	9.46	ug/Kg	93.6	2	PRB	08/29/18	1041	1796296	2
Uranium-235		16.1	1.89	13.2	ug/Kg	93.6	2	PRB	08/29/18	1405	1796296	3
Uranium-238		665	12.5	37.8	ug/Kg	93.6	2					
Uranium		718	12.5	37.8	ug/Kg	93.6	2	PRB	08/29/18	1730	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.23	0.010	0.100	SU		1	RXB5	08/24/18	1711	1794362	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	1042	1796416

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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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Project: Soil and Vegetation Analysis

Client Sample ID: HF-B3-(3-4) Soil Boring
Sample ID: 457991006
Matrix: Soil
Collect Date: 21-AUG-18 08:58
Receive Date: 23-AUG-18
Collector: Client
Moisture: .876%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		50.4	0.343	1.01	mg/kg	10.0	1	MAR1	08/28/18	2310	1796417	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		70.8	1.98	9.91	ug/Kg	98.2	2	PRB	08/29/18	1043	1796296	2
Uranium-235		8210	198	1390	ug/Kg	98.2	200	PRB	08/29/18	1407	1796296	3
Uranium-238		196000	1310	3960	ug/Kg	98.2	200					
Uranium		199000	1310	3960	ug/Kg	98.2	200	PRB	08/29/18	1731	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.29	0.010	0.100	SU		1	RXB5	08/24/18	1712	1794362	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	1042	1796416

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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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Client Sample ID: HF-B3-(4.5-5) Soil Boring
Sample ID: 457991007
Matrix: Soil
Collect Date: 21-AUG-18 09:10
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.46%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		118	1.73	5.07	mg/kg	10.0	5	MAR1	08/28/18	2341	1796417	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		36.6	2.02	10.1	ug/Kg	99.6	2	PRB	08/29/18	1045	1796296	2
Uranium-235		4360	202	1420	ug/Kg	99.6	200	PRB	08/29/18	1410	1796296	3
Uranium-238		115000	1330	4040	ug/Kg	99.6	200					
Uranium		114000	167	505	ug/Kg	99.6	25	PRB	08/29/18	1733	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.19	0.010	0.100	SU		1	RXB5	08/24/18	1713	1794362	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	1042	1796416

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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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Project: Soil and Vegetation Analysis

Client Sample ID: HF-B4-(1-2) Soil Boring
Sample ID: 457991008
Matrix: Soil
Collect Date: 21-AUG-18 09:46
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.02%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		10.8	0.341	1.00	mg/kg	9.93	1	MAR1	08/29/18	0012	1796417	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		112	2.02	10.1	ug/Kg	100	2	PRB	08/29/18	1046	1796296	2
Uranium-235		13600	202	1410	ug/Kg	100	200	PRB	08/29/18	1412	1796296	3
Uranium-238		429000	1330	4040	ug/Kg	100	200					
Uranium		447000	1330	4040	ug/Kg	100	200	PRB	08/29/18	1735	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.30	0.010	0.100	SU		1	RXB5	08/24/18	1714	1794362	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	1042	1796416

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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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Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF-B4-(3-4) Soil Boring
Sample ID: 457991009
Matrix: Soil
Collect Date: 21-AUG-18 09:59
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.27%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		10.8	0.341	1.00	mg/kg	9.90	1	MAR1	08/29/18	0043	1796417	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		132	2.01	10.0	ug/Kg	99.2	2	PRB	08/29/18	1048	1796296	2
Uranium-235		16600	251	1760	ug/Kg	99.2	250	PRB	08/29/18	1422	1796296	3
Uranium-238		512000	1660	5020	ug/Kg	99.2	250					
Uranium		535000	1330	4020	ug/Kg	99.2	200	PRB	08/29/18	1736	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.30	0.010	0.100	SU		1	RXB5	08/24/18	1717	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	1042	1796416

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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
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SQL: Sample Quantitation Limit

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

Client Sample ID: HF-B4-(5-5.5) Soil Boring
Sample ID: 457991010
Matrix: Soil
Collect Date: 21-AUG-18 10:10
Receive Date: 23-AUG-18
Collector: Client
Moisture: 2.01%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		22.8	0.343	1.01	mg/kg	9.88	1	MAR1	08/28/18	0846	1796417	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		33.2	1.93	9.65	ug/Kg	94.5	2	PRB	08/29/18	1050	1796296	2
Uranium-238		109000	127	386	ug/Kg	94.5	20	PRB	08/29/18	1424	1796296	3
Uranium-235		3800	193	1350	ug/Kg	94.5	200	PRB	08/29/18	1426	1796296	4
Uranium		116000	127	386	ug/Kg	94.5	20	PRB	08/29/18	1738	1796296	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.18	0.010	0.100	SU		1	RXB5	08/24/18	1719	1796197	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	1042	1796416

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: September 6, 2018

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: HF-B5-(1-2) Soil Boring
Sample ID: 457991011
Matrix: Soil
Collect Date: 21-AUG-18 11:01
Receive Date: 23-AUG-18
Collector: Client
Moisture: 4.58%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		6.27	0.354	1.04	mg/kg	9.93	1	MAR1	08/29/18	0317	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234	J	4.70	1.88	9.41	ug/Kg	89.8	2	PRB	08/29/18	1051	1796296	2
Uranium-235		577	18.8	132	ug/Kg	89.8	20	PRB	08/29/18	1427	1796296	3
Uranium-238		20400	124	376	ug/Kg	89.8	20					
Uranium		21300	124	376	ug/Kg	89.8	20	PRB	08/29/18	1740	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	8.01	0.010	0.100	SU		1	RXB5	08/24/18	1722	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 6, 2018

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: HF-B6-(1-2) Soil Boring
Sample ID: 457991012
Matrix: Soil
Collect Date: 21-AUG-18 11:27
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.83%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride	J	0.514	0.369	1.08	mg/kg	10.0	1	MAR1	08/29/18	0348	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234	U	ND	2.05	10.3	ug/Kg	94.7	2	PRB	08/29/18	1053	1796296	2
Uranium-235	J	12.4	2.05	14.4	ug/Kg	94.7	2	PRB	08/29/18	1510	1796296	3
Uranium-238		941	13.6	41.1	ug/Kg	94.7	2					
Uranium		969	13.6	41.1	ug/Kg	94.7	2	PRB	08/29/18	1742	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.66	0.010	0.100	SU		1	RXB5	08/24/18	1723	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 6, 2018

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: HF-B6-(3-4) Soil Boring
Sample ID: 457991013
Matrix: Soil
Collect Date: 21-AUG-18 11:45
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.88%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride	J	0.915	0.368	1.08	mg/kg	9.98	1	MAR1	08/29/18	0419	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234	U	ND	2.02	10.1	ug/Kg	93.1	2	PRB	08/29/18	1058	1796296	2
Uranium-235	J	8.29	2.02	14.1	ug/Kg	93.1	2	PRB	08/29/18	1511	1796296	3
Uranium-238		915	13.3	40.4	ug/Kg	93.1	2					
Uranium		910	13.3	40.4	ug/Kg	93.1	2	PRB	08/29/18	1747	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.72	0.010	0.100	SU		1	RXB5	08/24/18	1724	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: HF-B6-(5-6) Soil Boring
Sample ID: 457991014
Matrix: Soil
Collect Date: 21-AUG-18 13:47
Receive Date: 23-AUG-18
Collector: Client
Moisture: 10.3%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride	U	ND	0.377	1.11	mg/kg	9.95	1	MAR1	08/29/18	0450	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234	U	ND	2.19	11.0	ug/Kg	98.4	2	PRB	08/29/18	1100	1796296	2
Uranium-235	J	9.74	2.19	15.4	ug/Kg	98.4	2	PRB	08/29/18	1513	1796296	3
Uranium-238		1170	14.5	43.9	ug/Kg	98.4	2					
Uranium		1160	14.5	43.9	ug/Kg	98.4	2	PRB	08/29/18	1748	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.92	0.010	0.100	SU		1	RXB5	08/24/18	1725	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: HF-B7-(1-2) Soil Boring
Sample ID: 457991015
Matrix: Soil
Collect Date: 21-AUG-18 14:51
Receive Date: 23-AUG-18
Collector: Client
Moisture: 2.14%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		4.48	0.345	1.01	mg/kg	9.93	1	MAR1	08/29/18	0521	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234	U	ND	1.97	9.84	ug/Kg	96.3	2	PRB	08/29/18	1102	1796296	2
Uranium-235		185	4.92	34.5	ug/Kg	96.3	5	PRB	08/29/18	1436	1796296	3
Uranium-238		6340	32.5	98.4	ug/Kg	96.3	5					
Uranium		6830	13.0	39.4	ug/Kg	96.3	2	PRB	08/29/18	1750	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	8.92	0.010	0.100	SU		1	RXB5	08/24/18	1726	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 6, 2018

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: HF-B8-(1-2) Soil Boring
Sample ID: 457991016
Matrix: Soil
Collect Date: 21-AUG-18 15:10
Receive Date: 23-AUG-18
Collector: Client
Moisture: 3.86%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		5.30	0.353	1.04	mg/kg	9.98	1	MAR1	08/29/18	0552	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		31.2	1.91	9.53	ug/Kg	91.6	2	PRB	08/29/18	1104	1796296	2
Uranium-238		131000	126	381	ug/Kg	91.6	20	PRB	08/29/18	1441	1796296	3
Uranium-235		4210	191	1330	ug/Kg	91.6	200	PRB	08/29/18	1443	1796296	4
Uranium		136000	126	381	ug/Kg	91.6	20	PRB	08/29/18	1752	1796296	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	9.30	0.010	0.100	SU		1	RXB5	08/24/18	1729	1796197	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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

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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: HF-B9-(1-2) Soil Boring
Sample ID: 457991017
Matrix: Soil
Collect Date: 21-AUG-18 16:17
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.36%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride	J	0.414	0.365	1.07	mg/kg	9.95	1	MAR1	08/29/18	0623	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234	U	ND	2.07	10.3	ug/Kg	95.8	2	PRB	08/29/18	1105	1796296	2
Uranium-235	J	14.1	2.07	14.5	ug/Kg	95.8	2	PRB	08/29/18	1515	1796296	3
Uranium-238		1170	13.6	41.4	ug/Kg	95.8	2					
Uranium		1280	13.6	41.4	ug/Kg	95.8	2	PRB	08/29/18	1753	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.75	0.010	0.100	SU		1	RXB5	08/24/18	1730	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: HF-B9-(3-4) Soil Boring
Sample ID: 457991018
Matrix: Soil
Collect Date: 21-AUG-18 16:58
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.23%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		305	3.66	10.8	mg/kg	9.98	10	MAR1	08/29/18	1030	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		466	10.6	53.2	ug/Kg	98.6	10	PRB	08/29/18	1107	1796296	2
Uranium-238		1410000	1400	4250	ug/Kg	98.6	200	PRB	08/29/18	1446	1796296	3
Uranium-235		53000	2130	14900	ug/Kg	98.6	2000	PRB	08/29/18	1448	1796296	4
Uranium		1440000	1400	4250	ug/Kg	98.6	200	PRB	08/29/18	1755	1796296	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.04	0.010	0.100	SU		1	RXB5	08/24/18	1731	1796197	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: HF-B9-(5-6) Soil Boring
Sample ID: 457991019
Matrix: Soil
Collect Date: 21-AUG-18 17:23
Receive Date: 23-AUG-18
Collector: Client
Moisture: 11.5%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		111	1.92	5.65	mg/kg	10.0	5	MAR1	08/29/18	1101	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		64.7	2.16	10.8	ug/Kg	95.4	2	PRB	08/29/18	1109	1796296	2
Uranium-238		183000	178	539	ug/Kg	95.4	25	PRB	08/29/18	1450	1796296	3
Uranium-235		7680	216	1510	ug/Kg	95.4	200	PRB	08/29/18	1451	1796296	4
Uranium		194000	178	539	ug/Kg	95.4	25	PRB	08/29/18	1757	1796296	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	3.95	0.010	0.100	SU		1	RXB5	08/24/18	1732	1796197	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: September 6, 2018

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: HF-B10-(1-2) Soil Boring
Sample ID: 457991020
Matrix: Soil
Collect Date: 22-AUG-18 08:40
Receive Date: 23-AUG-18
Collector: Client
Moisture: 5.09%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		13.3	0.356	1.05	mg/kg	9.93	1	MAR1	08/29/18	0857	1796420	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		53.9	2.08	10.4	ug/Kg	98.8	2	PRB	08/29/18	1110	1796296	2
Uranium-235		7020	208	1460	ug/Kg	98.8	200	PRB	08/29/18	1455	1796296	3
Uranium-238		217000	1370	4160	ug/Kg	98.8	200					
Uranium		218000	1370	4160	ug/Kg	98.8	200	PRB	08/29/18	1805	1796296	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.40	0.010	0.100	SU		1	RXB5	08/24/18	1734	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0932	1796295
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/28/18	0756	1796419

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 6, 2018

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: HF-B10-(3-4) Soil Boring
Sample ID: 457991021
Matrix: Soil
Collect Date: 22-AUG-18 08:55
Receive Date: 23-AUG-18
Collector: Client
Moisture: 2.11%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		17.6	0.346	1.02	mg/kg	9.98	1	MAR1	08/27/18	2024	1796414	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-238		669000	1300	3940	ug/Kg	96.5	200	PRB	08/29/18	1525	1796299	2
Uranium-235		22300	986	6900	ug/Kg	96.5	1000	PRB	08/29/18	1532	1796299	3
Uranium		689000	1300	3940	ug/Kg	96.5	200	PRB	08/29/18	1810	1796299	4
Uranium-234		181	9.86	49.3	ug/Kg	96.5	10	PRB	08/29/18	1121	1796299	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.55	0.010	0.100	SU		1	RXB5	08/24/18	1736	1796197	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0930	1796298
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	0722	1796413

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: HF-B11-(1-2) Soil Boring
Sample ID: 457991022
Matrix: Soil
Collect Date: 22-AUG-18 09:42
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.18%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		47.6	0.342	1.00	mg/kg	9.93	1	MAR1	08/27/18	2055	1796414	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		12.2	1.87	9.37	ug/Kg	92.6	2	PRB	08/29/18	1132	1796299	2
Uranium-235		1470	23.4	164	ug/Kg	92.6	25	PRB	08/29/18	1544	1796299	3
Uranium-238		44900	155	469	ug/Kg	92.6	25					
Uranium		46300	155	469	ug/Kg	92.6	25	PRB	08/29/18	1820	1796299	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.48	0.010	0.100	SU		1	RXB5	08/24/18	1736	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0930	1796298
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	0722	1796413

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 6, 2018

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: HF-B11-(3-4) Soil Boring
Sample ID: 457991023
Matrix: Soil
Collect Date: 22-AUG-18 10:05
Receive Date: 23-AUG-18
Collector: Client
Moisture: 3.16%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		295	3.50	10.3	mg/kg	9.98	10	MAR1	08/28/18	1629	1796414	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		400	9.58	47.9	ug/Kg	92.8	10	PRB	08/29/18	1133	1796299	2
Uranium		1320000	1260	3830	ug/Kg	92.8	200	PRB	08/29/18	1822	1796299	3
Uranium-238		1250000	1260	3830	ug/Kg	92.8	200	PRB	08/29/18	1546	1796299	4
Uranium-235		46600	1920	13400	ug/Kg	92.8	2000	PRB	08/29/18	1547	1796299	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.13	0.010	0.100	SU		1	RXB5	08/24/18	1738	1796197	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0930	1796298
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	0722	1796413

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: September 6, 2018

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: HF-B11-(5-6) Soil Boring
Sample ID: 457991024
Matrix: Soil
Collect Date: 22-AUG-18 10:42
Receive Date: 23-AUG-18
Collector: Client
Moisture: 13.3%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		1180	9.78	28.8	mg/kg	9.98	25	MAR1	08/28/18	1659	1796414	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		1680	26.2	131	ug/Kg	90.9	25	PRB	08/29/18	1135	1796299	2
Uranium-238		5600000	13800	42000	ug/Kg	90.9	2000	PRB	08/29/18	1549	1796299	3
Uranium-235		192000	4200	29400	ug/Kg	90.9	4000	PRB	08/29/18	1551	1796299	4
Uranium		5640000	13800	42000	ug/Kg	90.9	2000	PRB	08/29/18	1824	1796299	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	3.65	0.010	0.100	SU		1	RXB5	08/24/18	1739	1796197	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0930	1796298
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	0722	1796413

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: September 6, 2018

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: HF-B12-(1-2) Soil Boring
Sample ID: 457991025
Matrix: Soil
Collect Date: 22-AUG-18 11:21
Receive Date: 23-AUG-18
Collector: Client
Moisture: 2.71%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		43.6	0.347	1.02	mg/kg	9.93	1	MAR1	08/27/18	2228	1796414	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		399	9.92	49.6	ug/Kg	96.5	10	PRB	08/29/18	1137	1796299	2
Uranium-238		10100000	13100	39700	ug/Kg	96.5	2000	PRB	08/29/18	1552	1796299	3
Uranium-235		85600	3970	27800	ug/Kg	96.5	4000	PRB	08/29/18	1554	1796299	4
Uranium		10400000	13100	39700	ug/Kg	96.5	2000	PRB	08/29/18	1825	1796299	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.86	0.010	0.100	SU		1	RXB5	08/24/18	1740	1796197	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0930	1796298
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	0722	1796413

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: September 6, 2018

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: HF-B12-(3-4) Soil Boring
Sample ID: 457991026
Matrix: Soil
Collect Date: 22-AUG-18 11:38
Receive Date: 23-AUG-18
Collector: Client
Moisture: 4.42%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride "Dry Weight Corrected"												
Fluoride		467	7.06	20.8	mg/kg	9.93	20	MAR1	08/28/18	1730	1796414	1
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-234		1010	19.6	98.1	ug/Kg	93.8	20	PRB	08/29/18	1139	1796299	2
Uranium-235		119000	1960	13700	ug/Kg	93.8	2000	PRB	08/29/18	1556	1796299	3
Uranium-238		2750000	13000	39300	ug/Kg	93.8	2000					
Uranium		2900000	13000	39300	ug/Kg	93.8	2000	PRB	08/29/18	1827	1796299	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.17	0.010	0.100	SU		1	RXB5	08/24/18	1742	1796197	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	SXW1	08/24/18	0930	1796298
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	08/27/18	0722	1796413

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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

QC Summary

Report Date: September 6, 2018

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

Contact: **Ms. Cynthia Logsdon**

Workorder: **457991**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 1796414										
QC1204100742 457991026 DUP										
Fluoride		467		467	mg/kg	0.0703		(0%-20%)	MAR1	08/28/18 18:01
QC1204100741 LCS										
Fluoride	25.0			24.7	mg/kg		98.9	(90%-110%)		08/27/18 19:22
QC1204100740 MB										
Fluoride			U	ND	mg/kg					08/27/18 18:51
QC1204100743 457991026 MS										
Fluoride	26.1	467		463	mg/kg		N/A	(30%-135%)		08/28/18 18:32
Batch 1796417										
QC1204100746 457991010 DUP										
Fluoride		22.8		23.3	mg/kg	1.83		(0%-20%)	MAR1	08/28/18 09:17
QC1204100745 LCS										
Fluoride	25.0			25.3	mg/kg		101	(90%-110%)		08/28/18 20:36
QC1204100744 MB										
Fluoride			U	ND	mg/kg					08/28/18 20:05
QC1204100747 457991010 MS										
Fluoride	25.2	22.8		48.5	mg/kg		102	(30%-135%)		08/28/18 09:47
Batch 1796420										
QC1204100750 457991020 DUP										
Fluoride		13.3		12.5	mg/kg	6.38		(0%-20%)	MAR1	08/29/18 09:28
QC1204100749 LCS										
Fluoride	25.0			25.6	mg/kg		103	(90%-110%)		08/29/18 02:46

QC Summary

Workorder: **457991**

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography											
Batch 1796420											
QC1204100748 MB											
Fluoride				U	ND	mg/kg				MAR1	08/29/18 02:15
QC1204100751 457991020 MS											
Fluoride	26.2		13.3		30.3	mg/kg		64.8	(30%-135%)		08/29/18 09:59
Metals Analysis - ICPMS											
Batch 1796296											
QC1204100481 457991001 DUP											
Uranium			4540		6640	ug/Kg	37.7*		(0%-20%)	PRB	08/29/18 17:14
Uranium-234		U	ND	U	ND	ug/Kg	N/A				08/29/18 10:27
Uranium-235			134		194	ug/Kg	36.7*		(0%-20%)		08/29/18 13:48
Uranium-238			4350		6420	ug/Kg	38.5*		(0%-20%)		
QC1204100480 LCS											
Uranium	4800				4660	ug/Kg		97.1	(80%-120%)		08/29/18 17:11
Uranium-235	34.5				31.3	ug/Kg		90.5	(80%-120%)		08/29/18 13:45
Uranium-238	4760				4280	ug/Kg		89.9	(80%-120%)		
QC1204100498 LCS											
Uranium-234	50.9				41.9	ug/Kg		82.2	(80%-120%)		08/29/18 10:24
QC1204100479 MB											
Uranium				U	ND	ug/Kg					08/29/18 17:09
Uranium-234				U	ND	ug/Kg					08/29/18 10:22
Uranium-235				U	ND	ug/Kg					08/29/18 13:43

QC Summary

Workorder: **457991**

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1796296											
Uranium-238				U	ND	ug/Kg				PRB	08/29/18 13:43
QC1204100482 457991001 MS											
Uranium	5170		4540		9640	ug/Kg		98.8	(75%-125%)		08/29/18 17:16
Uranium-235	37.2		134		171	ug/Kg		99.3	(75%-125%)		08/29/18 13:50
Uranium-238	5140		4350		9280	ug/Kg		96.1	(75%-125%)		
QC1204100499 457991001 MS											
Uranium-234	56.7	U	ND		52.6	ug/Kg		90.9	(75%-125%)		08/29/18 10:29
QC1204100483 457991001 SDILT											
Uranium			22.1		4.20	ug/L	4.94		(0%-10%)		08/29/18 17:19
Uranium-234		U	ND	U	ND	ug/L	N/A				08/29/18 10:31
Uranium-235			0.653		0.137	ug/L	4.53		(0%-10%)		08/29/18 13:53
Uranium-238			21.2		4.25	ug/L	.383		(0%-10%)		
Batch 1796299											
QC1204100486 457991021 DUP											
Uranium			689000		645000	ug/Kg	6.6		(0%-20%)	PRB	08/29/18 18:12
Uranium-234			181		175	ug/Kg	3.51 ^		(+/-49.2)		08/29/18 11:23
Uranium-235			22300		19400	ug/Kg	13.8 ^		(+/-6890)		08/29/18 15:34
Uranium-238			669000		625000	ug/Kg	6.84		(0%-20%)		08/29/18 15:27

QC Summary

Workorder: **457991**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS										
Batch 1796299										
QC1204100485 LCS										
Uranium	4690			4160	ug/Kg		88.7	(80%-120%)	PRB	08/29/18 18:09
Uranium-235	33.8			30.5	ug/Kg		90.2	(80%-120%)		08/29/18 15:23
Uranium-238	4660			4120	ug/Kg		88.5	(80%-120%)		
QC1204100500 LCS										
Uranium-234	53.4			48.9	ug/Kg		91.6	(80%-120%)		08/29/18 11:19
QC1204100484 MB										
Uranium			U	ND	ug/Kg					08/29/18 18:07
Uranium-234			U	ND	ug/Kg					08/29/18 11:18
Uranium-235			U	ND	ug/Kg					08/29/18 15:22
Uranium-238			U	ND	ug/Kg					
QC1204100487 457991021 MS										
Uranium	5040	689000		684000	ug/Kg		N/A	(75%-125%)		08/29/18 18:14
Uranium-235	36.3	22300		21500	ug/Kg		N/A	(75%-125%)		08/29/18 15:35
Uranium-238	5000	669000		641000	ug/Kg		N/A	(75%-125%)		08/29/18 15:28
QC1204100501 457991021 MS										
Uranium-234	51.6	181		262	ug/Kg		156*	(75%-125%)		08/29/18 11:25
QC1204103557 457991021 PS										
Uranium-234	1.38	0.184		1.45	ug/L		91.8	(80%-120%)		08/29/18 12:00

QC Summary

Workorder: **457991**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS										
Batch 1796299										
QC1204100488 457991021 SDILT										
Uranium		34.9		6.37	ug/L	8.77		(0%-10%)	PRB	08/29/18 18:15
Uranium-234		0.184	J	0.035	ug/L	4.89				08/29/18 11:26
Uranium-235		0.226	J	0.0433	ug/L	4.12		(0%-10%)		08/29/18 15:37
Uranium-238		33.9		6.56	ug/L	3.3		(0%-10%)		08/29/18 15:30
Titration and Ion Analysis										
Batch 1794362										
QC1204096010 457499001 DUP										
Corrosivity	H	7.15	H	7.14	SU	0.14		(0%-10%)	RXB5	08/24/18 17:04
QC1204096009 LCS										
Corrosivity	7.00			7.05	SU		101	(95%-105%)		08/24/18 16:59
Batch 1796197										
QC1204100258 457991009 DUP										
Corrosivity	H	5.30	H	5.31	SU	0.189		(0%-10%)	RXB5	08/24/18 17:18
QC1204100259 457991010 DUP										
Corrosivity	H	5.18	H	5.30	SU	2.29		(0%-10%)		08/24/18 17:20
QC1204100257 LCS										
Corrosivity	7.00			7.05	SU		101	(95%-105%)		08/24/18 17:01

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 %difference of sample and SD is >10%. Sample concentration must meet flagging criteria
- E General Chemistry--Concentration of the target analyte exceeds the instrument calibration range

QC Summary

Workorder: **457991**

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

FB Mercury was found present at quantifiable concentrations in field blanks received with these samples. Data associated with the blank are deemed invalid for reporting to regulatory agencies

H Analytical holding time was exceeded

J Value is estimated

N Metals--The Matrix spike sample recovery is not within specified control limits

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

Y Other specific qualifiers were required to properly define the results. Consult case narrative.

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.

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

Certificate of Analysis

Report Date: September 6, 2018

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: HF-B1-(1-2) Soil Boring
Project: WNUC00518
Sample ID: 457991001
Client ID: WNUC007
Matrix: Soil
Collect Date: 20-AUG-18 14:26
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.41%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		7.41				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		4.92	+/-1.13	0.493	0.500	pCi/g			JXR5	08/29/18	1222	1797288	2
Uranium-235/236	U	0.281	+/-0.355	0.442	0.500	pCi/g							
Uranium-238		2.50	+/-0.801	0.309	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	3.85	+/-12.7	21.8	50.0	pCi/g			TXJ1	08/29/18	0827	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			63.7	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.6	(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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Certificate of Analysis

Report Date: September 6, 2018

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: HF-B1-(3-4) Soil Boring
Sample ID: 457991002
Matrix: Soil
Collect Date: 20-AUG-18 14:50
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.27%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		7.27				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		7420	+/-158	6.96	0.500	pCi/g			JXR5	08/29/18	1222	1797288	2
Uranium-235/236		375	+/-39.6	6.63	0.500	pCi/g							
Uranium-238		1310	+/-66.4	6.49	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	14.6	+/-14.2	23.7	50.0	pCi/g			TXJ1	08/28/18	0544	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			84.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.5	(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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Certificate of Analysis

Report Date: September 6, 2018

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: HF-B1-(5-6) Soil Boring
Project: WNUC00518
Sample ID: 457991003
Client ID: WNUC007
Matrix: Soil
Collect Date: 20-AUG-18 15:30
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.66%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		7.66				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		8750	+/-166	12.3	0.500	pCi/g			JXR5	08/29/18	1222	1797288	2
Uranium-235/236		402	+/-39.6	4.85	0.500	pCi/g							
Uranium-238		1640	+/-71.7	5.39	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	6.24	+/-16.4	28.1	50.0	pCi/g			TXJ1	08/28/18	0606	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			90.8	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			98.7	(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: September 6, 2018

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: HF-B2-(1-2) Soil Boring
Sample ID: 457991004
Matrix: Soil
Collect Date: 20-AUG-18 17:01
Receive Date: 23-AUG-18
Collector: Client
Moisture: 4.75%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		4.75				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		12.6	+/-1.41	0.336	0.500	pCi/g			JXR5	08/29/18	1222	1797288	2
Uranium-235/236		0.638	+/-0.368	0.240	0.500	pCi/g							
Uranium-238		2.96	+/-0.688	0.247	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	14.7	+/-13.2	22.0	50.0	pCi/g			TXJ1	08/28/18	0627	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			94.3	(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: September 6, 2018

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: HF-B3-(1-2) Soil Boring
Project: WNUC00518
Sample ID: 457991005
Client ID: WNUC007
Matrix: Soil
Collect Date: 21-AUG-18 08:40
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.04%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		1.04				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.49	+/-0.490	0.274	0.500	pCi/g			JXR5	08/29/18	1222	1797288	2
Uranium-235/236		0.195	+/-0.215	0.146	0.500	pCi/g							
Uranium-238		0.811	+/-0.374	0.292	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-16.8	+/-24.4	43.2	50.0	pCi/g			TXJ1	08/29/18	0849	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			91.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			77.2	(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: September 6, 2018

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: HF-B3-(3-4) Soil Boring
Project: WNUC00518
Sample ID: 457991006
Client ID: WNUC007
Matrix: Soil
Collect Date: 21-AUG-18 08:58
Receive Date: 23-AUG-18
Collector: Client
Moisture: .876%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		0.876				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		745	+/-15.1	0.837	0.500	pCi/g			JXR5	08/29/18	1429	1797288	2
Uranium-235/236		36.1	+/-3.70	0.471	0.500	pCi/g							
Uranium-238		121	+/-6.07	0.752	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-2.68	+/-12.1	21.2	50.0	pCi/g			TXJ1	08/28/18	0711	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			85.9	(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: September 6, 2018

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: HF-B3-(4.5-5) Soil Boring
Project: WNUC00518
Sample ID: 457991007
Client ID: WNUC007
Matrix: Soil
Collect Date: 21-AUG-18 09:10
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.46%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		1.46				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		311	+/-10.2	0.586	0.500	pCi/g			JXR5	08/29/18	1222	1797288	2
Uranium-235/236		13.6	+/-2.39	0.516	0.500	pCi/g							
Uranium-238		51.5	+/-4.17	0.756	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.24	+/-15.5	27.0	50.0	pCi/g			TXJ1	08/28/18	0733	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			87.5	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			88.5	(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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Certificate of Analysis

Report Date: September 6, 2018

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: HF-B4-(1-2) Soil Boring
Sample ID: 457991008
Matrix: Soil
Collect Date: 21-AUG-18 09:46
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.02%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		1.02				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		793	+/-17.1	0.635	0.500	pCi/g			JXR5	08/29/18	1222	1797288	2
Uranium-235/236		43.6	+/-4.45	0.354	0.500	pCi/g							
Uranium-238		173	+/-7.97	0.529	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	15.5	+/-16.8	28.2	50.0	pCi/g			TXJ1	08/28/18	0755	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			82	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			98.9	(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: September 6, 2018

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: HF-B4-(3-4) Soil Boring
Sample ID: 457991009
Matrix: Soil
Collect Date: 21-AUG-18 09:59
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.27%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		1.27				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		999	+/-18.5	0.596	0.500	pCi/g			JXR5	08/29/18	1222	1797288	2
Uranium-235/236		54.5	+/-4.81	0.529	0.500	pCi/g							
Uranium-238		224	+/-8.77	0.495	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	5.15	+/-16.1	27.6	50.0	pCi/g			TXJ1	08/28/18	0816	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			72.8	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			90.5	(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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Certificate of Analysis

Report Date: September 6, 2018

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: HF-B4-(5-5.5) Soil Boring
Sample ID: 457991010
Matrix: Soil
Collect Date: 21-AUG-18 10:10
Receive Date: 23-AUG-18
Collector: Client
Moisture: 2.01%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		2.01				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		237	+/-8.64	0.468	0.500	pCi/g			JXR5	08/29/18	1222	1797288	2
Uranium-235/236		9.91	+/-1.97	0.303	0.500	pCi/g							
Uranium-238		49.8	+/-3.97	0.634	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	2.51	+/-14.1	24.4	50.0	pCi/g			TXJ1	08/28/18	0838	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			75.3	(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

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Report Date: September 6, 2018

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: HF-B5-(1-2) Soil Boring
Project: WNUC00518
Sample ID: 457991011
Client ID: WNUC007
Matrix: Soil
Collect Date: 21-AUG-18 11:01
Receive Date: 23-AUG-18
Collector: Client
Moisture: 4.58%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		4.58				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		17.1	+/-1.57	0.331	0.500	pCi/g			JXR5	08/29/18	1422	1797288	2
Uranium-235/236		1.02	+/-0.453	0.355	0.500	pCi/g							
Uranium-238		4.59	+/-0.817	0.260	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.15	+/-13.4	23.4	50.0	pCi/g			TXJ1	08/28/18	0900	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			71.8	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			98.1	(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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Report Date: September 6, 2018

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: HF-B6-(1-2) Soil Boring
Sample ID: 457991012
Matrix: Soil
Collect Date: 21-AUG-18 11:27
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.83%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		7.83				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.31	+/-0.408	0.250	0.500	pCi/g			JXR5	08/29/18	1422	1797288	2
Uranium-235/236	U	-0.00756	+/-0.113	0.265	0.500	pCi/g							
Uranium-238		1.00	+/-0.350	0.147	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	3.23	+/-12.8	22.1	50.0	pCi/g			TXJ1	08/28/18	0922	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			85.8	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			98.3	(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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Report Date: September 6, 2018

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: HF-B6-(3-4) Soil Boring
Sample ID: 457991013
Matrix: Soil
Collect Date: 21-AUG-18 11:45
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.88%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		7.88				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		0.945	+/-0.380	0.301	0.500	pCi/g			JXR5	08/29/18	1422	1797288	2
Uranium-235/236	U	-0.0102	+/-0.0883	0.205	0.500	pCi/g							
Uranium-238		0.700	+/-0.319	0.211	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	19.0	+/-18.5	30.9	50.0	pCi/g			TXJ1	08/28/18	0944	1796303	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			79.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.8	(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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Report Date: September 6, 2018

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: HF-B6-(5-6) Soil Boring
Project: WNUC00518
Sample ID: 457991014
Client ID: WNUC007
Matrix: Soil
Collect Date: 21-AUG-18 13:47
Receive Date: 23-AUG-18
Collector: Client
Moisture: 10.3%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		10.3				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.16	+/-0.482	0.364	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236	U	0.114	+/-0.196	0.171	0.500	pCi/g							
Uranium-238		0.912	+/-0.416	0.221	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	3.57	+/-14.3	24.7	50.0	pCi/g			TXJ1	08/28/18	0521	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			74.7	(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: September 6, 2018

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: HF-B7-(1-2) Soil Boring
Sample ID: 457991015
Matrix: Soil
Collect Date: 21-AUG-18 14:51
Receive Date: 23-AUG-18
Collector: Client
Moisture: 2.14%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		2.14				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		9.68	+/-1.16	0.237	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		0.597	+/-0.337	0.245	0.500	pCi/g							
Uranium-238		2.70	+/-0.615	0.198	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	15.4	+/-17.5	29.5	50.0	pCi/g			TXJ1	08/28/18	0543	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			88.4	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.6	(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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Certificate of Analysis

Report Date: September 6, 2018

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: HF-B8-(1-2) Soil Boring
Sample ID: 457991016
Matrix: Soil
Collect Date: 21-AUG-18 15:10
Receive Date: 23-AUG-18
Collector: Client
Moisture: 3.86%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		3.86				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		12.8	+/-1.45	0.338	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		0.422	+/-0.311	0.158	0.500	pCi/g							
Uranium-238		2.79	+/-0.685	0.236	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	12.7	+/-18.3	30.9	50.0	pCi/g			TXJ1	08/28/18	0604	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			79.6	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			99.1	(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: September 6, 2018

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: HF-B9-(1-2) Soil Boring
Project: WNUC00518
Sample ID: 457991017
Client ID: WNUC007
Matrix: Soil
Collect Date: 21-AUG-18 16:17
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.36%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		7.36				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.68	+/-0.546	0.326	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236	U	0.146	+/-0.211	0.254	0.500	pCi/g							
Uranium-238		0.999	+/-0.432	0.332	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	10.7	+/-14.5	24.4	50.0	pCi/g			TXJ1	08/28/18	0626	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			80.5	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			95.6	(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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Certificate of Analysis

Report Date: September 6, 2018

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: HF-B9-(3-4) Soil Boring
Sample ID: 457991018
Matrix: Soil
Collect Date: 21-AUG-18 16:58
Receive Date: 23-AUG-18
Collector: Client
Moisture: 7.23%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		7.23				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		3690	+/-69.6	3.04	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		202	+/-18.1	2.34	0.500	pCi/g							
Uranium-238		637	+/-28.9	2.76	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	23.1	+/-16.1	26.5	50.0	pCi/g			TXJ1	08/28/18	0648	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			74.3	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			98.1	(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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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 6, 2018

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: HF-B9-(5-6) Soil Boring
Project: WNUC00518
Sample ID: 457991019
Client ID: WNUC007
Matrix: Soil
Collect Date: 21-AUG-18 17:23
Receive Date: 23-AUG-18
Collector: Client
Moisture: 11.5%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		11.5				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		478	+/-12.0	0.600	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		28.3	+/-3.25	0.291	0.500	pCi/g							
Uranium-238		81.1	+/-4.95	0.480	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	7.95	+/-11.1	18.7	50.0	pCi/g			TXJ1	08/28/18	0709	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			71.3	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.6	(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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Certificate of Analysis

Report Date: September 6, 2018

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: HF-B10-(1-2) Soil Boring
Sample ID: 457991020
Matrix: Soil
Collect Date: 22-AUG-18 08:40
Receive Date: 23-AUG-18
Collector: Client
Moisture: 5.09%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		5.09				percent			CXB7	08/23/18	1614	1796278	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		430	+/-10.1	0.577	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		23.4	+/-2.63	0.230	0.500	pCi/g							
Uranium-238		96.9	+/-4.81	0.481	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	16.1	+/-18.4	31.0	50.0	pCi/g			TXJ1	08/28/18	0731	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1614	1796278

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			93.6	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.5	(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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Certificate of Analysis

Report Date: September 6, 2018

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: HF-B10-(3-4) Soil Boring
Sample ID: 457991021
Matrix: Soil
Collect Date: 22-AUG-18 08:55
Receive Date: 23-AUG-18
Collector: Client
Moisture: 2.11%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		2.11				percent			CXB7	08/23/18	1619	1796279	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1460	+/-47.3	3.64	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		74.7	+/-12.0	2.73	0.500	pCi/g							
Uranium-238		290	+/-21.1	2.95	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	6.99	+/-11.6	19.7	50.0	pCi/g			TXJ1	08/28/18	0753	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1619	1796279

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			71.8	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			97.9	(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: September 6, 2018

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: HF-B11-(1-2) Soil Boring
Sample ID: 457991022
Matrix: Soil
Collect Date: 22-AUG-18 09:42
Receive Date: 23-AUG-18
Collector: Client
Moisture: 1.18%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		1.18				percent			CXB7	08/23/18	1619	1796279	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		80.0	+/-4.36	0.571	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		4.52	+/-1.17	0.466	0.500	pCi/g							
Uranium-238		17.1	+/-2.03	0.536	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	20.5	+/-20.0	33.5	50.0	pCi/g			TXJ1	08/28/18	0814	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1619	1796279

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			91.2	(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: September 6, 2018

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: HF-B11-(3-4) Soil Boring
Sample ID: 457991023
Matrix: Soil
Collect Date: 22-AUG-18 10:05
Receive Date: 23-AUG-18
Collector: Client
Moisture: 3.16%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		3.16				percent			CXB7	08/23/18	1619	1796279	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		3300	+/-68.6	2.86	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		175	+/-17.6	2.20	0.500	pCi/g							
Uranium-238		618	+/-29.7	2.27	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	3.24	+/-14.6	25.1	50.0	pCi/g			TXJ1	08/28/18	0836	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1619	1796279

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			79.2	(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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Certificate of Analysis

Report Date: September 6, 2018

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: HF-B11-(5-6) Soil Boring
Sample ID: 457991024
Matrix: Soil
Collect Date: 22-AUG-18 10:42
Receive Date: 23-AUG-18
Collector: Client
Moisture: 13.3%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		13.3				percent			CXB7	08/23/18	1619	1796279	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		12500	+/-215	6.05	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		630	+/-53.8	5.71	0.500	pCi/g							
Uranium-238		2320	+/-92.7	7.13	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.18	+/-14.4	25.1	50.0	pCi/g			TXJ1	08/28/18	0858	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1619	1796279

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			67.9	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94.3	(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: September 6, 2018

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: HF-B12-(1-2) Soil Boring
Sample ID: 457991025
Matrix: Soil
Collect Date: 22-AUG-18 11:21
Receive Date: 23-AUG-18
Collector: Client
Moisture: 2.71%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		2.71				percent			CXB7	08/23/18	1619	1796279	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		5170	+/-101	3.81	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		249	+/-24.6	3.49	0.500	pCi/g							
Uranium-238		841	+/-40.6	3.58	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.935	+/-14.5	25.1	50.0	pCi/g			TXJ1	08/28/18	0920	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1619	1796279

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			56	(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: September 6, 2018

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: HF-B12-(3-4) Soil Boring
Sample ID: 457991026
Matrix: Soil
Collect Date: 22-AUG-18 11:38
Receive Date: 23-AUG-18
Collector: Client
Moisture: 4.42%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		4.42				percent			CXB7	08/23/18	1619	1796279	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		5900	+/-125	5.29	0.500	pCi/g			JXR5	08/29/18	1222	1797293	2
Uranium-235/236		291	+/-31.0	4.74	0.500	pCi/g							
Uranium-238		978	+/-51.0	4.85	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	19.4	+/-20.0	33.5	50.0	pCi/g			TXJ1	08/28/18	0941	1796304	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXB7	08/23/18	1619	1796279

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			74.5	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			98.9	(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

QC Summary

Report Date: September 6, 2018

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

Contact: **Ms. Cynthia Logsdon**

Workorder: **457991**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch 1797288											
QC1204102810 457991004 DUP											
Uranium-233/234		12.6		15.3	pCi/g	19.8		(0%-20%)	JXR5	08/29/18	14:22
	Uncertainty	+/-1.41		+/-1.48							
Uranium-235/236		0.638		0.812	pCi/g	24		(0% - 100%)			
	Uncertainty	+/-0.368		+/-0.392							
Uranium-238		2.96		3.44	pCi/g	14.7		(0%-20%)			
	Uncertainty	+/-0.688		+/-0.713							
QC1204102811 LCS											
Uranium-233/234				14.6	pCi/g					08/29/18	14:29
	Uncertainty			+/-1.63							
Uranium-235/236				0.969	pCi/g						
	Uncertainty			+/-0.483							
Uranium-238	12.4			15.3	pCi/g		123	(75%-125%)			
	Uncertainty			+/-1.67							
QC1204102809 MB											
Uranium-233/234			U	0.0496	pCi/g					08/29/18	14:22
	Uncertainty			+/-0.159							
Uranium-235/236			U	0.0736	pCi/g						
	Uncertainty			+/-0.169							
Uranium-238			U	0.0689	pCi/g						
	Uncertainty			+/-0.135							
Batch 1797293											
QC1204102816 457991014 DUP											
Uranium-233/234		1.16		1.05	pCi/g	10		(0% - 100%)	JXR5	08/29/18	12:22
	Uncertainty	+/-0.482		+/-0.451							
Uranium-235/236	U	0.114	U	0.144	pCi/g	N/A		N/A			
	Uncertainty	+/-0.196		+/-0.208							
Uranium-238		0.912		0.627	pCi/g	37.1		(0% - 100%)			
	Uncertainty	+/-0.416		+/-0.357							

QC Summary

Workorder: **457991**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1797293										
QC1204102817 LCS										
Uranium-233/234				13.8	pCi/g				JXR5	08/29/18 12:22
	Uncertainty			+/-1.55						
Uranium-235/236				1.09	pCi/g					
	Uncertainty			+/-0.495						
Uranium-238	13.2			14.1	pCi/g		107	(75%-125%)		
	Uncertainty			+/-1.56						
QC1204102815 MB										
Uranium-233/234			U	0.132	pCi/g					08/29/18 12:22
	Uncertainty			+/-0.228						
Uranium-235/236			U	0.100	pCi/g					
	Uncertainty			+/-0.197						
Uranium-238			U	0.0258	pCi/g					
	Uncertainty			+/-0.166						
Rad Liquid Scintillation										
Batch 1796303										
QC1204100519 457991001 DUP										
Technetium-99	U	3.85	U	11.9	pCi/g	N/A		N/A	TXJ1	08/28/18 10:27
	Uncertainty	+/-12.7		+/-15.1						
QC1204100520 LCS										
Technetium-99	548			507	pCi/g		92.6	(75%-125%)		08/28/18 10:49
	Uncertainty			+/-25.8						
QC1204100518 MB										
Technetium-99			U	-0.764	pCi/g					08/28/18 10:05
	Uncertainty			+/-13.1						
Batch 1796304										
QC1204100522 457991014 DUP										
Technetium-99	U	3.57	U	-4.55	pCi/g	N/A		N/A	TXJ1	08/28/18 10:25
	Uncertainty	+/-14.3		+/-14.3						
QC1204100523 LCS										
Technetium-99	467			446	pCi/g		95.6	(75%-125%)		08/28/18 10:46
	Uncertainty			+/-21.7						
QC1204100521 MB										
Technetium-99			U	0.608	pCi/g					08/28/18 10:03
	Uncertainty			+/-10.6						

QC Summary

Workorder: **457991**

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	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 (WNUC)
SDG #: 457991

Metals

Product: **Determination of Metals by ICP-MS**
Analytical Method: SW846 3050B/6020A
Analytical Procedure: GL-MA-E-014 REV# 32
Analytical Batch: 1796296

Preparation Method: SW846 3050B
Preparation Procedure: GL-MA-E-009 REV# 28
Preparation Batch: 1796295

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

GEL Sample ID#	Client Sample Identification
457991001	HF-B1-(1-2) Soil Boring
457991002	HF-B1-(3-4) Soil Boring
457991003	HF-B1-(5-6) Soil Boring
457991004	HF-B2-(1-2) Soil Boring
457991005	HF-B3-(1-2) Soil Boring
457991006	HF-B3-(3-4) Soil Boring
457991007	HF-B3-(4.5-5) Soil Boring
457991008	HF-B4-(1-2) Soil Boring
457991009	HF-B4-(3-4) Soil Boring
457991010	HF-B4-(5-5.5) Soil Boring
457991011	HF-B5-(1-2) Soil Boring
457991012	HF-B6-(1-2) Soil Boring
457991013	HF-B6-(3-4) Soil Boring
457991014	HF-B6-(5-6) Soil Boring
457991015	HF-B7-(1-2) Soil Boring
457991016	HF-B8-(1-2) Soil Boring
457991017	HF-B9-(1-2) Soil Boring
457991018	HF-B9-(3-4) Soil Boring
457991019	HF-B9-(5-6) Soil Boring
457991020	HF-B10-(1-2) Soil Boring
1204100479	Method Blank (MB)**ICP-MS**
1204100480	Laboratory Control Sample (LCS)
1204100498	Laboratory Control Sample (LCS)
1204100483	457991001(HF-B1-(1-2) Soil BoringL) Serial Dilution (SD)
1204100481	457991001(HF-B1-(1-2) Soil BoringD) Sample Duplicate (DUP)
1204100482	457991001(HF-B1-(1-2) Soil BoringS) Matrix Spike (MS)
1204100499	457991001(HF-B1-(1-2) Soil BoringS) 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.

Calibration Information

CRDL/PQL Requirements
The CRDL standard recoveries for SW846 6020A/6020B met the advisory control limits with the exception of uranium 235. Client sample concentrations were greater than two times the CRDL; therefore the data were not adversely affected. 457991009 (HF-B4-(3-4) Soil Boring), 457991010 (HF-B4-(5-5.5) Soil Boring), 457991011 (HF-B5-(1-2) Soil Boring), 457991015 (HF-B7-(1-2) Soil Boring), 457991016 (HF-B8-(1-2) Soil Boring), 457991018 (HF-B9-(3-4) Soil Boring), 457991019 (HF-B9-(5-6) Soil Boring) and 457991020 (HF-B10-(1-2) Soil Boring).

ICSA/ICSAB Statement
For the ICP-MS analysis, the ICSA solution contains analyte concentrations which are verified trace impurities indigenous to the purchased standard.

Quality Control (QC) Information

Duplicate Relative Percent Difference (RPD) Statement
The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. Not all the applicable analyte RPD values were within the acceptance criteria.

Sample	Analyte	Value
1204100481 (HF-B1-(1-2) Soil BoringDUP)	Uranium	37.7* (0%-20%)
	Uranium-235	36.7* (0%-20%)
	Uranium-238	38.5* (0%-20%)

Technical Information

Preparation/Analytical Method Verification
Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions
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. Samples 457991001 (HF-B1-(1-2) Soil Boring), 457991002 (HF-B1-(3-4) Soil Boring), 457991003 (HF-B1-(5-6) Soil Boring), 457991004 (HF-B2-(1-2) Soil Boring), 457991006 (HF-B3-(3-4) Soil Boring), 457991007 (HF-B3-(4.5-5) Soil Boring), 457991008 (HF-B4-(1-2) Soil Boring), 457991009 (HF-B4-(3-4) Soil Boring), 457991010 (HF-B4-(5-5.5) Soil Boring), 457991011 (HF-B5-(1-2) Soil Boring), 457991015 (HF-B7-(1-2) Soil Boring), 457991016 (HF-B8-(1-2) Soil Boring), 457991018 (HF-B9-(3-4) Soil Boring), 457991019 (HF-B9-(5-6) Soil Boring) and 457991020 (HF-B10-(1-2) Soil Boring) were diluted to ensure that the analyte concentrations were within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	457991									
	001	002	003	004	005	006	007	008	009	010
Uranium	2X	2000X	2000X	2X	2X	200X	25X	200X	200X	20X
Uranium-234	2X	20X	20X	2X	2X	2X	2X	2X	2X	2X
Uranium-235	2X	2000X	2000X	10X	2X	200X	200X	200X	250X	200X

Uranium-238	2X	2000X	2000X	2X	2X	200X	200X	200X	250X	20X

Analyte	457991									
	011	**012**	**013**	**014**	**015**	**016**	**017**	**018**	**019**	**020**
Uranium	20X	2X	2X	2X	2X	20X	2X	200X	25X	200X
Uranium-234	2X	2X	2X	2X	2X	2X	2X	10X	2X	2X
Uranium-235	20X	2X	2X	2X	5X	200X	2X	2000X	200X	200X
Uranium-238	20X	2X	2X	2X	5X	20X	2X	200X	25X	200X

Product: **Determination of Metals by ICP-MS**
Analytical Method: SW846 3050B/6020A
Analytical Procedure: GL-MA-E-014 REV# 32
Analytical Batch: 1796299

Preparation Method: SW846 3050B
Preparation Procedure: GL-MA-E-009 REV# 28
Preparation Batch: 1796298

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

GEL Sample ID#	Client Sample Identification
457991021	HF-B10-(3-4) Soil Boring
457991022	HF-B11-(1-2) Soil Boring
457991023	HF-B11-(3-4) Soil Boring
457991024	HF-B11-(5-6) Soil Boring
457991025	HF-B12-(1-2) Soil Boring
457991026	HF-B12-(3-4) Soil Boring
1204100484	Method Blank (MB)**ICP-MS**
1204100485	Laboratory Control Sample (LCS)
1204100500	Laboratory Control Sample (LCS)
1204100488	457991021(HF-B10-(3-4) Soil BoringL) Serial Dilution (SD)
1204100486	457991021(HF-B10-(3-4) Soil BoringD) Sample Duplicate (DUP)
1204100487	457991021(HF-B10-(3-4) Soil BoringS) Matrix Spike (MS)
1204100501	457991021(HF-B10-(3-4) Soil BoringS) Matrix Spike (MS)
1204103557	457991021(HF-B10-(3-4) Soil BoringPS) Post Spike (PS)

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.

Calibration Information

ICSA/ICSAB Statement
For the ICP-MS analysis, the ICSA solution contains analyte concentrations which are verified trace impurities

indigenous to the purchased standard.

Quality Control (QC) Information

Matrix Spike (MS/MSD) Recovery Statement
The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1204100501 (HF-B10-(3-4) Soil BoringMS)	Uranium-234	156* (75%-125%)

Technical Information

Preparation/Analytical Method Verification
Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions
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. Samples were diluted to ensure that the analyte concentrations were within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	457991					
	021	022	023	024	025	026
Uranium	200X	25X	200X	2000X	2000X	2000X
Uranium-234	10X	2X	10X	25X	10X	20X
Uranium-235	1000X	25X	2000X	4000X	4000X	2000X
Uranium-238	200X	25X	200X	2000X	2000X	2000X

General Chemistry

Product: Ion Chromatography
Analytical Method: SW846 9056A
Analytical Procedure: GL-GC-E-086 REV# 25
Analytical Batches: 1796414 and 1796413

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

GEL Sample ID#	Client Sample Identification
457991002	HF-B1-(3-4) Soil Boring
457991021	HF-B10-(3-4) Soil Boring
457991022	HF-B11-(1-2) Soil Boring

457991023	HF-B11-(3-4) Soil Boring
457991024	HF-B11-(5-6) Soil Boring
457991025	HF-B12-(1-2) Soil Boring
457991026	HF-B12-(3-4) Soil Boring
1204100740	Method Blank (MB)
1204100741	Laboratory Control Sample (LCS)
1204100742	457991026(HF-B12-(3-4) Soil Boring) Sample Duplicate (DUP)
1204100743	457991026(HF-B12-(3-4) Soil Boring) 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 1204100742 (HF-B12-(3-4) Soil BoringDUP), 1204100743 (HF-B12-(3-4) Soil BoringMS), 457991002 (HF-B1-(3-4) Soil Boring), 457991023 (HF-B11-(3-4) Soil Boring), 457991024 (HF-B11-(5-6) Soil Boring) and 457991026 (HF-B12-(3-4) Soil Boring) 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	457991			
	002	023	024	026
Fluoride	5X	10X	25X	20X

Product: **Ion Chromatography**
Analytical Method: SW846 9056A
Analytical Procedure: GL-GC-E-086 REV# 25
Analytical Batches: 1796417 and 1796416

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

GEL Sample ID#	Client Sample Identification
457991001	HF-B1-(1-2) Soil Boring
457991003	HF-B1-(5-6) Soil Boring
457991004	HF-B2-(1-2) Soil Boring
457991005	HF-B3-(1-2) Soil Boring
457991006	HF-B3-(3-4) Soil Boring
457991007	HF-B3-(4.5-5) Soil Boring
457991008	HF-B4-(1-2) Soil Boring
457991009	HF-B4-(3-4) Soil Boring
457991010	HF-B4-(5-5.5) Soil Boring
1204100744	Method Blank (MB)
1204100745	Laboratory Control Sample (LCS)
1204100746	457991010(HF-B4-(5-5.5) Soil Boring) Sample Duplicate (DUP)

1204100747 457991010(HF-B4-(5-5.5) Soil Boring) 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 457991003 (HF-B1-(5-6) Soil Boring) and 457991007 (HF-B3-(4.5-5) Soil Boring) 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	457991	
	003	007
Fluoride	10X	5X

Sample Re-analysis
Samples1204100744 (MB), 1204100745 (LCS), 457991001 (HF-B1-(1-2) Soil Boring), 457991004 (HF-B2-(1-2) Soil Boring), 457991005 (HF-B3-(1-2) Soil Boring), 457991006 (HF-B3-(3-4) Soil Boring), 457991008 (HF-B4-(1-2) Soil Boring) and 457991009 (HF-B4-(3-4) Soil Boring) were re-analyzed due to CCV failure. The reanalysis data with passing instrument QC was reported.

Product: **Ion Chromatography**
Analytical Method: SW846 9056A
Analytical Procedure: GL-GC-E-086 REV# 25
Analytical Batches: 1796420 and 1796419

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

GEL Sample ID#	Client Sample Identification
457991011	HF-B5-(1-2) Soil Boring
457991012	HF-B6-(1-2) Soil Boring
457991013	HF-B6-(3-4) Soil Boring
457991014	HF-B6-(5-6) Soil Boring
457991015	HF-B7-(1-2) Soil Boring
457991016	HF-B8-(1-2) Soil Boring
457991017	HF-B9-(1-2) Soil Boring
457991018	HF-B9-(3-4) Soil Boring
457991019	HF-B9-(5-6) Soil Boring
457991020	HF-B10-(1-2) Soil Boring
1204100748	Method Blank (MB)
1204100749	Laboratory Control Sample (LCS)
1204100750	457991020(HF-B10-(1-2) Soil Boring) Sample Duplicate (DUP)
1204100751	457991020(HF-B10-(1-2) Soil Boring) 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 457991018 (HF-B9-(3-4) Soil Boring) and 457991019 (HF-B9-(5-6) Soil Boring) 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	457991	
	018	019
Fluoride	10X	5X

Product: pH
Analytical Method: SW846 9045D
Analytical Procedure: GL-GC-E-008 REV# 23
Analytical Batch: 1794362

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

GEL Sample ID#	Client Sample Identification
457991001	HF-B1-(1-2) Soil Boring
457991002	HF-B1-(3-4) Soil Boring
457991003	HF-B1-(5-6) Soil Boring
457991004	HF-B2-(1-2) Soil Boring
457991005	HF-B3-(1-2) Soil Boring
457991006	HF-B3-(3-4) Soil Boring
457991007	HF-B3-(4.5-5) Soil Boring
457991008	HF-B4-(1-2) Soil Boring
1204096009	Laboratory Control Sample (LCS)
1204096010	457499001(NonSDG) 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
1204096010 (Non SDG 457499001DUP)	Corrosivity	Received 16-AUG-18, out of holding 09-AUG-18
457991001 (HF-B1-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 20-AUG-18
457991002 (HF-B1-(3-4) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 20-AUG-18
457991003 (HF-B1-(5-6) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 20-AUG-18
457991004 (HF-B2-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 20-AUG-18
457991005 (HF-B3-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991006 (HF-B3-(3-4) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991007 (HF-B3-(4.5-5) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991008 (HF-B4-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18

Product: **pH**
Analytical Method: SW846 9045D
Analytical Procedure: GL-GC-E-008 REV# 23
Analytical Batch: 1796197

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

GEL Sample ID#	Client Sample Identification
457991009	HF-B4-(3-4) Soil Boring
457991010	HF-B4-(5-5.5) Soil Boring
457991011	HF-B5-(1-2) Soil Boring
457991012	HF-B6-(1-2) Soil Boring
457991013	HF-B6-(3-4) Soil Boring
457991014	HF-B6-(5-6) Soil Boring
457991015	HF-B7-(1-2) Soil Boring
457991016	HF-B8-(1-2) Soil Boring
457991017	HF-B9-(1-2) Soil Boring
457991018	HF-B9-(3-4) Soil Boring
457991019	HF-B9-(5-6) Soil Boring
457991020	HF-B10-(1-2) Soil Boring
457991021	HF-B10-(3-4) Soil Boring
457991022	HF-B11-(1-2) Soil Boring
457991023	HF-B11-(3-4) Soil Boring
457991024	HF-B11-(5-6) Soil Boring
457991025	HF-B12-(1-2) Soil Boring
457991026	HF-B12-(3-4) Soil Boring
1204100257	Laboratory Control Sample (LCS)
1204100258	457991009(HF-B4-(3-4) Soil Boring) Sample Duplicate (DUP)
1204100259	457991010(HF-B4-(5-5.5) Soil Boring) 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
1204100258 (HF-B4-(3-4) Soil BoringDUP)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
1204100259 (HF-B4-(5-5.5) Soil BoringDUP)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991009 (HF-B4-(3-4) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991010 (HF-B4-(5-5.5) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991011 (HF-B5-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991012 (HF-B6-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991013 (HF-B6-(3-4) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991014 (HF-B6-(5-6) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991015 (HF-B7-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991016 (HF-B8-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991017 (HF-B9-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991018 (HF-B9-(3-4) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991019 (HF-B9-(5-6) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 21-AUG-18
457991020 (HF-B10-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 22-AUG-18
457991021 (HF-B10-(3-4) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 22-AUG-18
457991022 (HF-B11-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 22-AUG-18
457991023 (HF-B11-(3-4) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 22-AUG-18
457991024 (HF-B11-(5-6) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 22-AUG-18
457991025 (HF-B12-(1-2) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 22-AUG-18
457991026 (HF-B12-(3-4) Soil Boring)	Corrosivity	Received 23-AUG-18, out of holding 22-AUG-18

Radiochemistry

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1797288

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1796278

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

GEL Sample ID#	Client Sample Identification
457991001	HF-B1-(1-2) Soil Boring
457991002	HF-B1-(3-4) Soil Boring
457991003	HF-B1-(5-6) Soil Boring
457991004	HF-B2-(1-2) Soil Boring
457991005	HF-B3-(1-2) Soil Boring
457991006	HF-B3-(3-4) Soil Boring
457991007	HF-B3-(4.5-5) Soil Boring
457991008	HF-B4-(1-2) Soil Boring
457991009	HF-B4-(3-4) Soil Boring
457991010	HF-B4-(5-5.5) Soil Boring
457991011	HF-B5-(1-2) Soil Boring
457991012	HF-B6-(1-2) Soil Boring
457991013	HF-B6-(3-4) Soil Boring
1204102809	Method Blank (MB)
1204102810	457991004(HF-B2-(1-2) Soil Boring) Sample Duplicate (DUP)
1204102811	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.

Technical Information

Sample Re-prep/Re-analysis
Samples were reprepped due to high relative percent difference/relative error ratio. The re-analysis is being reported.

Recounts
Sample 457991006 (HF-B3-(3-4) Soil Boring) was recounted due to detector error. The recount is reported.

Miscellaneous Information

Additional Comments
The tracer peak centroid for sample 457991001 (HF-B1-(1-2) Soil Boring) 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# 26
Analytical Batch: 1797293

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batches: 1796278 and 1796279

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

GEL Sample ID#	Client Sample Identification
457991014	HF-B6-(5-6) Soil Boring
457991015	HF-B7-(1-2) Soil Boring
457991016	HF-B8-(1-2) Soil Boring
457991017	HF-B9-(1-2) Soil Boring
457991018	HF-B9-(3-4) Soil Boring
457991019	HF-B9-(5-6) Soil Boring
457991020	HF-B10-(1-2) Soil Boring
457991021	HF-B10-(3-4) Soil Boring
457991022	HF-B11-(1-2) Soil Boring
457991023	HF-B11-(3-4) Soil Boring
457991024	HF-B11-(5-6) Soil Boring
457991025	HF-B12-(1-2) Soil Boring
457991026	HF-B12-(3-4) Soil Boring
1204102815	Method Blank (MB)
1204102816	457991014(HF-B6-(5-6) Soil Boring) Sample Duplicate (DUP)
1204102817	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.

Technical Information

Sample Re-prep/Re-analysis
Samples were reprepped due to high blank activity. The re-analysis is being reported.

Miscellaneous Information

Manual Integration
Manual integrations of alpha spectroscopy spectra 457991016 (HF-B8-(1-2) Soil Boring) and 457991018 (HF-B9-(3-4) Soil Boring) were performed to fully separate counts in Regions of Interest which would have been biased.

Additional Comments
The tracer peak centroid for sample 457991016 (HF-B8-(1-2) Soil Boring) 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: **Dry Weight**
Analytical Method: ASTM D 2216 (Modified)
Analytical Procedure: GL-OA-E-020 REV# 13
Analytical Batch: 1796278

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1796278

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

GEL Sample ID#	Client Sample Identification
457991001	HF-B1-(1-2) Soil Boring
457991002	HF-B1-(3-4) Soil Boring
457991003	HF-B1-(5-6) Soil Boring
457991004	HF-B2-(1-2) Soil Boring
457991005	HF-B3-(1-2) Soil Boring
457991006	HF-B3-(3-4) Soil Boring
457991007	HF-B3-(4.5-5) Soil Boring
457991008	HF-B4-(1-2) Soil Boring
457991009	HF-B4-(3-4) Soil Boring
457991010	HF-B4-(5-5.5) Soil Boring
457991011	HF-B5-(1-2) Soil Boring
457991012	HF-B6-(1-2) Soil Boring
457991013	HF-B6-(3-4) Soil Boring
457991014	HF-B6-(5-6) Soil Boring
457991015	HF-B7-(1-2) Soil Boring
457991016	HF-B8-(1-2) Soil Boring
457991017	HF-B9-(1-2) Soil Boring
457991018	HF-B9-(3-4) Soil Boring
457991019	HF-B9-(5-6) Soil Boring
457991020	HF-B10-(1-2) Soil Boring
1204100452	457991001(HF-B1-(1-2) Soil Boring) 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**
Analytical Method: ASTM D 2216 (Modified)
Analytical Procedure: GL-OA-E-020 REV# 13
Analytical Batch: 1796279

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1796279

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

GEL Sample ID#	Client Sample Identification
457991021	HF-B10-(3-4) Soil Boring
457991022	HF-B11-(1-2) Soil Boring
457991023	HF-B11-(3-4) Soil Boring
457991024	HF-B11-(5-6) Soil Boring
457991025	HF-B12-(1-2) Soil Boring
457991026	HF-B12-(3-4) Soil Boring
1204100453	457991021(HF-B10-(3-4) Soil Boring) 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: 1796303

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

GEL Sample ID#	Client Sample Identification
457991001	HF-B1-(1-2) Soil Boring
457991002	HF-B1-(3-4) Soil Boring
457991003	HF-B1-(5-6) Soil Boring
457991004	HF-B2-(1-2) Soil Boring
457991005	HF-B3-(1-2) Soil Boring
457991006	HF-B3-(3-4) Soil Boring
457991007	HF-B3-(4.5-5) Soil Boring
457991008	HF-B4-(1-2) Soil Boring
457991009	HF-B4-(3-4) Soil Boring
457991010	HF-B4-(5-5.5) Soil Boring
457991011	HF-B5-(1-2) Soil Boring
457991012	HF-B6-(1-2) Soil Boring
457991013	HF-B6-(3-4) Soil Boring
1204100518	Method Blank (MB)
1204100519	457991001(HF-B1-(1-2) Soil Boring) Sample Duplicate (DUP)
1204100520	Laboratory Control Sample (LCS)

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

Data Summary:

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

Technical Information

Recounts
Sample 457991001 (HF-B1-(1-2) Soil Boring) was recounted to verify sample results. Recount is reported.
Sample 457991005 (HF-B3-(1-2) Soil Boring) was recounted due to results more negative than the three sigma TPU. The second count is reported.

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: 1796304

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

GEL Sample ID#	Client Sample Identification
457991014	HF-B6-(5-6) Soil Boring
457991015	HF-B7-(1-2) Soil Boring
457991016	HF-B8-(1-2) Soil Boring
457991017	HF-B9-(1-2) Soil Boring
457991018	HF-B9-(3-4) Soil Boring
457991019	HF-B9-(5-6) Soil Boring
457991020	HF-B10-(1-2) Soil Boring
457991021	HF-B10-(3-4) Soil Boring
457991022	HF-B11-(1-2) Soil Boring
457991023	HF-B11-(3-4) Soil Boring
457991024	HF-B11-(5-6) Soil Boring
457991025	HF-B12-(1-2) Soil Boring
457991026	HF-B12-(3-4) Soil Boring
1204100521	Method Blank (MB)
1204100522	457991014(HF-B6-(5-6) Soil Boring) Sample Duplicate (DUP)
1204100523	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.

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Page: 1 of 7
Project #: HF Spiking Station 2
GEL Quote #:
QC Number [1]:
PO Number: 4500720046

GEL Chain of Custody and Analytical Request

See www.gel.com for GEL's Sample Acceptance SOP

GEL Work Order Number: 457991

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

Client Name: Westinghouse Electric Company LLC — Phone #: 803.647.1920

Project/Site Name: Columbia Fuel Fabrication Facility — Fax #: 803.695.3964

Address: 5801 Bluff Road, Hopkins, SC 29061

Collected by: Jeremy Grant / Randy Crews — Send Results: 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	Should this sample be considered: TSCA Regulated	Total number of containers	isotopic uranium (alpha spec)	isotopic uranium (by individual isotope, ICP MS)	Tc-99	Moisture Content	Fluoride	pH	<-- Preservative Type (6)
HF-B1-(1-2)	Soil Boring	8/20/2018	1426	G	N	SO			1	X	X	X	X	X	X	
HF-B1-(3-4)	Soil Boring	8/20/2018	1450	G	N	SO			1	X	X	X	X	X	X	
HF-B1-(5-6)	Soil Boring	8/20/2018	1530	G	N	SO			1	X	X	X	X	X	X	
HF-B2-(1-2)	Soil Boring	8/20/2018	1701	G	N	SO			1	X	X	X	X	X	X	
HF-B3-(1-2)	Soil Boring	8/21/2018	0840	G	N	SO			1	X	X	X	X	X	X	
HF-B3-(3-4)	Soil Boring	8/21/2018	0858	G	N	SO			1	X	X	X	X	X	X	
HF-B3-(4.5-5)	Soil Boring	8/21/2018	0910	G	N	SO			1	X	X	X	X	X	X	

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: ___ Rush: __X__ Specify: _ASAP_
(Subject to Surcharge)

Fax Results: Yes / No

Circle Deliverable:
C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
Eastern Pacific
Central Other _____
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	R Crews	8/23/18	1005	[illegible]	8/23/18	1005
2						
3						

Sample Shipping and Delivery Details

GEL PM: Hope Taylor
Method of Shipment:
Date Shipped: N/A
Airbill #:
Airbill #:

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

For Lab Receiving Use Only
Custody Seal Intact? *YES* *NO*
Cooler Temp: *C*

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

Page: 2 of 7
Project #: HF Spiking Station 2
GEL Quote #:
QC Number [1]:
PO Number: 4500720046

GEL Chain of Custody and Analytical Request

See www.gel.com for GEL's Sample Acceptance SOP

GEL Work Order Number:

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

Client Name: Westinghouse Electric Company LLC — Phone #: 803.647.1920
Project/Site Name: Columbia Fuel Fabrication Facility — Fax #: 803.695.3964
Address: 5801 Bluff Road, Hopkins, SC 29061
Collected by: Jeremy Grant / Randy Crews — Send Results: 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	Should this sample be considered: TSCA Regulated	Total number of containers	isotopic uranium (alpha spec)	isotopic uranium (by individual isotope, ICP MS)	Tc-99	Moisture Content	Fluoride	pH					<-- Preservative Type (6)
HF-B4-(1-2) Soil Boring	8/21/2018	0946	G	N	SO			1	X	X	X	X	X	X					
HF-B4-(3-4) Soil Boring	8/21/2018	0959	G	N	SO			1	X	X	X	X	X	X					
HF-B4-(5-5.5) Soil Boring	8/21/2018	1010	G	N	SO			1	X	X	X	X	X	X					
HF-B5-(1-2) Soil Boring	8/21/2018	1101	G	N	SO			1	X	X	X	X	X	X					
HF-B6-(1-2) Soil Boring	8/21/2018	1127	G	N	SO			1	X	X	X	X	X	X					
HF-B6-(3-4) Soil Boring	8/21/2018	1145	G	N	SO			1	X	X	X	X	X	X					
HF-B6-(5-6) Soil Boring	8/21/2018	1347	G	N	SO			1	X	X	X	X	X	X					

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: ___ Rush: __X__ Specify: _ASAP_
(Subject to Surcharge)

Fax Results: Yes / No

Circle Deliverable:
C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
Eastern Pacific
Central Other _____
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	R Crews	8/23/18	0805	Stacy Burn	8/23/18	
2						
3						

Sample Shipping and Delivery Details

GEL PM: Hope Taylor
Method of Shipment:
Date Shipped: N/A
Airbill #:
Airbill #:

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

For Lab Receiving Use Only
Custody Seal Intact?
YES *NO*
Cooler Temp: *C*

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

Page: 3 of 7
Project #: HF Spiking Station 2
GEL Quote #:
QC Number [1]:
PO Number: 4500720046

GEL Chain of Custody and Analytical Request

See www.gel.com for GEL's Sample Acceptance SOP

GEL Work Order Number:

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

Client Name: Westinghouse Electric Company LLC — Phone #: 803.647.1920
Project/Site Name: Columbia Fuel Fabrication Facility — Fax #: 803.695.3964
Address: 5801 Bluff Road, Hopkins, SC 29061
Collected by: Jeremy Grant / Randy Crews — Send Results: 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	Should this sample be considered: TSCA Regulated	Total number of containers	isotopic uranium (alpha spec)	isotopic uranium (by individual isotope, ICP-MS)	Tc-99	Moisture Content	Fluoride	pH					<-- Preservative Type (6)
HF-B7-(1-2) Soil Boring	8/21/2018	1451	G	N	SO			1	X	X	X	X	X	X					
HF-B8-(1-2) Soil Boring	8/21/2018	1510	G	N	SO			1	X	X	X	X	X	X					
HF-B9-(1-2) Soil Boring	8/21/2018	1617	G	N	SO			1	X	X	X	X	X	X					
HF-B9-(3-4) Soil Boring	8/21/2018	1658	G	N	SO			1	X	X	X	X	X	X					
HF-B9-(5-6) Soil Boring	8/21/2018	1723	G	N	SO			1	X	X	X	X	X	X					

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: ___ Rush: __X__ Specify: _ASAP_
(Subject to Surcharge)

Fax Results: Yes / No

Circle Deliverable:
C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
Eastern Pacific
Central Other _____
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	R Crews	8/23/18	1005		8/23/18	5005
2						
3						

Sample Shipping and Delivery Details

GEL PM: Hope Taylor
Method of Shipment:
Date Shipped: N/A
Airbill #:
Airbill #:

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

For Lab Receiving Use Only
Custody Seal Intact? *YES* *NO*
Cooler Temp: *C*

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

Page: 4 of 7
Project #: HF Spiking Station 2
GEL Quote #:
QC Number [1]:
PO Number: 4500720046

GEL Chain of Custody and Analytical Request

See www.gel.com for GEL's Sample Acceptance SOP

GEL Work Order Number:

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

Client Name: Westinghouse Electric Company LLC — Phone #: 803.647.1920

Project/Site Name: Columbia Fuel Fabrication Facility — Fax #: 803.695.3964

Address: 5801 Bluff Road, Hopkins, SC 29061

Collected by: Jeremy Grant / Randy Crews — Send Results: 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	Should this sample be considered: TSCA Regulated	Total number of containers	isotopic uranium (alpha spec)	isotopic uranium (by individual isotope, ICP MS)	Tc-99	Moisture Content	Fluoride	pH					<-- Preservative Type (6)
HF-B10-(1-2) Soil Boring	8/22/2018	0840	G	N	SO			1	X	X	X	X	X	X					
HF-B10-(3-4) Soil Boring	8/22/2018	0855	G	N	SO			1	X	X	X	X	X	X					
HF-B11-(1-2) Soil Boring	8/22/2018	0942	G	N	SO			1	X	X	X	X	X	X					
HF-B11-(3-4) Soil Boring	8/22/2018	1005	G	N	SO			1	X	X	X	X	X	X					
HF-B11-(5-6) Soil Boring	8/22/2018	1042	G	N	SO			1	X	X	X	X	X	X					
HF-B12-(1-2) Soil Boring	8/22/2018	1121	G	N	SO			1	X	X	X	X	X	X					
HF-B12-(3-4) Soil Boring	8/22/2018	1138	G	N	SO			1	X	X	X	X	X	X					

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: ___ Rush: __X__ Specify: _ASAP_
(Subject to Surcharge)

Fax Results: Yes / No

Circle Deliverable:
C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
Eastern Pacific
Central Other _____
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	R Crews	8/23/18	1005	[signature]	8/23/18	
2						
3						

Sample Shipping and Delivery Details

GEL PM: Hope Taylor
Method of Shipment:
Date Shipped: N/A
Airbill #:
Airbill #:

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

For Lab Receiving Use Only
Custody Seal Intact?
YES NO
Cooler Temp:
C

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WNUC	SDG/AR/COC/Work Order: 457991
Received By: STACY BOONE	Date Received: 8/23/18 HT
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier Other — CLIENT

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 8 CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. 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?	✓			
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: 21c
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR3-17 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? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes No___ N/A (If unknown, select No) VOA vials free of headspace? Yes No___ N/A 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?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?	✓			
13	COC form is properly signed in relinquished/received sections?	✓			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials TMC Date 8/24/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

List of current GEL Certifications as of 06 September 2018

State	Certification
Alaska	17−018
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 Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122018−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−18−13
Utah NELAP	SC000122018−26
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

September 19, 2018

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

Re: Soil and Vegetation Analysis
Work Order: 459059

Dear Ms. Logsdon:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 07, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4778.

Sincerely,

Hope Taylor
Project Manager

Purchase Order: 4500720046
Enclosures

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

Certificate of Analysis Report
for

WNUC007 Westinghouse Electric Co, LLC

Client SDG: 459059 GEL Work Order: 459059

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

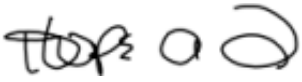
J Value is estimated

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, Hope Taylor.

Reviewed by 

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

Certificate of Analysis

Report Date: September 19, 2018

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: HF-B6-(7-8) Soil Boring
Sample ID: 459059001
Matrix: Soil
Collect Date: 06-SEP-18 09:51
Receive Date: 07-SEP-18
Collector: Client
Moisture: 9.27%

Project: WNUC00518
Client ID: WNUC007

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	10.0	1	MAR1	09/11/18	0845	1801076	1
Nitrate-N		29.4	0.364	1.10	mg/kg	10.0	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235		28.0	2.17	15.2	ug/Kg	98.6	2	SKJ	09/17/18	1006	1800921	2
Uranium-238		1090	14.3	43.5	ug/Kg	98.6	2					
Uranium		1130	14.3	43.5	ug/Kg	98.6	2	SKJ	09/17/18	1453	1800921	3
Uranium-234	U	ND	2.12	10.6	ug/Kg	96.3	2	SKJ	09/18/18	0909	1802228	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.18	0.010	0.100	SU		1	RXB5	09/08/18	1655	1800907	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 19, 2018

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: HF-B6-(9-10) Soil Boring
Sample ID: 459059002
Matrix: Soil
Collect Date: 06-SEP-18 10:24
Receive Date: 07-SEP-18
Collector: Client
Moisture: 13%

Project: WNUC00518
Client ID: WNUC007

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	0.388	1.14	mg/kg	9.93	1	MAR1	09/11/18	1017	1801076	1
Nitrate-N		16.8	0.376	1.14	mg/kg	9.93	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235	J	10.3	2.13	14.9	ug/Kg	92.8	2	SKJ	09/17/18	1016	1800921	2
Uranium-238		909	14.1	42.7	ug/Kg	92.8	2					
Uranium		937	14.1	42.7	ug/Kg	92.8	2	SKJ	09/17/18	1504	1800921	3
Uranium-234	U	ND	2.25	11.2	ug/Kg	97.8	2	SKJ	09/18/18	0918	1802228	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.18	0.010	0.100	SU		1	RXB5	09/08/18	1658	1800907	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 19, 2018

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: HF-B6-(11-12) Soil Boring
Sample ID: 459059003
Matrix: Soil
Collect Date: 06-SEP-18 11:00
Receive Date: 07-SEP-18
Collector: Client
Moisture: 12.4%

Project: WNUC00518
Client ID: WNUC007

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	0.384	1.13	mg/kg	9.90	1	MAR1	09/11/18	1048	1801076	1
Nitrate-N		12.7	0.373	1.13	mg/kg	9.90	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235	J	13.9	2.15	15.0	ug/Kg	94.0	2	SKJ	09/17/18	1018	1800921	2
Uranium-238		1030	14.2	42.9	ug/Kg	94.0	2					
Uranium		992	14.2	42.9	ug/Kg	94.0	2	SKJ	09/17/18	1506	1800921	3
Uranium-234	U	ND	2.23	11.1	ug/Kg	97.5	2	SKJ	09/18/18	0919	1802228	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.97	0.010	0.100	SU		1	RXB5	09/08/18	1704	1800907	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 19, 2018

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: HF-B9-(7-8) Soil Boring
Sample ID: 459059004
Matrix: Soil
Collect Date: 06-SEP-18 13:00
Receive Date: 07-SEP-18
Collector: Client
Moisture: 10.8%

Project: WNUC00518
Client ID: WNUC007

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	0.381	1.12	mg/kg	10.0	1	MAR1	09/11/18	1119	1801076	1
Nitrate-N		167	1.85	5.61	mg/kg	10.0	5	MAR1	09/12/18	0523	1801076	2
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235		24.0	2.15	15.0	ug/Kg	95.8	2	SKJ	09/17/18	1019	1800921	3
Uranium-238		1240	14.2	43.0	ug/Kg	95.8	2					
Uranium		1250	14.2	43.0	ug/Kg	95.8	2	SKJ	09/17/18	1507	1800921	4
Uranium-234	U	ND	2.22	11.1	ug/Kg	98.8	2	SKJ	09/18/18	0920	1802228	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.81	0.010	0.100	SU		1	RXB5	09/08/18	1705	1800907	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: September 19, 2018

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:	HF-B9-(7-8) Soil Boring	Project:	WNUC00518
Sample ID:	459059004	Client ID:	WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

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: September 19, 2018

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: HF-B9-(9-10) Soil Boring
Sample ID: 459059005
Matrix: Soil
Collect Date: 06-SEP-18 13:27
Receive Date: 07-SEP-18
Collector: Client
Moisture: 11.2%

Project: WNUC00518
Client ID: WNUC007

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	0.381	1.12	mg/kg	9.95	1	MAR1	09/11/18	1150	1801076	1
Nitrate-N		43.9	0.370	1.12	mg/kg	9.95	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235		17.3	2.07	14.5	ug/Kg	91.9	2	SKJ	09/17/18	1021	1800921	2
Uranium-238		1060	13.7	41.4	ug/Kg	91.9	2					
Uranium		1040	13.7	41.4	ug/Kg	91.9	2	SKJ	09/17/18	1509	1800921	3
Uranium-234	U	ND	2.22	11.1	ug/Kg	98.4	2	SKJ	09/18/18	0922	1802228	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.15	0.010	0.100	SU		1	RXB5	09/08/18	1706	1800907	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 19, 2018

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: HF-B9-(11-12) Soil Boring
Sample ID: 459059006
Matrix: Soil
Collect Date: 06-SEP-18 13:58
Receive Date: 07-SEP-18
Collector: Client
Moisture: 13.4%

Project: WNUC00518
Client ID: WNUC007

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	0.392	1.15	mg/kg	9.98	1	MAR1	09/11/18	1220	1801076	1
Nitrate-N		19.3	0.380	1.15	mg/kg	9.98	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235		80.4	2.11	14.8	ug/Kg	91.2	2	SKJ	09/17/18	1022	1800921	2
Uranium-238		2970	13.9	42.1	ug/Kg	91.2	2					
Uranium		2990	13.9	42.1	ug/Kg	91.2	2	SKJ	09/17/18	1511	1800921	3
Uranium-234	U	ND	2.26	11.3	ug/Kg	98.0	2	SKJ	09/18/18	0923	1802228	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.02	0.010	0.100	SU		1	RXB5	09/08/18	1707	1800907	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 19, 2018

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: HF-B11-(7-8) Soil Boring
Sample ID: 459059007
Matrix: Soil
Collect Date: 07-SEP-18 09:07
Receive Date: 07-SEP-18
Collector: Client
Moisture: 11.9%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		497	7.66	22.5	mg/kg	9.93	20	MAR1	09/12/18	0554	1801076	1
Nitrate-N		729	7.44	22.5	mg/kg	9.93	20					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-238		3910000	7330	22200	ug/Kg	97.8	1000	SKJ	09/17/18	1257	1800921	2
Uranium		3630000	147	444	ug/Kg	97.8	20	SKJ	09/17/18	1524	1800921	3
Uranium-234		1550	21.9	110	ug/Kg	96.5	20	SKJ	09/18/18	0935	1802228	4
Uranium-235		152000	2220	15500	ug/Kg	97.8	2000	SKJ	09/17/18	1345	1800921	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.06	0.010	0.100	SU		1	RXB5	09/08/18	1708	1800907	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: September 19, 2018

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:	HF-B11-(7-8) Soil Boring	Project:	WNUC00518
Sample ID:	459059007	Client ID:	WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

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: September 19, 2018

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: HF-B11-(9-10) Soil Boring
Sample ID: 459059008
Matrix: Soil
Collect Date: 07-SEP-18 09:40
Receive Date: 07-SEP-18
Collector: Client
Moisture: 11.9%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		2.59	0.384	1.13	mg/kg	9.95	1	MAR1	09/11/18	1424	1801076	1
Nitrate-N		188	1.86	5.65	mg/kg	9.95	5	MAR1	09/12/18	0625	1801076	2
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-238		8180	15.0	45.3	ug/Kg	99.8	2	SKJ	09/17/18	1305	1800921	3
Uranium		8690	15.0	45.3	ug/Kg	99.8	2	SKJ	09/17/18	1519	1800921	4
Uranium-234	U	ND	2.11	10.6	ug/Kg	93.1	2	SKJ	09/18/18	0930	1802228	5
Uranium-235		286	11.3	79.3	ug/Kg	99.8	10	SKJ	09/17/18	1346	1800921	6
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.83	0.010	0.100	SU		1	RXB5	09/08/18	1711	1800907	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	SW846 3050B/6020A	
7	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: September 19, 2018

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:	HF-B11-(9-10) Soil Boring	Project:	WNUC00518
Sample ID:	459059008	Client ID:	WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

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: September 19, 2018

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: HF-B11-(11-12) Soil Boring
Sample ID: 459059009
Matrix: Soil
Collect Date: 07-SEP-18 10:22
Receive Date: 07-SEP-18
Collector: Client
Moisture: 12.2%

Project: WNUC00518
Client ID: WNUC007

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	0.385	1.13	mg/kg	9.95	1	MAR1	09/11/18	1455	1801076	1
Nitrate-N		34.6	0.374	1.13	mg/kg	9.95	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-238		8620	14.8	44.8	ug/Kg	98.4	2	SKJ	09/17/18	1307	1800921	2
Uranium		9540	14.8	44.8	ug/Kg	98.4	2	SKJ	09/17/18	1520	1800921	3
Uranium-234	U	ND	2.18	10.9	ug/Kg	95.6	2	SKJ	09/18/18	0932	1802228	4
Uranium-235		323	11.2	78.5	ug/Kg	98.4	10	SKJ	09/17/18	1348	1800921	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.64	0.010	0.100	SU		1	RXB5	09/08/18	1712	1800907	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: September 19, 2018

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:	HF-B11-(11-12) Soil Boring	Project:	WNUC00518
Sample ID:	459059009	Client ID:	WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

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: September 19, 2018

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: HF-B1-(7-8) Soil Boring
Sample ID: 459059010
Matrix: Soil
Collect Date: 06-SEP-18 15:15
Receive Date: 07-SEP-18
Collector: Client
Moisture: 9.77%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		341	9.30	27.4	mg/kg	9.88	25	MAR1	09/12/18	0656	1801076	1
Nitrate-N		717	9.03	27.4	mg/kg	9.88	25					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235		106000	2190	15300	ug/Kg	98.8	2000	SKJ	09/17/18	1349	1800921	2
Uranium-238		2750000	14500	43800	ug/Kg	98.8	2000					
Uranium		2720000	145	438	ug/Kg	98.8	20	SKJ	09/17/18	1530	1800921	3
Uranium-234		954	21.6	108	ug/Kg	97.3	20	SKJ	09/18/18	0936	1802228	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	3.76	0.010	0.100	SU		1	RXB5	09/08/18	1713	1800907	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 19, 2018

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: HF-B1-(9-10) Soil Boring
Sample ID: 459059011
Matrix: Soil
Collect Date: 06-SEP-18 15:45
Receive Date: 07-SEP-18
Collector: Client
Moisture: 11.9%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		5.21	0.381	1.12	mg/kg	9.88	1	MAR1	09/11/18	1557	1801076	1
Nitrate-N		351	3.70	11.2	mg/kg	9.88	10	MAR1	09/12/18	0727	1801076	2
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235		4910	105	734	ug/Kg	92.4	100	SKJ	09/17/18	1340	1800921	3
Uranium-238		122000	692	2100	ug/Kg	92.4	100					
Uranium		117000	13.8	41.9	ug/Kg	92.4	2	SKJ	09/17/18	1532	1800921	4
Uranium-234		72.7	2.22	11.1	ug/Kg	98.0	2	SKJ	09/18/18	0941	1802228	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.18	0.010	0.100	SU		1	RXB5	09/08/18	1714	1800907	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: September 19, 2018

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:	HF-B1-(9-10) Soil Boring	Project:	WNUC00518
Sample ID:	459059011	Client ID:	WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

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: September 19, 2018

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: HF-B1-(11-12) Soil Boring
Sample ID: 459059012
Matrix: Soil
Collect Date: 06-SEP-18 16:33
Receive Date: 07-SEP-18
Collector: Client
Moisture: 12.6%

Project: WNUC00518
Client ID: WNUC007

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	0.400	0.384	1.13	mg/kg	9.88	1	MAR1	09/11/18	1628	1801076	1
Nitrate-N		104	1.87	5.65	mg/kg	9.88	5	MAR1	09/12/18	0758	1801076	2
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235		3600	105	734	ug/Kg	91.6	100	SKJ	09/17/18	1341	1800921	3
Uranium-238		91100	692	2100	ug/Kg	91.6	100					
Uranium		86200	13.8	41.9	ug/Kg	91.6	2	SKJ	09/17/18	1533	1800921	4
Uranium-234		20.5	2.16	10.8	ug/Kg	94.3	2	SKJ	09/18/18	0942	1802228	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.78	0.010	0.100	SU		1	RXB5	09/08/18	1715	1800907	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: September 19, 2018

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:	HF-B1-(11-12) Soil Boring	Project:	WNUC00518
Sample ID:	459059012	Client ID:	WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

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: September 19, 2018

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: HF-B16-(1-2) Soil Boring
Sample ID: 459059013
Matrix: Soil
Collect Date: 06-SEP-18 17:15
Receive Date: 07-SEP-18
Collector: Client
Moisture: 5.77%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		33.7	0.357	1.05	mg/kg	9.90	1	MAR1	09/11/18	1658	1801076	1
Nitrate-N		236	3.47	10.5	mg/kg	9.90	10	MAR1	09/12/18	0829	1801076	2
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-238		284000	688	2080	ug/Kg	98.2	100	SKJ	09/17/18	1344	1800921	3
Uranium		276000	13.8	41.7	ug/Kg	98.2	2	SKJ	09/17/18	1535	1800921	4
Uranium-234		86.7	1.98	9.92	ug/Kg	93.5	2	SKJ	09/18/18	0943	1802228	5
Uranium-235		9690	208	1460	ug/Kg	98.2	200	SKJ	09/17/18	1605	1800921	6
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.26	0.010	0.100	SU		1	RXB5	09/08/18	1715	1800907	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	SW846 3050B/6020A	
7	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: September 19, 2018

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:	HF-B16-(1-2) Soil Boring	Project:	WNUC00518
Sample ID:	459059013	Client ID:	WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

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: September 19, 2018

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: HF-B16-(3-4) Soil Boring
Sample ID: 459059014
Matrix: Soil
Collect Date: 06-SEP-18 17:29
Receive Date: 07-SEP-18
Collector: Client
Moisture: 8.38%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		122	1.83	5.38	mg/kg	9.85	5	MAR1	09/12/18	0900	1801076	1
Nitrate-N		114	1.77	5.38	mg/kg	9.85	5					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235		140000	2010	14100	ug/Kg	92.3	2000	SKJ	09/17/18	1351	1800921	2
Uranium-238		3660000	13300	40300	ug/Kg	92.3	2000					
Uranium		3600000	133	403	ug/Kg	92.3	20	SKJ	09/17/18	1539	1800921	3
Uranium-234		1230	20.6	103	ug/Kg	94.3	20	SKJ	09/18/18	0945	1802228	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.53	0.010	0.100	SU		1	RXB5	09/08/18	1716	1800907	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/17/18	1321	1802227
SW846 3050B	ICP-MS 3050BS PREP	SXW1	09/08/18	0510	1800920
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/11/18	0813	1801075

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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

QC Summary

Report Date: September 19, 2018

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

Contact: **Ms. Cynthia Logsdon**

Workorder: **459059**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 1801076										
QC1204110890 459059001 DUP										
Fluoride	U	ND	U	ND	mg/kg	N/A			MAR1	09/11/18 09:15
Nitrate-N		29.4		29.2	mg/kg	0.983		(0%-20%)		
QC1204110891 459059014 DUP										
Fluoride		122		124	mg/kg	1.34		(0%-20%)		09/12/18 09:31
Nitrate-N		114		113	mg/kg	0.417		(0%-20%)		
QC1204110889 LCS										
Fluoride	25.0			25.0	mg/kg		100	(90%-110%)		09/11/18 07:59
Nitrate-N	25.0			23.8	mg/kg		95.3	(90%-110%)		
QC1204110888 MB										
Fluoride			U	ND	mg/kg					09/11/18 07:29
Nitrate-N			U	ND	mg/kg					
QC1204111773 459059001 MS										
Fluoride	27.4	U ND		7.92	mg/kg		28.9*	(30%-135%)		09/11/18 09:46
Nitrate-N	27.4	29.4		55.8	mg/kg		96.1	(70%-125%)		
QC1204111774 459059014 MS										
Fluoride	27.1	122		148	mg/kg		N/A	(30%-135%)		09/12/18 10:01
Nitrate-N	27.1	114		133	mg/kg		N/A	(70%-125%)		

QC Summary

Workorder: **459059**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS										
Batch 1800921										
QC1204110210 459059001 DUP										
Uranium		1130		984	ug/Kg	13.8		(0%-20%)	SKJ	09/17/18 14:55
Uranium-235		28.0		19.7	ug/Kg	34.9 ^		(+/-14.9)		09/17/18 10:07
Uranium-238		1090		939	ug/Kg	15.3		(0%-20%)		
QC1204110209 LCS										
Uranium	4700			4730	ug/Kg		101	(80%-120%)		09/17/18 14:51
Uranium-235	33.8			32.0	ug/Kg		94.5	(80%-120%)		09/17/18 10:04
Uranium-238	4670			4580	ug/Kg		98.1	(80%-120%)		
QC1204110208 MB										
Uranium			U	ND	ug/Kg					09/17/18 14:50
Uranium-235			U	ND	ug/Kg					09/17/18 10:03
Uranium-238			U	ND	ug/Kg					
QC1204110211 459059001 MS										
Uranium	5460	1130		6130	ug/Kg		91.7	(75%-125%)		09/17/18 14:56
Uranium-235	39.3	28.0		54.3	ug/Kg		66.8 *	(75%-125%)		09/17/18 10:09
Uranium-238	5420	1090		5960	ug/Kg		89.9	(75%-125%)		
QC1204113112 459059001 PS										
Uranium-235	0.180	0.129		0.299	ug/L		94.7	(80%-120%)		09/17/18 10:10
QC1204110212 459059001 SDILT										
Uranium		5.20		1.06	ug/L	1.64		(0%-10%)		09/17/18 14:59

QC Summary

Workorder: **459059**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS										
Batch 1800921										
Uranium-235		0.129	J	0.0274	ug/L	6.28		(0%-10%)	SKJ	09/17/18 10:12
Uranium-238		5.04		1.04	ug/L	3.36		(0%-10%)		
Batch 1802228										
QC1204113125 459059001 DUP										
Uranium-234	U	ND	U	ND	ug/Kg	N/A			SKJ	09/18/18 09:10
QC1204113124 LCS										
Uranium-234	54.9			57.6	ug/Kg		105	(80%-120%)		09/18/18 09:08
QC1204113123 MB										
Uranium-234			U	ND	ug/Kg					09/18/18 09:06
QC1204113126 459059001 MS										
Uranium-234	58.9 U	ND		61.8	ug/Kg		105	(75%-125%)		09/18/18 09:12
QC1204113127 459059001 SDILT										
Uranium-234	U	ND	U	ND	ug/L	N/A				09/18/18 09:13
Titration and Ion Analysis										
Batch 1800907										
QC1204110171 459059001 DUP										
Corrosivity	H	6.18	H	6.19	SU	0.162		(0%-10%)	RXB5	09/08/18 16:56
QC1204110172 459059002 DUP										
Corrosivity	H	6.18	H	6.22	SU	0.645		(0%-10%)		09/08/18 16:59
QC1204110170 LCS										
Corrosivity	7.00			7.02	SU		100	(95%-105%)		09/08/18 15:24

Notes:

The Qualifiers in this report are defined as follows:

< Result is less than value reported

QC Summary

Workorder: **459059**

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	%difference of sample and SD is >10%. Sample concentration must meet flagging criteria
E	General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
FB	Mercury was found present at quantifiable concentrations in field blanks received with these samples. Data associated with the blank are deemed invalid for reporting to regulatory agencies
H	Analytical holding time was exceeded
J	Value is estimated
N	Metals--The Matrix spike sample recovery is not within specified control limits
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
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
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.

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

Certificate of Analysis

Report Date: September 19, 2018

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: HF-B6-(7-8) Soil Boring
Project: WNUC00518
Sample ID: 459059001
Client ID: WNUC007
Matrix: Soil
Collect Date: 06-SEP-18 09:51
Receive Date: 07-SEP-18
Collector: Client
Moisture: 9.27%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		9.27				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.28	+/-0.260	0.105	0.500	pCi/g			MXS2	09/17/18	2315	1801082	2
Uranium-235/236	U	0.0785	+/-0.0799	0.079	0.500	pCi/g							
Uranium-238		0.444	+/-0.158	0.103	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	13.5	+/-16.0	26.9	50.0	pCi/g			CXS7	09/18/18	0346	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			101	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			102	(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: September 19, 2018

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: HF-B6-(9-10) Soil Boring
Sample ID: 459059002
Matrix: Soil
Collect Date: 06-SEP-18 10:24
Receive Date: 07-SEP-18
Collector: Client
Moisture: 13%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		13.0				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		0.907	+/-0.228	0.115	0.500	pCi/g			MXS2	09/17/18	2315	1801082	2
Uranium-235/236	U	0.0969	+/-0.0922	0.0972	0.500	pCi/g							
Uranium-238		0.548	+/-0.179	0.105	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	16.5	+/-23.9	40.5	50.0	pCi/g			CXS7	09/18/18	0403	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			80.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			94	(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: September 19, 2018

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: HF-B6-(11-12) Soil Boring
Sample ID: 459059003
Matrix: Soil
Collect Date: 06-SEP-18 11:00
Receive Date: 07-SEP-18
Collector: Client
Moisture: 12.4%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		12.4				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.43	+/-0.259	0.0978	0.500	pCi/g			MXS2	09/17/18	2315	1801082	2
Uranium-235/236		0.142	+/-0.0952	0.0699	0.500	pCi/g							
Uranium-238		1.28	+/-0.244	0.0827	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	2.94	+/-26.5	46.0	50.0	pCi/g			CXS7	09/18/18	0419	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			97.3	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			89.7	(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: September 19, 2018

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: HF-B9-(7-8) Soil Boring
Project: WNUC00518
Sample ID: 459059004
Client ID: WNUC007
Matrix: Soil
Collect Date: 06-SEP-18 13:00
Receive Date: 07-SEP-18
Collector: Client
Moisture: 10.8%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		10.8				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.65	+/-0.277	0.0981	0.500	pCi/g			MXS2	09/17/18	2315	1801082	2
Uranium-235/236	U	0.0806	+/-0.0767	0.0809	0.500	pCi/g							
Uranium-238		0.728	+/-0.186	0.0874	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	11.0	+/-20.0	34.1	50.0	pCi/g			CXS7	09/18/18	0435	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			104	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			93.7	(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: September 19, 2018

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: HF-B9-(9-10) Soil Boring
Sample ID: 459059005
Matrix: Soil
Collect Date: 06-SEP-18 13:27
Receive Date: 07-SEP-18
Collector: Client
Moisture: 11.2%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		11.2				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.56	+/-0.273	0.120	0.500	pCi/g			MXS2	09/17/18	2315	1801082	2
Uranium-235/236		0.147	+/-0.101	0.0965	0.500	pCi/g							
Uranium-238		0.576	+/-0.170	0.115	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-3.91	+/-14.4	25.5	50.0	pCi/g			CXS7	09/18/18	0452	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			106	(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: September 19, 2018

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: HF-B9-(11-12) Soil Boring
Sample ID: 459059006
Matrix: Soil
Collect Date: 06-SEP-18 13:58
Receive Date: 07-SEP-18
Collector: Client
Moisture: 13.4%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		13.4				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		6.60	+/-0.562	0.105	0.500	pCi/g			MXS2	09/17/18	2315	1801082	2
Uranium-235/236		0.527	+/-0.180	0.0845	0.500	pCi/g							
Uranium-238		2.25	+/-0.330	0.104	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	2.81	+/-15.8	27.4	50.0	pCi/g			CXS7	09/18/18	0508	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			86.1	(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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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 19, 2018

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: HF-B11-(7-8) Soil Boring
Project: WNUC00518
Sample ID: 459059007
Client ID: WNUC007
Matrix: Soil
Collect Date: 07-SEP-18 09:07
Receive Date: 07-SEP-18
Collector: Client
Moisture: 11.9%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
High Rad Testing													
ASTM D 2216 % Moisture "As Received"													
Moisture		11.9				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		6650	+/-189	8.85	0.500	pCi/g			HAKB	09/19/18	0946	1802589	2
Uranium-235/236		343	+/-47.8	7.37	0.500	pCi/g							
Uranium-238		1170	+/-79.4	5.96	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	13.9	+/-21.7	36.9	50.0	pCi/g			CXS7	09/18/18	0525	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			82.5	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			91.3	(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: September 19, 2018

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: HF-B11-(9-10) Soil Boring
Sample ID: 459059008
Matrix: Soil
Collect Date: 07-SEP-18 09:40
Receive Date: 07-SEP-18
Collector: Client
Moisture: 11.9%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		11.9				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		11.4	+/-0.725	0.0937	0.500	pCi/g			MXS2	09/17/18	2315	1801082	2
Uranium-235/236		0.523	+/-0.176	0.0815	0.500	pCi/g							
Uranium-238		2.78	+/-0.358	0.0571	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	11.5	+/-18.5	31.4	50.0	pCi/g			CXS7	09/18/18	0541	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			85.2	(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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Certificate of Analysis

Report Date: September 19, 2018

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: HF-B11-(11-12) Soil Boring
Sample ID: 459059009
Matrix: Soil
Collect Date: 07-SEP-18 10:22
Receive Date: 07-SEP-18
Collector: Client
Moisture: 12.2%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		12.2				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		36.0	+/-1.25	0.104	0.500	pCi/g			MXS2	09/17/18	2315	1801082	2
Uranium-235/236		2.06	+/-0.334	0.0852	0.500	pCi/g							
Uranium-238		7.19	+/-0.559	0.069	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.17	+/-13.9	24.3	50.0	pCi/g			CXS7	09/18/18	0558	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			95.4	(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

Report Date: September 19, 2018

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: HF-B1-(7-8) Soil Boring
Sample ID: 459059010
Matrix: Soil
Collect Date: 06-SEP-18 15:15
Receive Date: 07-SEP-18
Collector: Client
Moisture: 9.77%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
High Rad Testing													
ASTM D 2216 % Moisture "As Received"													
Moisture		9.77				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		5650	+/-200	13.2	0.500	pCi/g			HAKB	09/19/18	0946	1802589	2
Uranium-235/236		267	+/-48.5	10.9	0.500	pCi/g							
Uranium-238		1030	+/-85.1	9.53	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	24.7	+/-21.1	35.1	50.0	pCi/g			CXS7	09/18/18	0614	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			53.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			81.6	(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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Certificate of Analysis

Report Date: September 19, 2018

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: HF-B1-(9-10) Soil Boring
Sample ID: 459059011
Matrix: Soil
Collect Date: 06-SEP-18 15:45
Receive Date: 07-SEP-18
Collector: Client
Moisture: 11.9%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		11.9				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		417	+/-36.2	5.74	0.500	pCi/g			HAKB	09/19/18	0946	1802589	2
Uranium-235/236		22.1	+/-9.45	3.02	0.500	pCi/g							
Uranium-238		73.4	+/-15.3	4.97	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.685	+/-24.2	42.2	50.0	pCi/g			CXS7	09/18/18	0631	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			91.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			93.7	(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: September 19, 2018

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: HF-B1-(11-12) Soil Boring
Project: WNUC00518
Sample ID: 459059012
Client ID: WNUC007
Matrix: Soil
Collect Date: 06-SEP-18 16:33
Receive Date: 07-SEP-18
Collector: Client
Moisture: 12.6%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		12.6				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		316	+/-31.4	5.22	0.500	pCi/g			HAKB	09/19/18	0946	1802589	2
Uranium-235/236		17.8	+/-8.52	4.26	0.500	pCi/g							
Uranium-238		61.3	+/-14.0	5.13	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	4.91	+/-17.3	29.8	50.0	pCi/g			CXS7	09/18/18	0647	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			96.6	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.3	(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: September 19, 2018

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: HF-B16-(1-2) Soil Boring
Sample ID: 459059013
Matrix: Soil
Collect Date: 06-SEP-18 17:15
Receive Date: 07-SEP-18
Collector: Client
Moisture: 5.77%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		5.77				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		450	+/-30.6	3.72	0.500	pCi/g			HAKB	09/19/18	0946	1802589	2
Uranium-235/236		23.2	+/-7.87	3.21	0.500	pCi/g							
Uranium-238		99.1	+/-14.4	3.31	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	13.2	+/-14.2	23.8	50.0	pCi/g			CXS7	09/18/18	0704	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			102	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.3	(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: September 19, 2018

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: HF-B16-(3-4) Soil Boring
Sample ID: 459059014
Matrix: Soil
Collect Date: 06-SEP-18 17:29
Receive Date: 07-SEP-18
Collector: Client
Moisture: 8.38%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
High Rad Testing													
ASTM D 2216 % Moisture "As Received"													
Moisture		8.38				percent			CXC1	09/11/18	1103	1801055	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		7980	+/-225	10.7	0.500	pCi/g			HAKB	09/19/18	0946	1802589	2
Uranium-235/236		409	+/-56.9	8.74	0.500	pCi/g							
Uranium-238		1420	+/-95.0	9.68	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	17.2	+/-20.9	35.3	50.0	pCi/g			CXS7	09/18/18	0720	1801311	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/11/18	1103	1801055

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			58.9	(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

QC Summary

Report Date: September 19, 2018

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

Contact: **Ms. Cynthia Logsdon**

Workorder: **459059**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1801082										
QC1204110610 459059001 DUP										
Uranium-233/234		1.28		1.18	pCi/g	7.84		(0%-20%)	MXS2	09/17/18 23:15
	Uncertainty	+/-0.260		+/-0.266						
Uranium-235/236	U	0.0785		0.0739	pCi/g	6.66		(0% - 100%)		
	Uncertainty	+/-0.0799		+/-0.0815						
Uranium-238		0.444		0.610	pCi/g	31.5*		(0%-20%)		
	Uncertainty	+/-0.158		+/-0.193						
QC1204110611 LCS										
Uranium-233/234				4.71	pCi/g					09/17/18 23:15
	Uncertainty			+/-0.491						
Uranium-235/236				0.294	pCi/g					
	Uncertainty			+/-0.140						
Uranium-238	4.81			5.06	pCi/g		105	(75%-125%)		
	Uncertainty			+/-0.507						
QC1204110609 MB										
Uranium-233/234			U	0.0775	pCi/g					09/17/18 23:15
	Uncertainty			+/-0.0722						
Uranium-235/236			U	0.0532	pCi/g					
	Uncertainty			+/-0.0627						
Uranium-238			U	0.0101	pCi/g					
	Uncertainty			+/-0.0541						
Batch 1802589										
QC1204113963 459059011 DUP										
Uranium-233/234		417		519	pCi/g	21.9*		(0%-20%)	HAKB	09/19/18 09:46
	Uncertainty	+/-36.2		+/-37.1						
Uranium-235/236		22.1		26.4	pCi/g	17.6		(0%-20%)		
	Uncertainty	+/-9.45		+/-9.44						
Uranium-238		73.4		80.8	pCi/g	9.66		(0%-20%)		
	Uncertainty	+/-15.3		+/-14.7						

QC Summary

Workorder: **459059**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1802589										
QC1204113964 LCS										
Uranium-233/234				146	pCi/g				HAKB	09/19/18 09:46
	Uncertainty			+/-19.4						
Uranium-235/236			U	4.46	pCi/g					
	Uncertainty			+/-4.25						
Uranium-238	143			161	pCi/g		112	(75%-125%)		
	Uncertainty			+/-20.3						
QC1204113962 MB										
Uranium-233/234			U	1.84	pCi/g					09/19/18 09:46
	Uncertainty			+/-2.90						
Uranium-235/236			U	2.21	pCi/g					
	Uncertainty			+/-3.19						
Uranium-238			U	2.76	pCi/g					
	Uncertainty			+/-3.18						
Rad Liquid Scintillation										
Batch 1801311										
QC1204111163 459059001 DUP										
Technetium-99	U	13.5	U	7.55	pCi/g	N/A		N/A	CXS7	09/18/18 07:53
	Uncertainty	+/-16.0		+/-17.2						
QC1204111164 LCS										
Technetium-99	445			396	pCi/g		89	(75%-125%)		09/18/18 08:10
	Uncertainty			+/-25.3						
QC1204111162 MB										
Technetium-99			U	5.42	pCi/g					09/18/18 07:37
	Uncertainty			+/-14.2						

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 Value is estimated

QC Summary

Workorder: **459059**

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

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.

Metals

Product: **Determination of Metals by ICP-MS**
Analytical Method: SW846 3050B/6020A
Analytical Procedure: GL-MA-E-014 REV# 33
Analytical Batch: 1800921

Preparation Method: SW846 3050B
Preparation Procedure: GL-MA-E-009 REV# 28
Preparation Batch: 1800920

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

GEL Sample ID#	Client Sample Identification
459059001	HF-B6-(7-8) Soil Boring
459059002	HF-B6-(9-10) Soil Boring
459059003	HF-B6-(11-12) Soil Boring
459059004	HF-B9-(7-8) Soil Boring
459059005	HF-B9-(9-10) Soil Boring
459059006	HF-B9-(11-12) Soil Boring
459059007	HF-B11-(7-8) Soil Boring
459059008	HF-B11-(9-10) Soil Boring
459059009	HF-B11-(11-12) Soil Boring
459059010	HF-B1-(7-8) Soil Boring
459059011	HF-B1-(9-10) Soil Boring
459059012	HF-B1-(11-12) Soil Boring
459059013	HF-B16-(1-2) Soil Boring
459059014	HF-B16-(3-4) Soil Boring
1204110208	Method Blank (MB)**ICP-MS**
1204110209	Laboratory Control Sample (LCS)
1204110212	459059001(HF-B6-(7-8) Soil BoringL) Serial Dilution (SD)
1204110210	459059001(HF-B6-(7-8) Soil BoringD) Sample Duplicate (DUP)
1204110211	459059001(HF-B6-(7-8) Soil BoringS) Matrix Spike (MS)
1204113112	459059001(HF-B6-(7-8) Soil BoringPS) Post Spike (PS)

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.

Calibration Information

CRDL/PQL Requirements
The CRDL standard recoveries for SW846 6020A/6020B met the advisory control limits with the exception of uranium and U-235. Client sample concentrations were greater than two times the CRDL; therefore the data were not adversely affected. 459059007 (HF-B11-(7-8) Soil Boring), 459059008 (HF-B11-(9-10) Soil Boring),

459059009 (HF-B11-(11-12) Soil Boring), 459059010 (HF-B1-(7-8) Soil Boring), 459059011 (HF-B1-(9-10) Soil Boring), 459059012 (HF-B1-(11-12) Soil Boring), 459059013 (HF-B16-(1-2) Soil Boring) and 459059014 (HF-B16-(3-4) Soil Boring).

ICSA/ICSAB Statement
For the ICP-MS analysis, the ICSA solution contains analyte concentrations which are verified trace impurities indigenous to the purchased standard.

Quality Control (QC) Information

Matrix Spike (MS/MSD) Recovery Statement
The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS/MSD (See Below) did not meet the recommended quality control acceptance criteria for percent recoveries for the following applicable analyte. The post spike recovery was within the required control limits. This verifies the absence of a matrix interference in the post-spike digested sample. The recovery may be attributed to possible sample matrix interference and/or non-homogeneity.

Sample	Analyte	Value
1204110211 (HF-B6-(7-8) Soil BoringMS)	Uranium-235	66.8* (75%-125%)

Technical Information

Preparation/Analytical Method Verification
Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions
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. Samples 459059007 (HF-B11-(7-8) Soil Boring), 459059008 (HF-B11-(9-10) Soil Boring), 459059009 (HF-B11-(11-12) Soil Boring), 459059010 (HF-B1-(7-8) Soil Boring), 459059011 (HF-B1-(9-10) Soil Boring), 459059012 (HF-B1-(11-12) Soil Boring), 459059013 (HF-B16-(1-2) Soil Boring) and 459059014 (HF-B16-(3-4) Soil Boring) were diluted to ensure that the analyte concentrations were within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	459059									
	001	002	003	004	005	006	007	008	009	010
Uranium	2X	2X	2X	2X	2X	2X	20X	2X	2X	20X
Uranium-235	2X	2X	2X	2X	2X	2X	2000X	10X	10X	2000X
Uranium-238	2X	2X	2X	2X	2X	2X	1000X	2X	2X	2000X

Analyte	459059			
	011	012	013	014
Uranium	2X	2X	2X	20X
Uranium-235	100X	100X	200X	2000X
Uranium-238	100X	100X	100X	2000X

Product: **Determination of Metals by ICP-MS**
Analytical Method: SW846 3050B/6020A
Analytical Procedure: GL-MA-E-014 REV# 33
Analytical Batch: 1802228

Preparation Method: SW846 3050B
Preparation Procedure: GL-MA-E-009 REV# 28
Preparation Batch: 1802227

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

GEL Sample ID#	Client Sample Identification
459059001	HF-B6-(7-8) Soil Boring
459059002	HF-B6-(9-10) Soil Boring
459059003	HF-B6-(11-12) Soil Boring
459059004	HF-B9-(7-8) Soil Boring
459059005	HF-B9-(9-10) Soil Boring
459059006	HF-B9-(11-12) Soil Boring
459059007	HF-B11-(7-8) Soil Boring
459059008	HF-B11-(9-10) Soil Boring
459059009	HF-B11-(11-12) Soil Boring
459059010	HF-B1-(7-8) Soil Boring
459059011	HF-B1-(9-10) Soil Boring
459059012	HF-B1-(11-12) Soil Boring
459059013	HF-B16-(1-2) Soil Boring
459059014	HF-B16-(3-4) Soil Boring
1204113123	Method Blank (MB)**ICP-MS**
1204113124	Laboratory Control Sample (LCS)
1204113127	459059001(HF-B6-(7-8) Soil BoringL) Serial Dilution (SD)
1204113125	459059001(HF-B6-(7-8) Soil BoringD) Sample Duplicate (DUP)
1204113126	459059001(HF-B6-(7-8) Soil BoringS) 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.

Calibration Information

ICSA/ICSAB Statement
For the ICP-MS analysis, the ICSA solution contains analyte concentrations which are verified trace impurities indigenous to the purchased standard.

Technical Information

Preparation/Analytical Method Verification
Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in

silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions
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. Samples 459059007 (HF-B11-(7-8) Soil Boring), 459059010 (HF-B1-(7-8) Soil Boring) and 459059014 (HF-B16-(3-4) Soil Boring) were diluted to ensure that the analyte concentrations were within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	459059									
	001	**002**	**003**	**004**	**005**	**006**	**007**	**008**	**009**	**010**
Uranium-234	2X	2X	2X	2X	2X	2X	20X	2X	2X	20X

Analyte	459059			
	011	**012**	**013**	**014**
Uranium-234	2X	2X	2X	20X

General Chemistry

Product: **Ion Chromatography**
Analytical Method: SW846 9056A
Analytical Procedure: GL-GC-E-086 REV# 25
Analytical Batches: 1801076 and 1801075

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

GEL Sample ID#	Client Sample Identification
459059001	HF-B6-(7-8) Soil Boring
459059002	HF-B6-(9-10) Soil Boring
459059003	HF-B6-(11-12) Soil Boring
459059004	HF-B9-(7-8) Soil Boring
459059005	HF-B9-(9-10) Soil Boring
459059006	HF-B9-(11-12) Soil Boring
459059007	HF-B11-(7-8) Soil Boring
459059008	HF-B11-(9-10) Soil Boring
459059009	HF-B11-(11-12) Soil Boring
459059010	HF-B1-(7-8) Soil Boring
459059011	HF-B1-(9-10) Soil Boring
459059012	HF-B1-(11-12) Soil Boring
459059013	HF-B16-(1-2) Soil Boring
459059014	HF-B16-(3-4) Soil Boring
1204110888	Method Blank (MB)
1204110889	Laboratory Control Sample (LCS)
1204110890	459059001(HF-B6-(7-8) Soil Boring) Sample Duplicate (DUP)
1204110891	459059014(HF-B16-(3-4) Soil Boring) Sample Duplicate (DUP)
1204111773	459059001(HF-B6-(7-8) Soil Boring) Matrix Spike (MS)
1204111774	459059014(HF-B16-(3-4) Soil Boring) 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. 1204111773 (HF-B6-(7-8) Soil BoringMS).

Technical Information

Sample Dilutions
The following samples 1204110890 (HF-B6-(7-8) Soil BoringDUP), 1204110891 (HF-B16-(3-4) Soil BoringDUP), 1204111773 (HF-B6-(7-8) Soil BoringMS), 1204111774 (HF-B16-(3-4) Soil BoringMS), 459059004 (HF-B9-(7-8) Soil Boring), 459059007 (HF-B11-(7-8) Soil Boring), 459059008 (HF-B11-(9-10) Soil Boring), 459059010 (HF-B1-(7-8) Soil Boring), 459059011 (HF-B1-(9-10) Soil Boring), 459059012 (HF-B1-(11-12) Soil Boring), 459059013 (HF-B16-(1-2) Soil Boring) and 459059014 (HF-B16-(3-4) Soil Boring) 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	459059							
	004	**007**	**008**	**010**	**011**	**012**	**013**	**014**
Fluoride	1X	20X	1X	25X	1X	1X	1X	5X
Nitrate	5X	20X	5X	25X	10X	5X	10X	5X

Miscellaneous Information

Manual Integrations
Samples 459059002 (HF-B6-(9-10) Soil Boring), 459059003 (HF-B6-(11-12) Soil Boring), 459059005 (HF-B9-(9-10) Soil Boring), 459059006 (HF-B9-(11-12) Soil Boring) and 459059009 (HF-B11-(11-12) Soil Boring) were manually integrated to correctly position the baseline as set in the calibration standards.

Product: **pH**
Analytical Method: SW846 9045D
Analytical Procedure: GL-GC-E-008 REV# 23
Analytical Batch: 1800907

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

GEL Sample ID#	Client Sample Identification
459059001	HF-B6-(7-8) Soil Boring
459059002	HF-B6-(9-10) Soil Boring

459059003	HF-B6-(11-12) Soil Boring
459059004	HF-B9-(7-8) Soil Boring
459059005	HF-B9-(9-10) Soil Boring
459059006	HF-B9-(11-12) Soil Boring
459059007	HF-B11-(7-8) Soil Boring
459059008	HF-B11-(9-10) Soil Boring
459059009	HF-B11-(11-12) Soil Boring
459059010	HF-B1-(7-8) Soil Boring
459059011	HF-B1-(9-10) Soil Boring
459059012	HF-B1-(11-12) Soil Boring
459059013	HF-B16-(1-2) Soil Boring
459059014	HF-B16-(3-4) Soil Boring
1204110170	Laboratory Control Sample (LCS)
1204110171	459059001(HF-B6-(7-8) Soil Boring) Sample Duplicate (DUP)
1204110172	459059002(HF-B6-(9-10) Soil Boring) 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
1204110171 (HF-B6-(7-8) Soil BoringDUP)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
1204110172 (HF-B6-(9-10) Soil BoringDUP)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059001 (HF-B6-(7-8) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059002 (HF-B6-(9-10) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059003 (HF-B6-(11-12) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059004 (HF-B9-(7-8) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059005 (HF-B9-(9-10) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059006 (HF-B9-(11-12) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059007 (HF-B11-(7-8) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 07-SEP-18
459059008 (HF-B11-(9-10) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 07-SEP-18
459059009 (HF-B11-(11-12) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 07-SEP-18
459059010 (HF-B1-(7-8) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059011 (HF-B1-(9-10) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059012 (HF-B1-(11-12) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059013 (HF-B16-(1-2) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18
459059014 (HF-B16-(3-4) Soil Boring)	Corrosivity	Received 07-SEP-18, out of holding 06-SEP-18

Radiochemistry

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1801082

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1801055

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

GEL Sample ID#	Client Sample Identification
459059001	HF-B6-(7-8) Soil Boring
459059002	HF-B6-(9-10) Soil Boring
459059003	HF-B6-(11-12) Soil Boring
459059004	HF-B9-(7-8) Soil Boring
459059005	HF-B9-(9-10) Soil Boring
459059006	HF-B9-(11-12) Soil Boring
459059008	HF-B11-(9-10) Soil Boring
459059009	HF-B11-(11-12) Soil Boring
1204110609	Method Blank (MB)
1204110610	459059001(HF-B6-(7-8) Soil Boring) Sample Duplicate (DUP)
1204110611	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
1204110610 (HF-B6-(7-8) Soil BoringDUP)	Uranium-238	RPD 31.5* (0.00%-20.00%) RER 1.2 (0-3)

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1802589

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1801055

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

GEL Sample ID#	Client Sample Identification
459059007	HF-B11-(7-8) Soil Boring
459059010	HF-B1-(7-8) Soil Boring
459059011	HF-B1-(9-10) Soil Boring
459059012	HF-B1-(11-12) Soil Boring
459059013	HF-B16-(1-2) Soil Boring
459059014	HF-B16-(3-4) Soil Boring
1204113962	Method Blank (MB)
1204113963	459059011(HF-B1-(9-10) Soil Boring) Sample Duplicate (DUP)
1204113964	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
1204113963 (HF-B1-(9-10) Soil BoringDUP)	Uranium-233/234	RPD 21.9* (0.00%-20.00%) RER 1.6 (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
1204113962 (MB)	Uranium-233/234	Result 1.84 < MDA 4.4 > RDL 0.5 pCi/g
	Uranium-235/236	Result 2.21 < MDA 3.88 > RDL 0.5 pCi/g
	Uranium-238	Result 2.76 < MDA 4 > RDL 0.5 pCi/g

Technical Information

Sample Re-prep/Re-analysis
Samples 459059007 (HF-B11-(7-8) Soil Boring), 459059010 (HF-B1-(7-8) Soil Boring), 459059011 (HF-B1-(9-10) Soil Boring), 459059012 (HF-B1-(11-12) Soil Boring), 459059013 (HF-B16-(1-2) Soil Boring) and 459059014 (HF-B16-(3-4) Soil Boring) were reprepped due to low tracer yield recoveries caused by high levels of activity in the samples. The re-analysis is being reported.

Product: **Dry Weight**
Analytical Method: ASTM D 2216 (Modified)
Analytical Procedure: GL-OA-E-020 REV# 13
Analytical Batch: 1801055

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1801055

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

GEL Sample ID#	Client Sample Identification
459059001	HF-B6-(7-8) Soil Boring
459059002	HF-B6-(9-10) Soil Boring
459059003	HF-B6-(11-12) Soil Boring
459059004	HF-B9-(7-8) Soil Boring
459059005	HF-B9-(9-10) Soil Boring
459059006	HF-B9-(11-12) Soil Boring
459059007	HF-B11-(7-8) Soil Boring
459059008	HF-B11-(9-10) Soil Boring
459059009	HF-B11-(11-12) Soil Boring
459059010	HF-B1-(7-8) Soil Boring
459059011	HF-B1-(9-10) Soil Boring
459059012	HF-B1-(11-12) Soil Boring
459059013	HF-B16-(1-2) Soil Boring
459059014	HF-B16-(3-4) Soil Boring
1204110571	459059001(HF-B6-(7-8) Soil Boring) 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: 1801311

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

GEL Sample ID#	Client Sample Identification
459059001	HF-B6-(7-8) Soil Boring
459059002	HF-B6-(9-10) Soil Boring
459059003	HF-B6-(11-12) Soil Boring
459059004	HF-B9-(7-8) Soil Boring
459059005	HF-B9-(9-10) Soil Boring
459059006	HF-B9-(11-12) Soil Boring
459059007	HF-B11-(7-8) Soil Boring
459059008	HF-B11-(9-10) Soil Boring
459059009	HF-B11-(11-12) Soil Boring
459059010	HF-B1-(7-8) Soil Boring
459059011	HF-B1-(9-10) Soil Boring
459059012	HF-B1-(11-12) Soil Boring
459059013	HF-B16-(1-2) Soil Boring
459059014	HF-B16-(3-4) Soil Boring
1204111162	Method Blank (MB)
1204111163	459059001(HF-B6-(7-8) Soil Boring) Sample Duplicate (DUP)
1204111164	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.

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Page: 1 of 7
Project #: HF Spiking Station 2
GEL Quote #:
COC Number [1]:
PO Number: 4500720046

GEL Chain of Custody and Analytical Request

See www.gel.com for GEL's Sample Acceptance SOP

GEL Work Order Number: 459859

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

Client Name: Westinghouse Electric Company LLC — Phone #: 803.647.1920
Project/Site Name: Columbia Fuel Fabrication Facility — Fax #: 803.695.3964
Address: 5801 Bluff Road, Hopkins, SC 29061
Collected by: Jeremy Grant / Randy Crews — Send Results: 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	Should this sample be considered: TSCA Regulated	Total number of containers	isotopic uranium (alpha spec)	isotopic uranium (by individual isotope, ICP-MS)	Tc-99	Moisture Content	Fluoride	pH	Nitrate				<-- Preservative Type (6)
HF-B6-(7-8) Soil Boring	9/6/2018	0951	G	N	SO			1	X	X	X	X	X	X	X				
HF-B6-(9-10) Soil Boring	9/6/2018	1024	G	N	SO			1	X	X	X	X	X	X	X				
HF-B6-(11-12) Soil Boring	9/6/2018	1100	G	N	SO			1	X	X	X	X	X	X	X				
HF-B9-(7-8) Soil Boring	9/6/2018	1300	G	N	SO			1	X	X	X	X	X	X	X				
HF-B9-(9-10) Soil Boring	9/6/2018	1327	G	N	SO			1	X	X	X	X	X	X	X				
HF-B9-(11-12) Soil Boring	9/6/2018	1358	G	N	SO			1	X	X	X	X	X	X	X				
HF-B11-(7-8) Soil Boring	9/7/2018	0907	G	N	SO			1	X	X	X	X	X	X	X				
HF-B11-(9-10) Soil Boring	9/7/2018	0940	G	N	SO			1	X	X	X	X	X	X	X				
HF-B11-(11-12) Soil Boring	9/7/2018	1022	G	N	SO			1	X	X	X	X	X	X	X				

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: ___ Rush: __X_ Specify: _ASAP_
(Subject to Surcharge)

Fax Results: Yes / No

Circle Deliverable:
C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
Eastern Pacific
Central Other _____
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	RCrews	9/7/18	1320		9/7/18	1320
2						
3						

Sample Shipping and Delivery Details

GEL PM: Hope Taylor
Method of Shipment:
Date Shipped: N/A
Airbill #:
Airbill #:

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

For Lab Receiving Use Only
Custody Seal Intact?
YES NO
Cooler Temp:
_____ C

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

Page: 2 of 7
Project #: HF Spiking Station 2
GEL Quote #:
COC Number (1):
PO Number: 4500720046

GEL Chain of Custody and Analytical Request

See www.gel.com for GEL's Sample Acceptance SOP

GEL Work Order Number:

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

Client Name: Westinghouse Electric Company LLC — Phone #: 803.647.1920
Project/Site Name: Columbia Fuel Fabrication Facility — Fax #: 803.695.3964
Address: 5801 Bluff Road, Hopkins, SC 29061
Collected by: Jeremy Grant/Randy Crews — Send Results: 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	Should this sample be considered: TSCA Regulated	Total number of containers	isotopic uranium (alpha spec)	isotopic uranium (by individual isotope, ICP-MS)	Tc-99	Moisture Content	Fluoride	pH	Nitrate				<-- Preservative Type (6)
HF-B1-(7-8) Soil Boring	9/6/2018	1515	G	N	SO			1	X	X	X	X	X	X	X				
HF-B1-(9-10) Soil Boring	9/6/2018	1545	G	N	SO			1	X	X	X	X	X	X	X				
HF-B1-(11-12) Soil Boring	9/6/2018	1633	G	N	SO			1	X	X	X	X	X	X	X				
HF-B16-(1-2) Soil Boring	9/6/2018	1715	G	N	SO			1	X	X	X	X	X	X	X				
HF-B16-(3-4) Soil Boring	9/6/2018	1729	G	N	SO			1	X	X	X	X	X	X	X				

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: ___ Rush: __X_ Specify: _ASAP_
(Subject to Surcharge)

Fax Results: Yes / No

Circle Deliverable:
C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
Eastern Pacific
Central Other _____
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1	R Crews	9/7/18	1320	R Grant	9/7/18	1320
2				2		
3				3		

Sample Shipping and Delivery Details

GEL PM: Hope Taylor
Method of Shipment:
Date Shipped: N/A
Airbill #:
Airbill #:

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

For Lab Receiving Use Only
Custody Seal Intact? *YES* *NO*
Cooler Temp: ____ *C*

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: WNUC	**SDG/AR/COC/Work Order:** 459059
Received By: STACY BOONE	**Date Received:** 9/7/18 HT
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.
Shipped as a DOT Hazardous?		/	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		/	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): Ø CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
Is package, COC, and/or Samples marked HAZ?		/	If yes, select Hazards below, and contact the GEL Safety Group. 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?	/			
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: ic
4	Daily check performed and passed on IR temperature gun?	/			Temperature Device Serial #: IR3-17 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? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes No___ N/A (If unknown, select No) VOA vials free of headspace? Yes___ No___ N/A___ 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?	/			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	/			Sample ID's affected:
11	Number of containers received match number indicated on COC?	/			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?	/			SB 9/7/18
13	COC form is properly signed in relinquished/received sections?	/			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KG Date 9/10/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

List of current GEL Certifications as of 19 September 2018

State	Certification
Alaska	17−018
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 Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122018−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−18−13
Utah NELAP	SC000122018−26
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

September 21, 2018

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

Re: Soil and Vegetation Analysis
Work Order: 459278

Dear Ms. Logsdon:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 17, 2018. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

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. 4778.

Sincerely,

Taylor Cannon for
Hope Taylor
Project Manager

Purchase Order: 4500720046
Enclosures

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

Certificate of Analysis Report
for

WNUC007 Westinghouse Electric Co, LLC

Client SDG: 459278 GEL Work Order: 459278

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 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, Hope Taylor.

Reviewed by _____

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

Certificate of Analysis

Report Date: September 21, 2018

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: HF-B14-(1-2) Soil Boring
Sample ID: 459278001
Matrix: Soil
Collect Date: 12-SEP-18 09:35
Receive Date: 17-SEP-18
Collector: Client
Moisture: 1.31%

Project: WNUC00518
Client ID: WNUC007

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	0.342	1.01	mg/kg	9.93	1	MAR1	09/18/18	1403	1802566	1
Nitrate-N		6.90	0.332	1.01	mg/kg	9.93	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		356	13.0	39.4	ug/Kg	97.3	2	SKJ	09/19/18	1031	1802353	2
Uranium-235	J	4.85	1.97	13.8	ug/Kg	97.3	2	SKJ	09/19/18	1242	1802353	3
Uranium-238		346	13.0	39.4	ug/Kg	97.3	2					
Uranium-234	U	ND	1.97	9.86	ug/Kg	97.3	2	SKJ	09/19/18	1425	1802353	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.88	0.010	0.100	SU		1	RXB5	09/19/18	1758	1802818	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 21, 2018

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: HF-B14-(3-4) Soil Boring
Sample ID: 459278002
Matrix: Soil
Collect Date: 12-SEP-18 09:45
Receive Date: 17-SEP-18
Collector: Client
Moisture: 1.17%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		2.51	0.342	1.01	mg/kg	9.95	1	MAR1	09/18/18	1536	1802566	1
Nitrate-N		8.34	0.332	1.01	mg/kg	9.95	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		33800	12.7	38.4	ug/Kg	94.9	2	SKJ	09/19/18	1042	1802353	2
Uranium-238		33200	63.4	192	ug/Kg	94.9	10	SKJ	09/19/18	1254	1802353	3
Uranium-234		12.3	1.92	9.60	ug/Kg	94.9	2	SKJ	09/19/18	1434	1802353	4
Uranium-235		1340	38.4	269	ug/Kg	94.9	40	SKJ	09/19/18	1255	1802353	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.09	0.010	0.100	SU		1	RXB5	09/19/18	1759	1802818	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: September 21, 2018

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: HF-B14-(5-5.3) Soil Boring
Project: WNUC00518
Sample ID: 459278003
Client ID: WNUC007
Matrix: Soil
Collect Date: 12-SEP-18 10:14
Receive Date: 17-SEP-18
Collector: Client
Moisture: 1.82%

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		139	1.72	5.05	mg/kg	9.93	5	MAR1	09/19/18	1556	1802566	1
Nitrate-N		57.8	1.67	5.05	mg/kg	9.93	5					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		172000	12.9	39.0	ug/Kg	95.6	2	SKJ	09/19/18	1044	1802353	2
Uranium-238		168000	129	390	ug/Kg	95.6	20	SKJ	09/19/18	1257	1802353	3
Uranium-234		58.2	1.95	9.74	ug/Kg	95.6	2	SKJ	09/19/18	1440	1802353	4
Uranium-235		6160	97.4	682	ug/Kg	95.6	100	SKJ	09/19/18	1258	1802353	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.64	0.010	0.100	SU		1	RXB5	09/19/18	1800	1802818	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: September 21, 2018

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: HF-B15-(1-2) Soil Boring
Sample ID: 459278004
Matrix: Soil
Collect Date: 12-SEP-18 11:02
Receive Date: 17-SEP-18
Collector: Client
Moisture: .958%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		1.18	0.341	1.00	mg/kg	9.93	1	MAR1	09/18/18	1638	1802566	1
Nitrate-N		24.7	0.331	1.00	mg/kg	9.93	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		519	12.4	37.7	ug/Kg	93.3	2	SKJ	09/19/18	1046	1802353	2
Uranium-235	J	7.70	1.88	13.2	ug/Kg	93.3	2	SKJ	09/19/18	1344	1802353	3
Uranium-238		479	12.4	37.7	ug/Kg	93.3	2					
Uranium-234	U	ND	1.88	9.42	ug/Kg	93.3	2	SKJ	09/19/18	1441	1802353	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	8.17	0.010	0.100	SU		1	RXB5	09/19/18	1803	1802818	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 21, 2018

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: HF-B15-(3-4) Soil Boring
Sample ID: 459278005
Matrix: Soil
Collect Date: 12-SEP-18 11:28
Receive Date: 17-SEP-18
Collector: Client
Moisture: 6.88%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		201	3.63	10.7	mg/kg	9.95	10	MAR1	09/19/18	1627	1802566	1
Nitrate-N		382	3.53	10.7	mg/kg	9.95	10					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		1580000	137	414	ug/Kg	96.3	20	SKJ	09/19/18	1047	1802353	2
Uranium-235		116000	2070	14500	ug/Kg	96.3	2000	SKJ	09/19/18	1301	1802353	3
Uranium-238		3260000	13700	41400	ug/Kg	96.3	2000					
Uranium-234		529	20.7	103	ug/Kg	96.3	20	SKJ	09/19/18	1509	1802353	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.46	0.010	0.100	SU		1	RXB5	09/19/18	1803	1802818	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: September 21, 2018

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: HF-B15-(5-6) Soil Boring
Sample ID: 459278006
Matrix: Soil
Collect Date: 12-SEP-18 12:08
Receive Date: 17-SEP-18
Collector: Client
Moisture: 7.97%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography												
SW846 9056A Fluoride and Nitrate "Dry Weight Corrected"												
Fluoride		288	7.32	21.5	mg/kg	9.90	20	MAR1	09/19/18	1658	1802566	1
Nitrate-N		384	7.10	21.5	mg/kg	9.90	20					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		1690000	140	424	ug/Kg	97.5	20	SKJ	09/19/18	1049	1802353	2
Uranium-235		119000	2120	14800	ug/Kg	97.5	2000	SKJ	09/19/18	1307	1802353	3
Uranium-238		3450000	14000	42400	ug/Kg	97.5	2000					
Uranium-234		531	21.2	106	ug/Kg	97.5	20	SKJ	09/19/18	1510	1802353	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.41	0.010	0.100	SU		1	RXB5	09/19/18	1804	1802818	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: HF-B15-(7-8) Soil Boring
Sample ID: 459278007
Matrix: Soil
Collect Date: 12-SEP-18 13:22
Receive Date: 17-SEP-18
Collector: Client
Moisture: 9.61%

Project: WNUC00518
Client ID: WNUC007

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	0.372	1.09	mg/kg	9.88	1	MAR1	09/18/18	1912	1802566	1
Nitrate-N		111	1.80	5.46	mg/kg	9.88	5	MAR1	09/19/18	1729	1802566	2
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		31800	13.6	41.1	ug/Kg	92.9	2	SKJ	09/19/18	1055	1802353	3
Uranium-238		31100	67.9	206	ug/Kg	92.9	10	SKJ	09/19/18	1308	1802353	4
Uranium-234	J	10.1	2.06	10.3	ug/Kg	92.9	2	SKJ	09/19/18	1446	1802353	5
Uranium-235		1160	20.6	144	ug/Kg	92.9	20	SKJ	09/19/18	1310	1802353	6
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.12	0.010	0.100	SU		1	RXB5	09/19/18	1805	1802818	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	SW846 3050B/6020A	
7	SW846 9045D	

Notes:

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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:	HF-B15-(7-8) Soil Boring	Project:	WNUC00518
Sample ID:	459278007	Client ID:	WNUC007

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

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: HF-B15-(9-10) Soil Boring
Sample ID: 459278008
Matrix: Soil
Collect Date: 12-SEP-18 14:09
Receive Date: 17-SEP-18
Collector: Client
Moisture: 12.9%

Project: WNUC00518
Client ID: WNUC007

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	0.389	1.15	mg/kg	9.98	1	MAR1	09/18/18	1943	1802566	1
Nitrate-N		40.1	0.378	1.15	mg/kg	9.98	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		1590	14.5	44.0	ug/Kg	95.8	2	SKJ	09/19/18	1057	1802353	2
Uranium-235		34.4	2.20	15.4	ug/Kg	95.8	2	SKJ	09/19/18	1311	1802353	3
Uranium-238		1580	14.5	44.0	ug/Kg	95.8	2					
Uranium-234	U	ND	2.20	11.0	ug/Kg	95.8	2	SKJ	09/19/18	1512	1802353	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.10	0.010	0.100	SU		1	RXB5	09/19/18	1806	1802818	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: HF-B15-(11-12) Soil Boring
Sample ID: 459278009
Matrix: Soil
Collect Date: 12-SEP-18 14:31
Receive Date: 17-SEP-18
Collector: Client
Moisture: 14.1%

Project: WNUC00518
Client ID: WNUC007

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	0.389	1.14	mg/kg	9.83	1	MAR1	09/18/18	2014	1802566	1
Nitrate-N		14.5	0.378	1.14	mg/kg	9.83	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		20200	14.9	45.2	ug/Kg	97.1	2	SKJ	09/19/18	1058	1802353	2
Uranium-238		19500	14.9	45.2	ug/Kg	97.1	2	SKJ	09/19/18	1313	1802353	3
Uranium-234	J	6.01	2.26	11.3	ug/Kg	97.1	2	SKJ	09/19/18	1513	1802353	4
Uranium-235		642	22.6	158	ug/Kg	97.1	20	SKJ	09/19/18	1314	1802353	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.29	0.010	0.100	SU		1	RXB5	09/19/18	1816	1802818	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: HF-B13-(1-2) Soil Boring
Sample ID: 459278010
Matrix: Soil
Collect Date: 12-SEP-18 15:40
Receive Date: 17-SEP-18
Collector: Client
Moisture: 8.69%

Project: WNUC00518
Client ID: WNUC007

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	0.371	1.09	mg/kg	9.98	1	MAR1	09/18/18	2045	1802566	1
Nitrate-N		70.8	0.721	2.18	mg/kg	9.98	2	MAR1	09/19/18	1800	1802566	2
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium-235	J	11.4	2.09	14.7	ug/Kg	95.6	2	SKJ	09/19/18	1350	1802353	3
Uranium-238		1140	13.8	41.9	ug/Kg	95.6	2					
Uranium-234	U	ND	2.09	10.5	ug/Kg	95.6	2	SKJ	09/19/18	1515	1802353	4
Uranium		1180	13.8	41.9	ug/Kg	95.6	2	SKJ	09/19/18	1100	1802353	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	6.18	0.010	0.100	SU		1	RXB5	09/19/18	1818	1802818	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: HF-B13-(3-4) Soil Boring
Sample ID: 459278011
Matrix: Soil
Collect Date: 12-SEP-18 16:00
Receive Date: 17-SEP-18
Collector: Client
Moisture: 7.83%

Project: WNUC00518
Client ID: WNUC007

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	0.990	0.366	1.08	mg/kg	9.93	1	MAR1	09/18/18	2116	1802566	1
Nitrate-N		67.0	0.711	2.15	mg/kg	9.93	2	MAR1	09/19/18	1831	1802566	2
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		1000	14.3	43.2	ug/Kg	99.6	2	SKJ	09/19/18	1102	1802353	3
Uranium-235	J	10.3	2.16	15.1	ug/Kg	99.6	2	SKJ	09/19/18	1351	1802353	4
Uranium-238		985	14.3	43.2	ug/Kg	99.6	2					
Uranium-234	U	ND	2.16	10.8	ug/Kg	99.6	2	SKJ	09/19/18	1516	1802353	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.67	0.010	0.100	SU		1	RXB5	09/19/18	1819	1802818	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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: HF-B13-(5-6) Soil Boring
Sample ID: 459278012
Matrix: Soil
Collect Date: 12-SEP-18 16:24
Receive Date: 17-SEP-18
Collector: Client
Moisture: 8.7%

Project: WNUC00518
Client ID: WNUC007

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	0.371	1.09	mg/kg	9.95	1	MAR1	09/18/18	2147	1802566	1
Nitrate-N		57.4	0.719	2.18	mg/kg	9.95	2	MAR1	09/19/18	1901	1802566	2
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		1100	13.9	42.0	ug/Kg	96.0	2	SKJ	09/19/18	1107	1802353	3
Uranium-235	J	11.0	2.10	14.7	ug/Kg	96.0	2	SKJ	09/19/18	1353	1802353	4
Uranium-238		1090	13.9	42.0	ug/Kg	96.0	2					
Uranium-234	U	ND	2.10	10.5	ug/Kg	96.0	2	SKJ	09/19/18	1520	1802353	5
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.50	0.010	0.100	SU		1	RXB5	09/19/18	1819	1802818	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 9056A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	SW846 3050B/6020A	
6	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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Contact: Ms. Cynthia Logsdon
Project: Soil and Vegetation Analysis

Client Sample ID: HF-B13-(7-8) Soil Boring
Sample ID: 459278013
Matrix: Soil
Collect Date: 12-SEP-18 17:09
Receive Date: 17-SEP-18
Collector: Client
Moisture: 11.9%

Project: WNUC00518
Client ID: WNUC007

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	0.382	1.12	mg/kg	9.90	1	MAR1	09/18/18	2218	1802566	1
Nitrate-N		33.6	0.371	1.12	mg/kg	9.90	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		888	14.5	44.1	ug/Kg	97.1	2	SKJ	09/19/18	1108	1802353	2
Uranium-235	J	8.28	2.20	15.4	ug/Kg	97.1	2	SKJ	09/19/18	1354	1802353	3
Uranium-238		914	14.5	44.1	ug/Kg	97.1	2					
Uranium-234	U	ND	2.20	11.0	ug/Kg	97.1	2	SKJ	09/19/18	1522	1802353	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.05	0.010	0.100	SU		1	RXB5	09/19/18	1820	1802818	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: HF-B13-(9-10) Soil Boring
Sample ID: 459278014
Matrix: Soil
Collect Date: 12-SEP-18 17:41
Receive Date: 17-SEP-18
Collector: Client
Moisture: 12.9%

Project: WNUC00518
Client ID: WNUC007

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	0.389	1.14	mg/kg	9.95	1	MAR1	09/18/18	2249	1802566	1
Nitrate-N		29.0	0.377	1.14	mg/kg	9.95	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		781	14.4	43.7	ug/Kg	95.1	2	SKJ	09/19/18	1110	1802353	2
Uranium-235	J	7.34	2.18	15.3	ug/Kg	95.1	2	SKJ	09/19/18	1356	1802353	3
Uranium-238		759	14.4	43.7	ug/Kg	95.1	2					
Uranium-234	U	ND	2.18	10.9	ug/Kg	95.1	2	SKJ	09/19/18	1523	1802353	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	4.52	0.010	0.100	SU		1	RXB5	09/19/18	1823	1802818	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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: HF-B13-(11-12) Soil Boring
Sample ID: 459278015
Matrix: Soil
Collect Date: 12-SEP-18 18:18
Receive Date: 17-SEP-18
Collector: Client
Moisture: 12.8%

Project: WNUC00518
Client ID: WNUC007

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	0.389	1.14	mg/kg	9.98	1	MAR1	09/19/18	0021	1802566	1
Nitrate-N		14.6	0.378	1.14	mg/kg	9.98	1					
Metals Analysis-ICP-MS												
SW846 3050B/6020A Uranium Solid "Dry Weight Corrected"												
Uranium		830	13.9	42.2	ug/Kg	91.9	2	SKJ	09/19/18	1111	1802353	2
Uranium-235	J	13.8	2.11	14.8	ug/Kg	91.9	2	SKJ	09/19/18	1357	1802353	3
Uranium-238		824	13.9	42.2	ug/Kg	91.9	2					
Uranium-234	U	ND	2.11	10.5	ug/Kg	91.9	2	SKJ	09/19/18	1524	1802353	4
Titration and Ion Analysis												
SW9045D Corrosivity (pH<2or>14) "As Received"												
Corrosivity	H	5.22	0.010	0.100	SU		1	RXB5	09/19/18	1825	1802818	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM8	09/18/18	1250	1802352
SW846 9056A	SW846 9056A Total Anions in Soil	MAR1	09/18/18	0901	1802565

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	SW846 3050B/6020A	
3	SW846 3050B/6020A	
4	SW846 3050B/6020A	
5	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

QC Summary

Report Date: September 21, 2018

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

Contact: **Ms. Cynthia Logsdon**

Workorder: **459278**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 1802566										
QC1204113926 459278001 DUP										
Fluoride	U	ND	U	ND	mg/kg	N/A			MAR1	09/18/18 14:34
Nitrate-N		6.90		6.94	mg/kg	0.6		(0%-20%)		
QC1204113927 459278015 DUP										
Fluoride	U	ND	U	ND	mg/kg	N/A				09/19/18 00:52
Nitrate-N		14.6		14.5	mg/kg	0.844		(0%-20%)		
QC1204113925 LCS										
Fluoride	25.0			24.4	mg/kg		97.7	(90%-110%)		09/18/18 13:33
Nitrate-N	25.0			23.7	mg/kg		94.8	(90%-110%)		
QC1204113924 MB										
Fluoride			U	ND	mg/kg					09/18/18 13:02
Nitrate-N			U	ND	mg/kg					
QC1204113928 459278001 MS										
Fluoride	25.3	U	ND	22.2	mg/kg		87.7	(30%-135%)		09/18/18 15:05
Nitrate-N	25.3		6.90	32.5	mg/kg		101	(70%-125%)		
QC1204113929 459278015 MS										
Fluoride	28.6	U	ND	8.88	mg/kg		31.1	(30%-135%)		09/19/18 01:23
Nitrate-N	28.6		14.6	44.4	mg/kg		104	(70%-125%)		

QC Summary

Workorder: **459278**

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1802353											
QC1204113504 459278001 DUP											
Uranium			356		412	ug/Kg	14.5		(0%-20%)	SKJ	09/19/18 10:33
Uranium-234		U	ND	U	ND	ug/Kg	N/A				09/19/18 14:27
Uranium-235		J	4.85	J	4.75	ug/Kg	2.13 ^		(+/-13.1)		09/19/18 12:43
Uranium-238			346		390	ug/Kg	11.9		(0%-20%)		
QC1204113503 LCS											
Uranium	4850				4900	ug/Kg		101	(80%-120%)		09/19/18 10:29
Uranium-235	35.0				32.6	ug/Kg		93.3	(80%-120%)		09/19/18 12:40
Uranium-238	4820				4550	ug/Kg		94.4	(80%-120%)		
QC1204113507 LCS											
Uranium-234	54.8				55.3	ug/Kg		101	(80%-120%)		09/19/18 14:24
QC1204113502 MB											
Uranium				U	ND	ug/Kg					09/19/18 10:28
Uranium-234				U	ND	ug/Kg					09/19/18 14:22
Uranium-235				U	ND	ug/Kg					09/19/18 12:39
Uranium-238				U	ND	ug/Kg					
QC1204113505 459278001 MS											
Uranium	4740		356		5040	ug/Kg		98.7	(75%-125%)		09/19/18 10:34
Uranium-235	34.2	J	4.85		35.1	ug/Kg		88.6	(75%-125%)		09/19/18 12:45

QC Summary

Workorder: **459278**

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1802353											
Uranium-238	4710		346		4790	ug/Kg		94.3	(75%-125%)	SKJ	09/19/18 12:45
QC1204113508 459278001 MS											
Uranium-234	50.9	U	ND		53.6	ug/Kg		105	(75%-125%)		09/19/18 14:28
QC1204113506 459278001 SDILT											
Uranium			1.81		0.369	ug/L	2.16		(0%-10%)		09/19/18 10:37
Uranium-234		U	ND	U	ND	ug/L	N/A				09/19/18 14:31
Uranium-235		J	0.0246	U	ND	ug/L	N/A		(0%-10%)		09/19/18 12:48
Uranium-238			1.76		0.351	ug/L	.148		(0%-10%)		
Titration and Ion Analysis											
Batch 1802818											
QC1204114455 459278015 DUP											
Corrosivity		H	5.22	H	5.22	SU	0		(0%-10%)	RXB5	09/19/18 18:26
QC1204114454 LCS											
Corrosivity	7.00				7.04	SU		101	(95%-105%)		09/19/18 17:51

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 %difference of sample and SD is >10%. Sample concentration must meet flagging criteria
- E General Chemistry--Concentration of the target analyte exceeds the instrument calibration range
- FB Mercury was found present at quantifiable concentrations in field blanks received with these samples. Data associated with the blank are deemed invalid for reporting to regulatory agencies
- H Analytical holding time was exceeded
- J Value is estimated

QC Summary

Workorder: **459278**

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

N	Metals--The Matrix spike sample recovery is not within specified control limits
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
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
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.

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

Certificate of Analysis

Report Date: September 21, 2018

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: HF-B14-(1-2) Soil Boring
Project: WNUC00518
Sample ID: 459278001
Client ID: WNUC007
Matrix: Soil
Collect Date: 12-SEP-18 09:35
Receive Date: 17-SEP-18
Collector: Client
Moisture: 1.31%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		1.31				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		0.709	+/-0.380	0.348	0.500	pCi/g			HAKB	09/21/18	0952	1803412	2
Uranium-235/236	U	0.205	+/-0.242	0.261	0.500	pCi/g							
Uranium-238		0.454	+/-0.302	0.269	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	7.11	+/-12.9	22.0	50.0	pCi/g			CXS7	09/19/18	2012	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			67.6	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			98.5	(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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Certificate of Analysis

Report Date: September 21, 2018

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: HF-B14-(3-4) Soil Boring
Sample ID: 459278002
Matrix: Soil
Collect Date: 12-SEP-18 09:45
Receive Date: 17-SEP-18
Collector: Client
Moisture: 1.17%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		1.17				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		94.4	+/-5.42	0.517	0.500	pCi/g			HAKB	09/20/18	1420	1803412	2
Uranium-235/236		5.00	+/-1.40	0.300	0.500	pCi/g							
Uranium-238		18.7	+/-2.42	0.388	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-0.389	+/-13.5	23.5	50.0	pCi/g			CXS7	09/19/18	2029	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			83.1	(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

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Certificate of Analysis

Report Date: September 21, 2018

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: HF-B14-(5-5.3) Soil Boring
Project: WNUC00518
Sample ID: 459278003
Client ID: WNUC007
Matrix: Soil
Collect Date: 12-SEP-18 10:14
Receive Date: 17-SEP-18
Collector: Client
Moisture: 1.82%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		1.82				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		366	+/-10.7	0.554	0.500	pCi/g			HAKB	09/21/18	0952	1803412	2
Uranium-235/236		21.3	+/-2.87	0.299	0.500	pCi/g							
Uranium-238		69.8	+/-4.66	0.387	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-2.65	+/-17.0	29.8	50.0	pCi/g			CXS7	09/19/18	2046	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			77.2	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			99.8	(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: September 21, 2018

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: HF-B15-(1-2) Soil Boring
Sample ID: 459278004
Matrix: Soil
Collect Date: 12-SEP-18 11:02
Receive Date: 17-SEP-18
Collector: Client
Moisture: .958%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		0.958				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.59	+/-0.515	0.281	0.500	pCi/g			HAKB	09/20/18	1420	1803412	2
Uranium-235/236	U	0.280	+/-0.266	0.281	0.500	pCi/g							
Uranium-238		0.390	+/-0.269	0.227	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	6.64	+/-28.0	48.3	50.0	pCi/g			CXS7	09/19/18	2103	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			86.1	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			79.5	(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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Certificate of Analysis

Report Date: September 21, 2018

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: HF-B15-(3-4) Soil Boring
Sample ID: 459278005
Matrix: Soil
Collect Date: 12-SEP-18 11:28
Receive Date: 17-SEP-18
Collector: Client
Moisture: 6.88%

Project: WNUC00518
Client ID: WNUC007

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		4760	+/-101	5.03	0.500	pCi/g			HAKB	09/21/18	0952	1803412	1
Uranium-235/236		268	+/-26.8	5.59	0.500	pCi/g							
Uranium-238		989	+/-46.2	5.16	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	31.6	+/-20.5	33.5	50.0	pCi/g			CXS7	09/19/18	2120	1802475	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	09/17/18	1440	1802382

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"			59.2	(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: September 21, 2018

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: HF-B15-(5-6) Soil Boring
Sample ID: 459278006
Matrix: Soil
Collect Date: 12-SEP-18 12:08
Receive Date: 17-SEP-18
Collector: Client
Moisture: 7.97%

Project: WNUC00518
Client ID: WNUC007

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		6560	+/-157	7.48	0.500	pCi/g			HAKB	09/20/18	1420	1803412	1
Uranium-235/236		416	+/-44.0	5.78	0.500	pCi/g							
Uranium-238		1480	+/-74.6	2.93	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-6.56	+/-15.3	27.2	50.0	pCi/g			CXS7	09/19/18	2136	1802475	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	09/17/18	1440	1802382

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"			57.6	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			95.5	(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

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

Certificate of Analysis

Report Date: September 21, 2018

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: HF-B15-(7-8) Soil Boring
Sample ID: 459278007
Matrix: Soil
Collect Date: 12-SEP-18 13:22
Receive Date: 17-SEP-18
Collector: Client
Moisture: 9.61%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		9.61				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		101	+/-5.43	0.584	0.500	pCi/g			HAKB	09/20/18	1643	1803412	2
Uranium-235/236		6.84	+/-1.59	0.450	0.500	pCi/g							
Uranium-238		23.7	+/-2.64	0.589	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	10.4	+/-19.1	32.5	50.0	pCi/g			CXS7	09/19/18	2153	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			85.6	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			82.5	(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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Certificate of Analysis

Report Date: September 21, 2018

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: HF-B15-(9-10) Soil Boring
Project: WNUC00518
Sample ID: 459278008
Client ID: WNUC007
Matrix: Soil
Collect Date: 12-SEP-18 14:09
Receive Date: 17-SEP-18
Collector: Client
Moisture: 12.9%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		12.9				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		8.04	+/-1.03	0.278	0.500	pCi/g			HAKB	09/20/18	1643	1803412	2
Uranium-235/236		0.359	+/-0.264	0.234	0.500	pCi/g							
Uranium-238		2.03	+/-0.528	0.252	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.57	+/-17.8	31.2	50.0	pCi/g			CXS7	09/19/18	2210	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			82.9	(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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Certificate of Analysis

Report Date: September 21, 2018

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: HF-B15-(11-12) Soil Boring
Sample ID: 459278009
Matrix: Soil
Collect Date: 12-SEP-18 14:31
Receive Date: 17-SEP-18
Collector: Client
Moisture: 14.1%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		14.1				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		23.8	+/-1.77	0.278	0.500	pCi/g			HAKB	09/20/18	1643	1803412	2
Uranium-235/236		2.14	+/-0.598	0.202	0.500	pCi/g							
Uranium-238		6.52	+/-0.931	0.240	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	3.30	+/-12.2	21.1	50.0	pCi/g			CXS7	09/19/18	2227	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			84.2	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			92.1	(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: September 21, 2018

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: HF-B13-(1-2) Soil Boring
Sample ID: 459278010
Matrix: Soil
Collect Date: 12-SEP-18 15:40
Receive Date: 17-SEP-18
Collector: Client
Moisture: 8.69%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		8.69				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.17	+/-0.436	0.305	0.500	pCi/g			HAKB	09/20/18	1643	1803412	2
Uranium-235/236		0.353	+/-0.278	0.260	0.500	pCi/g							
Uranium-238		1.16	+/-0.430	0.281	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	11.7	+/-21.4	36.4	50.0	pCi/g			CXS7	09/19/18	2244	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			80.6	(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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Certificate of Analysis

Report Date: September 21, 2018

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: HF-B13-(3-4) Soil Boring
Sample ID: 459278011
Matrix: Soil
Collect Date: 12-SEP-18 16:00
Receive Date: 17-SEP-18
Collector: Client
Moisture: 7.83%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		7.83				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		0.689	+/-0.332	0.277	0.500	pCi/g			HAKB	09/20/18	1643	1803412	2
Uranium-235/236		0.178	+/-0.196	0.133	0.500	pCi/g							
Uranium-238		1.11	+/-0.406	0.252	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-7.42	+/-15.9	28.4	50.0	pCi/g			CXS7	09/19/18	2301	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			78	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			92.3	(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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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: HF-B13-(5-6) Soil Boring
Sample ID: 459278012
Matrix: Soil
Collect Date: 12-SEP-18 16:24
Receive Date: 17-SEP-18
Collector: Client
Moisture: 8.7%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		8.70				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.39	+/-0.484	0.379	0.500	pCi/g			HAKB	09/20/18	1643	1803412	2
Uranium-235/236		0.427	+/-0.311	0.312	0.500	pCi/g							
Uranium-238		0.981	+/-0.416	0.372	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-1.48	+/-16.5	28.9	50.0	pCi/g			CXS7	09/19/18	2318	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			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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Certificate of Analysis

Report Date: September 21, 2018

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: HF-B13-(7-8) Soil Boring
Sample ID: 459278013
Matrix: Soil
Collect Date: 12-SEP-18 17:09
Receive Date: 17-SEP-18
Collector: Client
Moisture: 11.9%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		11.9				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.43	+/-0.533	0.354	0.500	pCi/g			HAKB	09/20/18	2156	1803412	2
Uranium-235/236		0.452	+/-0.345	0.279	0.500	pCi/g							
Uranium-238		0.581	+/-0.363	0.365	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	0.736	+/-12.9	22.5	50.0	pCi/g			CXS7	09/19/18	2335	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			71.4	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			98	(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: HF-B13-(9-10) Soil Boring
Project: WNUC00518
Sample ID: 459278014
Client ID: WNUC007
Matrix: Soil
Collect Date: 12-SEP-18 17:41
Receive Date: 17-SEP-18
Collector: Client
Moisture: 12.9%

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		12.9				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.38	+/-0.459	0.294	0.500	pCi/g			HAKB	09/20/18	2156	1803412	2
Uranium-235/236	U	0.203	+/-0.219	0.249	0.500	pCi/g							
Uranium-238		1.04	+/-0.400	0.269	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	-0.00596	+/-12.2	21.3	50.0	pCi/g			CXS7	09/19/18	2352	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			77.3	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.8	(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: September 21, 2018

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: HF-B13-(11-12) Soil Boring
Sample ID: 459278015
Matrix: Soil
Collect Date: 12-SEP-18 18:18
Receive Date: 17-SEP-18
Collector: Client
Moisture: 12.8%

Project: WNUC00518
Client ID: WNUC007

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Gravimetric Solids													
ASTM D 2216 % Moisture "As Received"													
Moisture		12.8				percent			CXC1	09/17/18	1440	1802382	1
Rad Alpha Spec Analysis													
Alphaspec U, Soil/Veg "Dry Weight Corrected"													
Uranium-233/234		1.48	+/-0.479	0.300	0.500	pCi/g			HAKB	09/20/18	2156	1803412	2
Uranium-235/236		0.540	+/-0.326	0.220	0.500	pCi/g							
Uranium-238		1.14	+/-0.420	0.260	0.500	pCi/g							
Rad Liquid Scintillation Analysis													
Liquid Scint Tc99, Soil "As Received"													
Technetium-99	U	2.49	+/-11.9	20.7	50.0	pCi/g			CXS7	09/20/18	0009	1802475	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	CXC1	09/17/18	1440	1802382

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	ASTM D 2216 (Modified)	
2	DOE EML HASL-300, U-02-RC Modified	
3	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"			78.2	(15%-125%)
Technetium-99m Tracer	Liquid Scint Tc99, Soil "As Received"			96.9	(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

QC Summary

Report Date: September 21, 2018

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

Contact: **Ms. Cynthia Logsdon**

Workorder: **459278**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec										
Batch 1803412										
QC1204115915 459278001 DUP										
Uranium-233/234		0.709		0.531	pCi/g	28.8		(0% - 100%)	HAKB	09/20/18 21:56
	Uncertainty	+/-0.380		+/-0.305						
Uranium-235/236	U	0.205		0.232	pCi/g	12.1		(0% - 100%)		
	Uncertainty	+/-0.242		+/-0.223						
Uranium-238		0.454		0.405	pCi/g	11.4		(0% - 100%)		
	Uncertainty	+/-0.302		+/-0.268						
QC1204115916 LCS										
Uranium-233/234				12.7	pCi/g					09/20/18 21:56
	Uncertainty			+/-1.27						
Uranium-235/236				1.38	pCi/g					
	Uncertainty			+/-0.479						
Uranium-238	12.7			14.4	pCi/g		113	(75%-125%)		
	Uncertainty			+/-1.35						
QC1204115914 MB										
Uranium-233/234			U	0.112	pCi/g					09/21/18 09:52
	Uncertainty			+/-0.253						
Uranium-235/236				0.498	pCi/g					
	Uncertainty			+/-0.367						
Uranium-238			U	0.177	pCi/g					
	Uncertainty			+/-0.224						
Rad Liquid Scintillation										
Batch 1802475										
QC1204113745 459278001 DUP										
Technetium-99	U	7.11	U	-7.88	pCi/g	N/A		N/A	CXS7	09/20/18 00:42
	Uncertainty	+/-12.9		+/-12.6						
QC1204113746 LCS										
Technetium-99	404			375	pCi/g		92.7	(75%-125%)		09/20/18 00:59
	Uncertainty			+/-23.6						

QC Summary

Workorder: **459278**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Liquid Scintillation											
Batch 1802475											
QC1204113744 MB											
Technetium-99			U	-9.44	pCi/g				CXS7	09/20/18	00:26
	Uncertainty			+/-12.1							

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	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

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

QC Summary

Workorder: **459278**

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.

Metals

Product: **Determination of Metals by ICP-MS**
Analytical Method: SW846 3050B/6020A
Analytical Procedure: GL-MA-E-014 REV# 33
Analytical Batch: 1802353

Preparation Method: SW846 3050B
Preparation Procedure: GL-MA-E-009 REV# 28
Preparation Batch: 1802352

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

GEL Sample ID#	Client Sample Identification
459278001	HF-B14-(1-2) Soil Boring
459278002	HF-B14-(3-4) Soil Boring
459278003	HF-B14-(5-5.3) Soil Boring
459278004	HF-B15-(1-2) Soil Boring
459278005	HF-B15-(3-4) Soil Boring
459278006	HF-B15-(5-6) Soil Boring
459278007	HF-B15-(7-8) Soil Boring
459278008	HF-B15-(9-10) Soil Boring
459278009	HF-B15-(11-12) Soil Boring
459278010	HF-B13-(1-2) Soil Boring
459278011	HF-B13-(3-4) Soil Boring
459278012	HF-B13-(5-6) Soil Boring
459278013	HF-B13-(7-8) Soil Boring
459278014	HF-B13-(9-10) Soil Boring
459278015	HF-B13-(11-12) Soil Boring
1204113502	Method Blank (MB)**ICP-MS**
1204113503	Laboratory Control Sample (LCS)
1204113507	Laboratory Control Sample (LCS)
1204113506	459278001(HF-B14-(1-2) Soil BoringL) Serial Dilution (SD)
1204113504	459278001(HF-B14-(1-2) Soil BoringD) Sample Duplicate (DUP)
1204113505	459278001(HF-B14-(1-2) Soil BoringS) Matrix Spike (MS)
1204113508	459278001(HF-B14-(1-2) Soil BoringS) 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.

Calibration Information

CRDL/PQL Requirements
The CRDL standard recoveries for SW846 6020A/6020B met the advisory control limits with the exception of

uranium-235. Client sample concentrations were less than the MDL or greater than two times the CRDL; therefore the data were not adversely affected. 459278002 (HF-B14-(3-4) Soil Boring), 459278003 (HF-B14-(5-5.3) Soil Boring), 459278005 (HF-B15-(3-4) Soil Boring), 459278006 (HF-B15-(5-6) Soil Boring), 459278007 (HF-B15-(7-8) Soil Boring), 459278008 (HF-B15-(9-10) Soil Boring) and 459278009 (HF-B15-(11-12) Soil Boring).

ICSA/ICSAB Statement
For the ICP-MS analysis, the ICSA solution contains analyte concentrations which are verified trace impurities indigenous to the purchased standard.

Technical Information

Preparation/Analytical Method Verification
Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions
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. Samples 459278002 (HF-B14-(3-4) Soil Boring), 459278003 (HF-B14-(5-5.3) Soil Boring), 459278005 (HF-B15-(3-4) Soil Boring), 459278006 (HF-B15-(5-6) Soil Boring), 459278007 (HF-B15-(7-8) Soil Boring) and 459278009 (HF-B15-(11-12) Soil Boring) were diluted to ensure that the analyte concentrations were within the linear calibration range of the instrument. The ICPMS solid samples in this SDG were diluted the standard two times.

Analyte	459278									
	001	002	003	004	005	006	007	008	009	010
Uranium	2X	2X	2X	2X	20X	20X	2X	2X	2X	2X
Uranium-234	2X	2X	2X	2X	20X	20X	2X	2X	2X	2X
Uranium-235	2X	40X	100X	2X	2000X	2000X	20X	2X	20X	2X
Uranium-238	2X	10X	20X	2X	2000X	2000X	10X	2X	2X	2X

Analyte	459278				
	011	012	013	014	015
Uranium	2X	2X	2X	2X	2X
Uranium-234	2X	2X	2X	2X	2X
Uranium-235	2X	2X	2X	2X	2X
Uranium-238	2X	2X	2X	2X	2X

General Chemistry

Product: **Ion Chromatography**
Analytical Method: SW846 9056A
Analytical Procedure: GL-GC-E-086 REV# 25
Analytical Batches: 1802566 and 1802565

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

GEL Sample ID#	Client Sample Identification
459278001	HF-B14-(1-2) Soil Boring
459278002	HF-B14-(3-4) Soil Boring
459278003	HF-B14-(5-5.3) Soil Boring
459278004	HF-B15-(1-2) Soil Boring
459278005	HF-B15-(3-4) Soil Boring
459278006	HF-B15-(5-6) Soil Boring
459278007	HF-B15-(7-8) Soil Boring
459278008	HF-B15-(9-10) Soil Boring
459278009	HF-B15-(11-12) Soil Boring
459278010	HF-B13-(1-2) Soil Boring
459278011	HF-B13-(3-4) Soil Boring
459278012	HF-B13-(5-6) Soil Boring
459278013	HF-B13-(7-8) Soil Boring
459278014	HF-B13-(9-10) Soil Boring
459278015	HF-B13-(11-12) Soil Boring
1204113924	Method Blank (MB)
1204113925	Laboratory Control Sample (LCS)
1204113926	459278001(HF-B14-(1-2) Soil Boring) Sample Duplicate (DUP)
1204113927	459278015(HF-B13-(11-12) Soil Boring) Sample Duplicate (DUP)
1204113928	459278001(HF-B14-(1-2) Soil Boring) Matrix Spike (MS)
1204113929	459278015(HF-B13-(11-12) Soil Boring) 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 459278003 (HF-B14-(5-5.3) Soil Boring), 459278005 (HF-B15-(3-4) Soil Boring), 459278006 (HF-B15-(5-6) Soil Boring), 459278007 (HF-B15-(7-8) Soil Boring), 459278010 (HF-B13-(1-2) Soil Boring), 459278011 (HF-B13-(3-4) Soil Boring) and 459278012 (HF-B13-(5-6) Soil Boring) 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	459278						
	003	005	006	007	010	011	012
Fluoride	5X	10X	20X	1X	1X	1X	1X
Nitrate	5X	10X	20X	5X	2X	2X	2X

Product: pH
Analytical Method: SW846 9045D
Analytical Procedure: GL-GC-E-008 REV# 23

Analytical Batch: 1802818

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

GEL Sample ID#	Client Sample Identification
459278001	HF-B14-(1-2) Soil Boring
459278002	HF-B14-(3-4) Soil Boring
459278003	HF-B14-(5-5.3) Soil Boring
459278004	HF-B15-(1-2) Soil Boring
459278005	HF-B15-(3-4) Soil Boring
459278006	HF-B15-(5-6) Soil Boring
459278007	HF-B15-(7-8) Soil Boring
459278008	HF-B15-(9-10) Soil Boring
459278009	HF-B15-(11-12) Soil Boring
459278010	HF-B13-(1-2) Soil Boring
459278011	HF-B13-(3-4) Soil Boring
459278012	HF-B13-(5-6) Soil Boring
459278013	HF-B13-(7-8) Soil Boring
459278014	HF-B13-(9-10) Soil Boring
459278015	HF-B13-(11-12) Soil Boring
1204114454	Laboratory Control Sample (LCS)
1204114455	459278015(HF-B13-(11-12) Soil Boring) 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
1204114455 (HF-B13-(11-12) Soil BoringDUP)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278001 (HF-B14-(1-2) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278002 (HF-B14-(3-4) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278003 (HF-B14-(5-5.3) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278004 (HF-B15-(1-2) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278005 (HF-B15-(3-4) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278006 (HF-B15-(5-6) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278007 (HF-B15-(7-8) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278008 (HF-B15-(9-10) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278009 (HF-B15-(11-12) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278010 (HF-B13-(1-2) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278011 (HF-B13-(3-4) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18

459278012 (HF-B13-(5-6) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278013 (HF-B13-(7-8) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278014 (HF-B13-(9-10) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18
459278015 (HF-B13-(11-12) Soil Boring)	Corrosivity	Received 17-SEP-18, out of holding 12-SEP-18

Miscellaneous Information

Additional Comments
5g used due to the highly radioactive and/or hazardous matrix of samples. 459278005 (HF-B15-(3-4) Soil Boring) and 459278006 (HF-B15-(5-6) Soil Boring).

Radiochemistry

Product: **Alphaspec U, Soil/Veg**
Analytical Method: DOE EML HASL-300, U-02-RC Modified
Analytical Procedure: GL-RAD-A-011 REV# 26
Analytical Batch: 1803412

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1802382

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

GEL Sample ID#	Client Sample Identification
459278001	HF-B14-(1-2) Soil Boring
459278002	HF-B14-(3-4) Soil Boring
459278003	HF-B14-(5-5.3) Soil Boring
459278004	HF-B15-(1-2) Soil Boring
459278005	HF-B15-(3-4) Soil Boring
459278006	HF-B15-(5-6) Soil Boring
459278007	HF-B15-(7-8) Soil Boring
459278008	HF-B15-(9-10) Soil Boring
459278009	HF-B15-(11-12) Soil Boring
459278010	HF-B13-(1-2) Soil Boring
459278011	HF-B13-(3-4) Soil Boring
459278012	HF-B13-(5-6) Soil Boring
459278013	HF-B13-(7-8) Soil Boring
459278014	HF-B13-(9-10) Soil Boring
459278015	HF-B13-(11-12) Soil Boring
1204115914	Method Blank (MB)
1204115915	459278001(HF-B14-(1-2) Soil Boring) Sample Duplicate (DUP)
1204115916	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
1204115914 (MB)	Uranium-235/236	Result: 0.498 pCi/g > MDA: 0.187 pCi/g <= RDL: 0.500 pCi/g

Technical Information

Sample Re-prep/Re-analysis
Samples were reprepped due to high blank activity. The re-analysis is being reported.

Recounts
Sample 1204115914 (MB) was recounted due to a suspected blank false positive. The recount is reported.
Samples 459278001 (HF-B14-(1-2) Soil Boring), 459278003 (HF-B14-(5-5.3) Soil Boring) and 459278005 (HF-B15-(3-4) Soil Boring) were recounted due to a peak shift. The recounts are reported.

Product: **Dry Weight**
Analytical Method: ASTM D 2216 (Modified)
Analytical Procedure: GL-OA-E-020 REV# 13
Analytical Batch: 1802382

Preparation Method: Dry Soil Prep
Preparation Procedure: GL-RAD-A-021 REV# 23
Preparation Batch: 1802382

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

GEL Sample ID#	Client Sample Identification
459278001	HF-B14-(1-2) Soil Boring
459278002	HF-B14-(3-4) Soil Boring
459278003	HF-B14-(5-5.3) Soil Boring
459278004	HF-B15-(1-2) Soil Boring
459278005	HF-B15-(3-4) Soil Boring
459278006	HF-B15-(5-6) Soil Boring
459278007	HF-B15-(7-8) Soil Boring
459278008	HF-B15-(9-10) Soil Boring
459278009	HF-B15-(11-12) Soil Boring
459278010	HF-B13-(1-2) Soil Boring
459278011	HF-B13-(3-4) Soil Boring
459278012	HF-B13-(5-6) Soil Boring
459278013	HF-B13-(7-8) Soil Boring
459278014	HF-B13-(9-10) Soil Boring
459278015	HF-B13-(11-12) Soil Boring
1204113562	459278001(HF-B14-(1-2) Soil Boring) 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: 1802475

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

GEL Sample ID#	Client Sample Identification
459278001	HF-B14-(1-2) Soil Boring
459278002	HF-B14-(3-4) Soil Boring
459278003	HF-B14-(5-5.3) Soil Boring
459278004	HF-B15-(1-2) Soil Boring
459278005	HF-B15-(3-4) Soil Boring
459278006	HF-B15-(5-6) Soil Boring
459278007	HF-B15-(7-8) Soil Boring
459278008	HF-B15-(9-10) Soil Boring
459278009	HF-B15-(11-12) Soil Boring
459278010	HF-B13-(1-2) Soil Boring
459278011	HF-B13-(3-4) Soil Boring
459278012	HF-B13-(5-6) Soil Boring
459278013	HF-B13-(7-8) Soil Boring
459278014	HF-B13-(9-10) Soil Boring
459278015	HF-B13-(11-12) Soil Boring
1204113744	Method Blank (MB)
1204113745	459278001(HF-B14-(1-2) Soil Boring) Sample Duplicate (DUP)
1204113746	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 7

Project #: HF Spiking Station 2

GEL Quote #:

COC Number (1):

PO Number: 4500720046

GEL Chain of Custody and Analytical Request

See www.gel.com for GEL's Sample Acceptance SOP

GEL Work Order Number: 459278

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

Client Name: Westinghouse Electric Company LLC Phone #: 803.647.1920

Project/Site Name: Columbia Fuel Fabrication Facility Fax #: 803.695.3964

Address: 5801 Bluff Road, Hopkins, SC 29061

Collected by: Jeremy Grant / Diana Joyner Send Results: 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	Should this sample be considered: TSCA Regulated	Total number of containers	isotopic uranium (alpha spec)	isotopic uranium (by individual isotope, ICP MS)	Tc-99	Moisture Content	Fluoride	pH	Nitrate				<-- Preservative Type (6)
HF-B14-(1-2) Soil Boring	9/12/2018	0935	G	N	SO			1	X	X	X	X	X	X	X				
HF-B14-(3-4) Soil Boring	9/12/2018	0945	G	N	SO			1	X	X	X	X	X	X	X				
HF-B14-(5-5.3) Soil Boring	9/12/2018	1014	G	N	SO			1	X	X	X	X	X	X	X				
HF-B15-(1-2) Soil Boring	9/12/2018	1102	G	N	SO			1	X	X	X	X	X	X	X				
HF-B15-(3-4) Soil Boring	9/12/2018	1128	G	N	SO			1	X	X	X	X	X	X	X				
HF-B15-(5-6) Soil Boring	9/12/2018	1208	G	N	SO			1	X	X	X	X	X	X	X				
HF-B15-(7-8) Soil Boring	9/12/2018	1322	G	N	SO			1	X	X	X	X	X	X	X				
HF-B15-(9-10) Soil Boring	9/12/2018	1409	G	N	SO			1	X	X	X	X	X	X	X				
HF-B15-(11-12) Soil Boring	9/12/2018	1431	G	N	SO			1	X	X	X	X	X	X	X				

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: ___ Rush: __X_ Specify: _ASAP_
(Subject to Surcharge)

Fax Results: Yes / No

Circle Deliverable:
C of A / QC Summary / Level I / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

*****5 STRAIGHT day turnaround*****

Sample Collection Time Zone
Eastern Pacific
Central Other _____
Mountain

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1 Diana Joyner		9/13/2018	1300	1 Randy Crews		9/13/2018	1300
2 R Crews	9/17/18	1001	2 A. Allmon	9/17/18	10:06
3			3		

Sample Shipping and Delivery Details

GEL PM: Hope Taylor

Method of Shipment: Date Shipped: N/A

Airbill #:

Airbill #:

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

For Lab Receiving Use Only

Custody Seal Intact?
YES *NO*

Cooler Temp:
C

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

Page: 2 of 7

Project #: HF Spiking Station 2

GEL Quote #:

COC Number [1]:

PO Number: 4500720046

GEL Chain of Custody and Analytical Request

See www.gel.com for GEL's Sample Acceptance SOP

GEL Work Order Number:

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

Client Name: Westinghouse Electric Company LLC Phone #: 803.647.1920

Project/Site Name: Columbia Fuel Fabrication Facility Fax #: 803.695.3964

Address: 5801 Bluff Road, Hopkins, SC 29061

Collected by: Jeremy Grant/Diana Joyner Send Results: 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	Should this sample be considered: TSCA Regulated	Total number of containers	isotopic uranium (alpha spec)	isotopic uranium (by individual isotope, ICP-MS)	Tc-99	Moisture Content	Fluoride	pH	Nitrate				<-- Preservative Type (6)
HF-B13-(1-2) Soil Boring	9/12/2018	1540	G	N	SO			1	X	X	X	X	X	X	X				
HF-B13-(3-4) Soil Boring	9/12/2018	1600	G	N	SO			1	X	X	X	X	X	X	X				
HF-B13-(5-6) Soil Boring	9/12/2018	1624	G	N	SO			1	X	X	X	X	X	X	X				
HF-B13-(7-8) Soil Boring	9/12/2018	1709	G	N	SO			1	X	X	X	X	X	X	X				
HF-B13-(9-10) Soil Boring	9/12/2018	1741	G	N	SO			1	X	X	X	X	X	X	X				
HF-B13-(11-12) Soil Boring	9/12/2018	1818	G	N	SO			1	X	X	X	X	X	X	X				

Comments
Note: extra sample is required for sample specific QC

TAT Requested: Normal: ___ Rush: __X_ Specify: _ASAP_
(Subject to Surcharge)

Fax Results: Yes / No

Circle Deliverable:
C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

*****5 STRAIGHT day turnaround*****

Sample Collection Time Zone
Eastern Pacific
Central Other _____
Mountain

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1 Diana Joyner	9/13/2018	1300	1 Randy Crews	9/13/2018	1300
2 R Crews	9/17/18	1001	2 A. Allen	9/17/18	10:00
3			3		

Sample Shipping and Delivery Details

GEL PM: Hope Taylor

Method of Shipment: Date Shipped: N/A

Airbill #:

Airbill #:

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

For Lab Receiving Use Only

Custody Seal Intact?
YES *NO*

Cooler Temp:
C

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

GEL Laboratories LLC HT

SAMPLE RECEIPT & REVIEW FORM

Client: WNUC	**SDG/AR/COC/Work Order:** 459278
Received By: AJA	**Date Received:** 9/17/18
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.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr **Classified as: Rad 1 Rad 2 Rad 3**
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. 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?	✓			
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 #:** IR2-18 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? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes No___ N/A (If unknown, select No) VOA vials free of headspace? Yes No___ N/A 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?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?	✓			
13	COC form is properly signed in relinquished/received sections?	✓			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KG Date 9/18/18 Page 1 of 1

GL-CHL-SR-001 Rev 5

List of current GEL Certifications as of 21 September 2018

State	Certification
Alaska	17−018
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 Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA180011
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122018−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−18−13
Utah NELAP	SC000122018−26
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Technical Basis Document

Site-Specific Target Clean-up Levels for Uranium in Soil at HF Spiking Station #2 at the Westinghouse Columbia Fuel Fabrication Facility (WCFFF)

Prepared for:

Westinghouse Columbia Fuel Fabrication Facility
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Prepared by:

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Kevin M Harris, PE
Sr. Environmental Engineer

November 30, 2018

PURPOSE

The purpose of this Technical Basis Document (TBD) is to establish pre-decommissioning target clean-up levels for residual uranium (U) in soil originating from HF Spiking Station #2.

Since the WCFFF is an operating manufacturing plant, the levels do not need to be reflective of an unrestricted use (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 prevent leaching of residual uranium into the groundwater or migration offsite.

HF Spiking Station #2:

In June of 2018, a system leak occurred at HF Spiking Station #2. As part of corrective measures, the polypropylene liner was removed for repair work. At that time, a crack was noticed in the coating covering the diked area. Upon further investigation of the crack and degraded concrete, soil sampling in this location was performed by WCFFF with analysis performed by the GEL laboratories. The laboratory analysis indicated the presence of U in soil.

WCFFF then removed portions of the concrete flooring in the HF Spiking Station area to facilitate additional investigation and repairs. WCFFF retained AECOM to conduct additional soil sampling. Results of the sampling are reported in the *HF Spiking Station #2 Assessment Report*, dated November 30, 2018 by AECOM.

TARGET CLEAN-UP LEVELS

Target clean-up levels have been calculated for the residual U based upon the mass, location, configuration, and accessibility of the U. For HF Spiking Station #2, the release occurred within the diked area, through and beneath the concrete floor. The target clean-up level is based upon the reasonable maximum exposure (RME) scenario of an industrial worker. Within the manufacturing building, where HF Spiking Station #2 is located, the industrial worker scenario is considered the RME, as there is not a foreseeable situation where a utility worker would be in contact with the sub-surface soil without proper controls. The exposure pathways applicable to the radiological risk and dose assessment are external gamma, inhalation, soil ingestion, and drinking water. Drinking water is included as a pathway in order to estimate the vertical migration of uranium from the release point to the groundwater. Although drinking water at the site does not originate from the site groundwater, and therefore this the drinking water is not a complete pathway for a site worker, the scenario will give an indication of when the uranium could potentially impact groundwater beneath the manufacturing building.

RESRAD-ONSITE Version 7.2 was used to calculate potential risk and dose 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).

The primary radiological contaminant of concern at HF Spiking Station #2 is U. For the purposes of this TBD, concentrations will be discussed as parts per million (ppm) of total U, where 1 ppm is equivalent to 1 milligram (mg) of U in 1 kilogram (kg) of soil. Where appropriate, U reported as picoCuries (pCi) per gram (g) will be converted to ppm assuming 4.95% enrichment, corresponding to the highest enrichment handled at the CFFF.

To calculate the nominal activities for 1 mg/kg of Total U, specific activity values from 49 CFR 173.435 and the Rad Pro Calculator were used to obtain a U-234 to U-238 activity ratio of 8.2155, a U-235 to U-238 activity ratio of 0.33583, and resulting mass fractions of 0.0004221 for U-234, 0.0495 for U-235, and 0.9500779 for U-238.

Default Target Clean-up Levels

Default target clean-up levels (concentrations) for U have been established by various agencies for different risk scenarios. As the WCFFF is an operating facility, the target levels are based on a restricted use, industrial work scenario.

The EPA Regional Screening Level (RSL) for U is based on U as a soluble salt. Using the target risk of $1(10)^{-6}$ (equating to an increased lifetime cancer risk of 1 in 1 million) and a Hazard Quotient of 1, the RSL for industrial soil is 230 ppm. This target level does not consider engineering controls to protect workers, but assumes a complete pathway between the contaminated soil and the worker. While this target level is not directly applicable to WCFFF, it is useful in establishing a baseline for clean-up levels.

The EPA also establishes Soil Screening Levels (SSLs) that are protective of groundwater. These SSLs are based on a source directly leaching into the groundwater used for drinking water. These limits are calculated based on the drinking water standard (maximum contaminant level [MCL] for U=30 parts per billion [ppb]). This limit is not directly applicable to WCFFF since the residual concentrations of U at the HF Spiking Station #2 are in the unsaturated zone and not the drinking water. However, the MCL based SSL is 14 ppm.

Within NRC Consolidated Decommissioning Guidance (NUREG-1757, Vol 2. Appendix H), there is a Memorandum of Understanding between the EPA and the NRC, which establishes levels of residual U that require consultation with the EPA. Specifically, the NRC has agreed to consult with EPA on the appropriate approach in responding to the circumstances at particular sites with groundwater impact at the time of license termination in excess of EPA's MCLs or those sites for which NRC contemplates either restricted release or the use of alternate criteria for license termination, or if the radioactive impact at the time of license termination exceeds the corresponding levels from the associated table. While WCFFF is

not contemplating license termination at this time, the levels from NUREG-1757, Appendix H, Table H-1 are useful for comparison purposes and in determining at what concentrations EPA requires consultation. For the industrial/commercial soil, the concentration level for total U is 1,230 ppm. Since the CFFF is not undergoing license termination and is not seeking final clean-up levels for U, this number is not directly applicable at this time.

Site-Specific Target Clean-up Level Scenarios:

The target clean-up levels described above do not consider site specific conditions, such as a protective cover material, the migration parameters for the contaminant, the thickness of the unsaturated zone and other factors that reduce the potential threat to human health and the environment. The contaminant release location being evaluated in this TBD has unique characteristics that mitigate the risk of residual contamination. Within this TBD, site-specific target clean-up levels for total U will be established specific to the conditions at HF Spiking Station #2. The RME receptor scenario applicable to WCFFF Spiking Station is the industrial worker receptor scenario. The industrial worker is selected to provide remediation levels that are protective during continued operations of WCFFF. The values are not intended to predetermine remediation levels for eventual decommissioning.

Protective Cover

At HF Spiking Station #2, the residual concentrations of U are beneath a minimum 6-inch layer of concrete. This, coupled with the fact that the spiking station itself is contained within a building structure, prevents any precipitation from providing a migration driver for the residual contamination to the underlying groundwater. 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 uranium 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. WCFFF is establishing controls to monitor these conditions and is developing a risk based decision making protocol should conditions change and/or leaks or spills occur. This protocol is based on the Groundwater and Soil Remediation Guidelines for Nuclear Power Plants, 2011 Technical Report, developed by the Electric Power Research Institute (EPRI 2011).

Migration Parameters

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 WCFFF 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 WCFFF 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 WCFFF, 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). U will also form neutral or anionic species with fluoride. This suggests that U would sorb, via cation exchange, under acidic conditions (resulting in a higher K_d), and sorb very poorly under neutral and basic conditions (resulting in a lower K_d).

The majority of soil sampling results in the vicinity of HF Spiking Station #2 have shown acidic conditions, with pH values ranging between 4 and 6. However, there are some exceptions, mainly in the 1-2 foot depth range where the pH is over 8. This variation in pH is likely an indication of various non-homogeneous fill material or the effects of an unintended release altering the pH of the soil. Therefore, the pH values may not be indicative of the native soil at the WCFFF, however, for HF Spiking Station #2, a site specific K_d value for U based on pH would indicate lower mobility of the contaminant.

TARGET CLEAN-UP LEVEL

HF Spiking Station #2

A RESRAD-ONSITE model was compiled to evaluate the residual contamination scenario at HF Spiking Station #2. Default RESRAD-ONSITE input parameters where appropriate, and site-specific data used are documented in Table 1 at the end of this TBD. The model was run using a concentration of 1 ppm. The resulting maximum dose and maximum risk were normalized to 15 mrem for dose and $1x10^{-6}$ and $1x10^{-4}$ increased lifetime cancer risk (the lower and upper range of the CERCLA target risk range), consistent with *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part A* (EPA 1989) Concentrations below the increased cancer risk of $1x10^{-6}$ do not require any actions or controls, concentrations within the CERCLA target risk range will required controls and restrictions, and concentrations above the upper limit of $1x10^{-4}$ may require remedial actions.

Based on the industrial worker scenario, the maximum estimated dose for 1 ppm of Total U is 0.00036 mrem/yr, which would occur at 40 years. Assuming a dose of 15 mrem/yr, the corresponding Total U is 41,667 ppm. The maximum estimated risk for 1 mg/kg of Total U is $6.7x10^{-9}$. While CERCLA is not applicable to this remediation, the CERLCA risk range of $1x10^{-6}$ to $1x10^{-4}$ is used as a regulatory standard for comparison of the estimated risks. Normalizing the results to an increased cancer risk of $1x10^{-6}$ and $1x10^{-4}$, which are the low and high limits of the CERCLA risk range, the corresponding concentration is 149.2 ppm (corresponding to $1x10^{-6}$) and 14,920 ppm of Total U (corresponding to $1x10^{-4}$).

These site-specific target clean up levels are higher in magnitude than default values, but given the unique scenario of the HF Spiking Station #2, they are reasonable. At HF Spiking Station #2, the residual U contamination will be under a liner and concrete slab. The model assumed the impact was located directly below the concrete floor and does not account for the additional cover and shielding of an un-impacted soil layer. In addition, the entire spiking station is inside the manufacturing building. Therefore, there are limited pathways for the residual U concentrations to impact an industrial worker. The airborne and direct contact pathways are eliminated for normal operations because the soil is beneath the concrete slab. Transport of the U in the soil vertically into the groundwater is extremely limited, due to the multiple impervious surfaces (building roof and the concrete floor). Also, since the area is raised above the natural ground surface, there is no lateral movement of groundwater to potentially mobilize the U. The only remaining mode of transport would be potential future releases of liquids infiltrating into the same area and mobilizing the U.

MONITORING AND INSPECTION

To evaluate the effectiveness of the removal and the target clean-up level, monitoring of the groundwater downgradient from HF Spiking Station #2 should be conducted. The monitoring should focus on the potential migration of U from the HF Spiking Station #2 and be performed on a regular basis to detect any increases in U that could be attributable to the residual release. WCFFF should implement a groundwater monitoring program that is sufficient for migration detection from a release beneath the process building. The groundwater detection network associated with the process building should include the installation and monitoring of wells around the east, south, and west sides of the building to ensure that the wells are downgradient of any potential releases. These wells can serve as an early detection system of groundwater impacts from the HF Spiking Station #2 release as well as any potential future releases. The

monitoring data can then be used, as necessary, to evaluate sources of groundwater contamination, if any, and to evaluate potential mitigation efforts to protect groundwater.

A monitoring and inspection program should also be instituted to inspect the status of engineered controls at the HF Spiking Stations to evaluate the integrity of the cover materials. The program criteria should be established based on the new design for the improved spiking station.

RESIDUAL URANIUM AND ENGINEERING CONTROL REGISTRY

A registry of residual U should be kept until the time of site decommissioning. This registry can be included in the WCFFF site procedure (RA-137 Decommissioning Recordkeeping) and should conform to the requirements of 10 CFR 20.1501. At a minimum, 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. The registry and inspection process can be incorporated into the policies and programs utilized at WCFFF.

CONCLUSIONS AND RECOMMENDATIONS

Based on the operating configuration of the HF Spiking Stations, the subsurface soil and concrete floor slab provide an adequate barrier between the residual U and an industrial worker. The target clean-up level for U based on a 15 mrem/yr dose would be 41,667 ppm. During the sampling of the spiking station release, levels of U were well below this limit. Based on the future risk scenarios, the target clean-up levels that correspond to the CERCLA target risk range were calculated to be 149.2 to 14,920 ppm. Sampling at HF Spiking Station #2 did indicate U concentrations above the $1x10^{-6}$ limit, but below the $1x10^{-4}$ limit. Although the residual U at these levels do not require immediate action, the soil was removed as a remedial action to eliminate this potential future risk.

Spiking Station #2 Scenario	Dose –Based Target Level (15mRem/yr)	Risk-Based Target Level ($CR=10^{-6}$)	Risk-Based Target Level ($CR=10^{-4}$)	Maximum Soil Detection
Inside – Industrial Worker	41,667 ppm	149 ppm	14,920 ppm	10,186 ppm

In this scenario, the risk based calculations drive the target clean-up levels (i.e., lower residual ppm). This is due to the model calculating the dose on an annual basis (mRem/yr) while the risk is based on an increased lifetime cancer risk.

One sample, HF-B15, indicated U concentrations above the $1x10^{-6}$ risk based site-specific target clean-up level but below the $1x10^{-4}$ clean-up level. This sample location was outside the HF Spiking Station #2 footprint. There is no foreseeable sub-surface activity in this area and therefore the risk due to exposure is eliminated and excavation is not warranted. However, since excavation of the soil is not required based on the current configuration of the impact and the protective cover that exists, the residual impact will require monitoring to ensure conditions do not change and the groundwater is not impacted. A

monitoring well network should be established to monitor the groundwater in the vicinity of the process building as described in the monitoring and surveillance section above. The soil beneath the building should be treated as a potential source, regardless of whether a release has occurred. Results of the monitoring can then be used as an ongoing evaluation of the effectiveness of the protective cover material in limiting the mobility of the residual U. A registry of residual U should be kept until the time of site decommissioning. This registry can be included in the WCFFF site procedure (RA-137 Decommissioning Recordkeeping) and should conform to the requirements of 10 CFR 20.1501.

This evaluation considered the industrial worker as the RME, due to limited future sub-slab work. If conditions change, such that sub-slab excavation and work becomes necessary, the utility worker scenario will require evaluation. WCFFF is establishing controls to monitor these conditions and is developing a risk based decision making protocol should conditions change and/or leaks or spills occur. This protocol is based on the Groundwater and Soil Remediation Guidelines for Nuclear Power Plants, 2011 Technical Report, developed by the Electric Power Research Institute (EPRI).

In addition, this evaluation assumes that the cover material will remain intact. To verify this assumption, a monitoring and inspection program should be instituted to inspect the status of engineered controls at the HF Spiking Stations to evaluate the integrity of the cover materials. The program criteria should be established based on the new design for the improved spiking station.

Table 1. RESRAD-ONSITE Non-Default Input Parameters

Category	Parameter	Industrial Worker Value	Basis for Value
Physical Parameters	Area of Contaminated Zone (m^2)	21	Based on sketch of Spiking Station and sample locations using 15 ft by 15 ft.
	Thickness of Contaminated Zone (m)	0.75	Average depth of contamination 2.5 ft based on sampling.
	Length Parallel to Aquifer Flow (m)	4.5	Based on side of Area of Contaminated Zone.
	Cover Depth (m)	0.15	6 inches of concrete cover.
	Density of Cover Material (g/cm^3)	2.4	Building foundation material density in *Data Collection Handbook to Support Modeling Impacts of Radioactive Material in Soil and Building Structures* (ANL 2015).
	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)	0.0001	Minimum allowed value. Building foundation provides cover.
	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.
	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).

Table 1. RESRAD-ONSITE Non-Default Input Parameters

Category	Parameter	Industrial Worker Value	Basis for Value
	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) = 0.1969.
	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.

References

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