Enclosure 17 to
LTR-RAC-20-94
Date: December 18, 2020

Enclosure 17

Response to Request for Additional Information

2018/2019 Annual Groundwater report

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2018/2019 Annual Groundwater Monitoring Report Westinghouse Columbia Fuel Fabrication Facility

Consent Agreement #19-02-HW
5801 Bluff Road
Hopkins, South Carolina 29061

September 2019

Quality information

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List of Acronyms

AECOM	AECOM Technical Services, Inc.
AOC	Area of Concern
bgs	below ground surface
CA	Consent Agreement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFFF	Columbia Fuel Fabrication Facility
Cis-1,2 DCE	cis-1,2-dichloroethene
COPC	constituent of potential concern
CSM	Conceptual Site Model
CVOC	chlorinated volatile organic compound
DHEC	South Carolina Department of Health and Environmental Control
DOE	United States Department of Energy
EPA	United States Environmental Protection Agency
GEL Labs	GEL Laboratories, LLC
MCL	maximum contaminant level
MSL	mean sea level
NPDES	National Pollution Discharge Elimination System
NPL	National Priority List
NRC	Nuclear Regulatory Commission
OU	Operational Unit
PCE	tetrachloroethene
pCi/L	picocuries per liter
Rust	Rust Environment and Infrastructure
S&ME	Soil and Material Engineers
SC	South Carolina
SCRDI	South Carolina Recycling and Disposal, Inc.
Shealy	Shealy Environmental Services, Inc.
SVOC	semivolatile organic compound
TCL	Target Compound List
TAL	Target Analyte List
Tc-99	Technetium-99
TCE	trichloroethene
ug/L	micrograms per liter
VOC	volatile organic compound
Westinghouse	Westinghouse Electric Company, LLC
WL2	West Lagoon 2
WWTP	wastewater treatment plant

1. Introduction

AECOM Technical Services (AECOM) has prepared this 2018/2019 Annual Groundwater Monitoring Report for the Westinghouse Columbia Fuel Fabrication Facility (CFFF). The site is located at 5801 Bluff Road in Hopkins, South Carolina (**Figure 1**). CFFF manufactures and assembles fuel assemblies and components for the commercial nuclear power industry.

As a result of historical operations and the need to further assess potential environmental impacts, South Carolina Department of Health and Environmental Control (DHEC) and CFFF entered into Consent Agreement (CA) 19-02-HW on February 26, 2019. The CA requires further assessment and potential remediation of constituents of potential concern (COPC) as outlined in the United States Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; also known as Superfund) and the South Carolina Hazardous Waste Management Act.

Condition 1 of the CA specifies that CFFF prepare a Remedial Investigation (RI) Work Plan that presents a comprehensive approach for the evaluation of property groundwater, surface water, sediment, and soil quality; sufficient to assess the full nature and extent of COPC. The CA also specifies that the RI Work Plan include a Conceptual Site Model (CSM) reflecting CFFF's current understanding of site hydrogeology, known COPC sources, potential migration pathways, along with a summary of potential risks to human health and the environment. The RI Work Plan was approved by DHEC in June 2019.

The scope of work outlined in the RI Work Plan is currently ongoing. As data from this work is collected, the CSM is updated with geologic and multi-media (i.e. sediment, surface water, groundwater) COPC data. After each phase of work, the data will be evaluated using the CSM to assess where additional data is needed to fully understand the extent of COPC impact from historical operations.

Groundwater sampling was completed during the Fall of 2018 and January of 2019 to meet the ongoing monitoring requirements of the National Pollution Discharge Elimination System (NPDES) Permit SC0001848 and CA between DHEC and CFFF and in accordance with the Remedial Investigation Work Plan (AECOM, 2019a). Details regarding the groundwater sample collection and QA\QC procedures are contained within the AECOM RI Work Plan dated June 2019.

This report provides an overview of the Site (Section 2.0), describes the sampling activities (Section 3.0), and presents the results (Section 4.0). Conclusions and recommendations based on the results are discussed in Section 5.0. Cited references are provided in Section 6.0. This report has been prepared by a technical team consisting of personnel from Westinghouse and AECOM.

2. Background

2.1 Site Location and Physical Setting

The CFFF property is located on Bluff Road (SC Highway 48) approximately 15 miles southeast of Columbia, SC and includes approximately 1,200 acres. The property is surrounded by rural forested and agricultural property. **Figures 1 through 3** illustrate the site features discussed below.

The primary plant building is located approximately 2,700 feet southwest of Bluff Road on the northern portion of the property. The wastewater treatment plant (WWTP) is located near the southwest corner of the plant building. Treated wastewater is piped to the Congaree River where it is discharged under NPDES permit SC0001848 from a diffuser located along the bottom of the river at a location approximately three miles south of the developed portion of the property.

The SCRDI Bluff Road (formerly known as South Carolina Recycling and Disposal, Inc.) site is located across Bluff Road from the northern property boundary. According to information on the internet (Justia US Law – law.justia.com), hazardous waste storage began on this property in late-1973 or early-1974 and operations ceased in 1982. This property was placed on the United States Environmental Protection Agency's (EPA) Superfund program's National Priority List (NPL) in 1983. Releases at SCRDI are not known to have impacted CFFF at this time.

Based on topographic data depicted on **Figure 1** and on-site survey data, the elevation of the developed area of the property is approximately 130-140 feet above mean sea level (MSL). Elevations drop to approximately 110 feet above MSL immediately south of the plant/WWTP area, on the Congaree River floodplain and Mill Creek, a tributary of the Congaree River. The change in elevation occurs abruptly along a bluff that defines the southern edge of the developed portion of the property.

A manmade pond (Gator Pond) that pre-exists CFFF is located approximately 500 feet southwest of the WWTP within a step-down area of the bluff. The pond is fed by a spring and does not have a constructed spillway. Water discharges from the pond through groundwater seepage or overland flow during periods of high precipitation.

Upper and Lower Sunset Lakes are located west and south of the pond and approximately 900 feet southwest of the WWTP. Sunset Lakes are located within a natural oxbow of Mill Creek. A manmade dam approximately 1,700 feet south of the WWTP backs up water in Mill Creek, creating Lower Sunset Lake. A second manmade dam cuts across Mill Creek approximately 1,000 feet southwest of the WWTP, creating Upper Sunset Lake.

The southern portion of the property, including the Gator Pond, Mill Creek, and Sunset Lakes are located within the floodplain of Mill Creek and the Congaree River. Surface drainage at the site flows toward several drainage ditches across the property and surrounding areas. These ditches flow into a stream that flows into upstream areas of Mill Creek/Upper Sunset Lake approximately 3,000 feet west of the plant.

2.2 Site Operational Background

The CFFF was constructed in 1969. Prior to construction the property consisted of farmland and woodlands. The main manufacturing activity is the fabrication of low-enriched uranium fuel assemblies and components for the nuclear power industry. The manufacturing process generates multiple wastewater streams which are treated by various physical/chemical/biological processes and in WWTP lagoons prior to discharge to the Congaree River under a NPDES permit issued by DHEC.

Releases of COPC have occurred from the wastewater treatment system, manufacturing operations, and past activities performed since 1969. CFFF has assessed known releases and installed an extensive groundwater monitoring system over multiple decades beginning in the early 1980s. Assessment activities have determined that releases have impacted soil and groundwater in locations largely confined to the immediate plant area. Various remediation efforts have been undertaken in response to the identified releases.

2.3 Facility Operational Units (OUs)

Based upon current and historical operations, the facility has been divided into eight operational units (OUs) illustrated on **Figure 4**. The OUs are identified as the Northern Storage Area, Mechanical Area of the plant building,

Chemical Area of the plant building, West Lagoons Area, Wastewater Treatment Area, Sanitary Lagoon Area, Southern Storage Area, Western Storage Area and Southern Storage Area. One area of concern (AOC), entitled the "Western Groundwater AOC", has also been identified. These OUs and AOC are described in detail in the Remedial Investigation Work Plan dated April 2019 (AECOM, 2019a).

2.4 Geology/Hydrogeology

The CFFF is located within the Upper Coastal Plain physiographic province. For the purpose of site characterization, the CFFF Site hydrogeology has been subdivided into four hydrogeologic units: surficial aquifer, floodplain sediment aquifer, Black Mingo aquifer, and Middendorf aquifer. The site geology/hydrogeology were described in the Remedial Investigation Work Plan (AECOM, 2019a) and are summarized below.

Surficial aquifer sediment generally occur to a depth of 20 to 40 feet below ground surface (bgs) at the plant site, depending on topography, and can be differentiated into upper surficial aquifer sediments and lower surficial aquifer sediments. The upper surficial aquifer sediments consist of firm clayey, silty sands (10 to 20 feet thick). The Lower Surficial Aquifer consists of loose sands and silty sands (also 10 to 20 feet thick). Floodplain sediment generally occurs to a depth of 25 to 45 feet bgs with one anomalous boring location containing over 80 feet of sediment. These sediments consist of silt to clayey silt (8-11 feet thick) at the surface underlain by alternating sand and silt/clay layers.

The surficial aquifer and Congaree River floodplain sediment is underlain by a confining bed composed of dry silt/clay and brittle shale of the upper Black Mingo Formation. Beneath the clay confining unit is an artesian sand aquifer within the lower Black Mingo Formation known as the Black Mingo aquifer. Previous geologic cross sections (AECOM, 2013) indicate that the Black Mingo confining bed ranges in thickness from 39 to 83 feet.

The Middendorf Formation occurs below the Black Mingo Formation. Sediments of the Middendorf Formation generally consist of multi-colored clay interbedded with fine to coarse grained sand. Previous subsurface investigations have not extended into the Middendorf aquifer.

Groundwater in the surficial aquifer occurs under unconfined (water table) conditions and generally flows from areas of higher topography in the vicinity of the plant building towards areas of lower topography in the floodplain of the Congaree River and its local tributary, Mill Creek. There is a dynamic relationship between surface water in the ditches that transect the site and groundwater in the surficial aquifer. The northern portions of the ditches are often above the water table and thus the ditches at these locations are sometimes dry. Runoff from precipitation that enters the dry portions of the ditches may infiltrate to the water table, temporarily recharging the surficial aquifer. The bottom of the southern portions of the ditches is below the water table and continually receives discharge of groundwater from the surficial aquifer. Middle portions of the ditches may recharge the shallow aquifer during low water table conditions and may receive groundwater discharge during high water table conditions.

Groundwater flow in the Black Mingo aquifer is inferred to the southwest based upon groundwater elevations from the three monitoring wells that are screened within this aquifer.

Based upon previous hydraulic characterization by AECOM and Rust Environment and Infrastructure (Rust), the average linear flow velocity in the surficial aquifer was estimated to be 0.42 feet per day or 153 feet per year. The potential for flow between the surficial aquifer and the Black Mingo aquifer was previously assessed to be downward at vertical hydraulic gradients ranging between 0.04 and 0.1 feet per feet (Rust, 1995 and AECOM, 2013). However, low moisture content and low vertical hydraulic conductivities of less than 10^{-7} centimeters per second (S&ME, 1982) throughout the 39 to 83 foot thickness of the Black Mingo confining clay preclude significant transfer of fluid between the surficial aquifer and the Black Mingo aquifer.

3. Groundwater Monitoring

The current existing monitoring well network consists of 60 monitoring wells. The monitoring well construction details are summarized on **Table 1**. Fall 2018 semi-annual sampling activities were completed by AECOM and CFFF personnel during October-December 2018. Winter 2019 semi-annual sampling activities were completed by AECOM and CFFF personnel during January 2019. Approval was granted by the Department to postpone the June-August 2019 sampling event to October 2019 to coincide with the CA well sampling event which will include all 90 wells (**Appendix E**). Non-routine groundwater monitoring was conducted several times during 2018-2019. These non-routine groundwater sampling events are described in further detail in **Section 4.3**. Monitoring activities were conducted in accordance with the requirements of the site's NPDES permit and by the procedures described in the Remedial Investigation Work Plan (AECOM, 2019a).

The depth to water in the monitoring wells was measured using electronic water level meters on November 26, 2018 and January 17, 2019. The water levels were converted to elevations and used to create potentiometric maps of the aquifer zones discussed in Section 4.1 below.

Monitoring wells were purged by low flow methodology using a peristaltic pump and water levels were monitored during purging. Groundwater quality indicator parameters of pH, specific conductance, dissolved oxygen, oxidation-reduction potential (ORP), turbidity, and temperature were monitored during the groundwater purging process and recorded on the Field Data Logs for Groundwater Sampling, which are included in **Appendix A**. Samples were collected once the parameters had stabilized in accordance with the low-flow sampling procedure in the Remedial Investigation Work Plan (AECOM, 2019a).

Upon collection, all groundwater samples were labeled, preserved on ice, and kept under chain-of-custody protocol until received at the analytical laboratory. The groundwater samples were analyzed by DHEC certified laboratories Shealy Environmental Services, Inc. (Shealy), GEL Laboratories, LLC (GEL Labs), and the Westinghouse Chemical Laboratory as appropriate for the following analyses:

- Target compound list (TCL) VOCs by EPA Method 8260B;
- TCL semi-VOCs by EPA Method 8270D;
- Target analyte list (TAL) metals by EPA Method 6010D/6020B;
- Nitrate by EPA Method 353.2;
- Ammonia by EPA Method 350.1;
- Fluoride by EPA Method 9056A;
- Isotopic Uranium by United States Department of Energy (DOE) Environmental Measurements Laboratory Health and Safety Laboratory (EML HASL)-300 (U-02-RC Modified);
- Isotopic Uranium by EPA Method 200.8/200.2; and
- Technetium-99 (Tc-99) via DOE EML HASL-300 (Tc-02-RC Modified).

Laboratory analytical reports and chain-of-custody forms are included in **Appendix B**.

4. Results

4.1 Groundwater Flow

The water level measurements on November 26, 2018 and January 17, 2019 were converted to water level elevations using existing monitoring well top-of-casing elevation data and are summarized in **Table 2**. The water level elevations were used to prepare the potentiometric maps for the upper surficial aquifer, lower surficial aquifer, and Black Mingo aquifer for the Fall 2018 and January 2019 monitoring periods (**Figures 5 through 10**).

4.1.1 Upper Surficial Aquifer

Based on the upper surficial aquifer potentiometric maps for November 26, 2018 and January 17, 2019 (**Figures 5 and 8**, respectively), groundwater in the upper surficial aquifer can be inferred to flow radially from the facility toward the southwest, south, and southeast. These upper surficial aquifer potentiometric contours and flow directions are similar to previous results.

4.1.2 Lower Surficial Aquifer

Based on the lower surficial aquifer potentiometric maps for November 26, 2018 and January 17, 2019 (**Figures 6 and 9**, respectively), groundwater flow in the lower surficial aquifer trends to the southwest with components of flow to the west. These lower surficial aquifer potentiometric contours and flow directions are similar to previous results.

4.1.3 Black Mingo Aquifer

Based on the Black Mingo Aquifer potentiometric maps for November 26, 2018 and January 17, 2019 (**Figures 7 and 10,** respectively), groundwater in the Black Mingo aquifer can be inferred to flow toward the southwest in western areas of the site. The Black Mingo aquifer potentiometric contours and flow directions are similar to previous results.

4.2 Groundwater Quality

Groundwater quality indicator parameters measured in the field during the well purging and sampling are presented in **Table 3**. The groundwater sampling logs are included in **Appendix A**. Laboratory analytical reports are included in **Appendix B** and the analytical results for the monitoring wells are summarized in **Table 4**. Historic analytical data is included in **Appendix C**.

Historic data trends for nitrate, fluoride, gross alpha and gross beta have been included in previous annual reports and updated trend plots are presented in **Appendix D**. CVOCs, uranium and Tc-99 plots will be included in future reports after concentration data is collected during four monitoring events to allow for trend analysis..

CFFF is transitioning from monitoring groundwater for gross alpha and gross beta to monitoring for isotopic uranium and Tc-99. Gross alpha and gross beta are typically used as screening parameters since they can represent various radionuclide components. In the past, action levels were established for gross alpha and gross beta whereby additional contingent tests were initiated for isotopic uranium and Tc-99 if the action levels were exceeded. Results below the action levels would not have been further speciated, thus calling to question whether the low detection of gross alpha or gross beta was a result of site activities or other circumstances such as natural radionuclide presence. CFFF has requested that DHEC and NRC allow them to eliminate the screening and contingent tests. Resultantly, the analysis will be accurate representations of the site's environmental impact, irrespective of other elements.

Based on previous groundwater assessment activities, the 2014 Preliminary Baseline Risk Assessment (AECOM, 2014), and the 2019 Preliminary Human Health Risk Assessment (AECOM, 2019a), COPCs in groundwater are tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), nitrate, fluoride, gross alpha, gross beta, uranium, and technetium-99 (Tc-99).

4.2.1 Chlorinated Volatile Organic Compounds (CVOCs)

Three CVOCs (PCE, TCE, and cis-1,2-DCE) were detected in the upper surficial aquifer and the lower surficial aquifer. TCE and cis-1,2-DCE are daughter products of the dechlorination of PCE. CVOCs were not detected in the

groundwater samples collected from the Black Mingo aquifer monitoring wells. There is currently no evidence that there are ongoing releases of CVOCs.

4.2.1.1 PCE

PCE was detected in groundwater from 29 of the 60 monitoring wells (**Table 4**) with PCE exceeding the maximum contaminant level (MCL) of 5.0 micrograms per liter (ug/L) in groundwater samples from 15 monitoring wells.

Upper Surficial Aquifer

Figures 11 and 12 illustrate the PCE concentrations in the upper surficial aquifer during the Fall 2018 and January 2019 sampling periods, respectively. Two PCE plumes are present in the upper surficial aquifer, one in west and one south of the facility. The highest PCE concentrations in upper surficial wells were from wells W-39 and W-41R in the western PCE plume at concentrations ranging from 190 ug/L to 310 ug/L. Monitoring well W-39 is screened across both the upper and lower portion of the surficial aquifer. Therefore, data from well W-39 is included in the upper and lower surficial aquifer analysis. The PCE concentrations were approximately an order of magnitude greater in the western PCE plume than the southern PCE plume.

The western PCE plume in the upper surficial aquifer appears to emanate from an area between WL2 and the plant building. Groundwater in this area migrates to the southwest. The southern PCE plume in the upper surficial aquifer emanates from the southern developed areas of the site and extends to the south.

Lower Surficial Aquifer

Figures 13 and 14 illustrate the PCE concentrations in the lower surficial aquifer during the Fall 2018 and January 2019 sampling periods, respectively. In the lower surficial aquifer, a PCE plume was observed directly west of the facility in the same area as the PCE plume observed in the upper surficial aquifer, however with a greater aerial extent. The highest PCE concentrations in lower surficial wells were from wells W-33, W-39 W-48, W-68, and RW-2 in the western PCE plume at concentrations ranging from 130 ug/L to 300 ug/L. Monitoring well W-39 is screened across both the upper and lower portion of the surficial aquifer. Therefore, data from well W-39 is included in the upper and lower surficial aquifer analysis. The PCE plume in the lower surficial aquifer appears to emanate from an area between WL2 and the plant building and migrates to the southwest.

4.2.1.2 TCE

TCE was detected in groundwater from 18 of the 60 monitoring wells (**Table 4**) with TCE detected above its MCL of 5.0 ug/L in groundwater samples from 8 monitoring wells. The greatest TCE concentration was observed in the groundwater from W-65 at a concentration of 94 ug/L during the January 2019 sampling event. W-65 is screened in the lower surficial aquifer.

Upper Surficial Aquifer

The upper surficial TCE plumes in the western and southern plumes are in the same locations as the PCE plumes but with a smaller aerial extent. **Figures 15 and 16** illustrate the TCE concentrations in the upper surficial aquifer during the Fall 2018 and January 2019 sampling periods, respectively. The TCE MCL was exceeded in the western TCE plume, southern TCE plume, and one location near the southwest corner of the plant building (W-38) in the upper surficial aquifer during each monitoring period. TCE exceeded the MCL in groundwater samples from monitoring well W-41R in the western TCE plume, W-14 and W-67 in the southern TCE plume, and monitoring well W-38 near the southwest corner of the plant building.

Lower Surficial Aquifer

In the lower surficial aquifer, a TCE plume was observed directly west of the facility extending in a southwestern direction. The TCE plume in the lower surficial aquifer is in the same location as the PCE plume but with a smaller aerial extent. **Figures 17 and 18** illustrate the TCE concentrations in the lower surficial aquifer during the Fall 2018 and January 2019 sampling periods, respectively. The TCE MCL was exceeded in the western TCE plume in groundwater from lower surficial aquifer wells W-33, W-65, and RW-2R in the Fall 2018 and W-33, W-48, W-65, and RW-2R in January 2019 at concentrations ranging from 5.1 ug/L to 94 ug/L. The greatest TCE concentration was observed in the groundwater from W-65 at a concentration of 94 ug/L during the January 2019 sampling event.

4.2.1.3 cis-1,2-Dichloroethene

Cis-1,2-DCE was detected at concentrations ranging from 1.1 ug/L to 46 ug/L in groundwater from 10 monitoring wells. Concentrations of cis-1,2 DCE did not exceed the MCL of 70 ug/L in groundwater from the 60 monitoring wells.

4.2.2 SVOCs

Concentrations of SVOCs were not detected in excess of their MDLs.

4.2.3 Nitrate

Nitrate was detected in groundwater from the upper and lower surficial aquifer wells and one of the two floodplain wells (**Table 4**) with nitrate detected above the MCL of 10 milligrams per liter (mg/L) in groundwater from 21 monitoring wells. **Figures 19 and 20** illustrate the nitrate concentrations for the Fall 2018 and January 2019 sampling periods, respectively. The highest nitrate concentration was observed in the groundwater collected from upper surficial monitoring well W18R at a concentration of 750 mg/L during the January 2019 sampling event. The aerial extent of the nitrate plume is primarily in the area of the facility WWTP and extends to areas to the west, southwest, and south. Nitrate was not detected in any of the Black Mingo aquifer monitoring wells.

Based on a review of time-series plots from 2013-2019, the site nitrate plume is stable. **Figure D1** in Appendix D illustrates nitrate concentration trends for groundwater from twelve monitoring wells. Groundwater from these monitoring wells were selected for trend analysis by including wells that are within the plume and along the edges of the plume. Since 2013, nitrate concentrations have decreased in groundwater from monitoring wells, W-10, W-29, and W-38. Nitrate concentrations in groundwater from monitoring well W-47 has indicated a slow increasing trend since 2014. Monitoring well W-47 is downgradient of the portion of the site with the highest nitrate concentrations (greater than 100 mg/L on **Figures 19 and 20**) in groundwater. Groundwater trends from the remaining monitoring wells indicate that nitrate concentrations remained stable and within historic ranges over the last six years.

4.2.4 Fluoride

Fluoride was detected in groundwater from all 61 monitoring wells (**Table 4**) with fluoride detected above the MCL of 4 mg/L in groundwater from 12 monitoring wells. Fluoride is a naturally occurring element and many of the concentrations in groundwater were orders of magnitude below the MCL indicating that the detections are not likely due to facility operations. **Figures 21 and 22** illustrate the fluoride concentrations for the Fall 2018 and January 2019 sampling events, respectively. The greatest fluoride concentration was observed in the groundwater from upper surficial well W-29 at a concentration of 9.69 mg/L during the January 2019 sampling period. The fluoride plume exceeding the MCL in the surficial aquifer is primarily in the southern area of the WWTP and extends to the south toward the Gator Pond and Lower Sunset Lake.

Based on a review of time-series plots from 2013-2019, the site fluoride plume is stable. **Figure D2** in **Appendix D** illustrates fluoride concentration trends for groundwater from eight monitoring wells. Groundwater from these monitoring wells were selected for trend analysis by including wells that were within the plume and along the edges of the plume. Fluoride concentrations in W-30 decreased significantly from 2013 until July 2017 with a slight increasing trend since July 2017. Fluoride concentrations from monitoring W-29 increased from April 2017 to April 2018 but groundwater from this well has indicated a decreasing trend since the high in April 2018. Fluoride concentrations in groundwater from monitoring wells W-18 and W-47 have indicated an overall decreasing trend. These two monitoring wells are downgradient of monitoring well W-29. Groundwater trends from the remaining monitoring wells indicate that fluoride concentrations remained stable and within historic concentration ranges.

4.2.5 Uranium

Uranium was detected in groundwater from 35 of the 61 monitoring wells (**Table 4**) with total uranium detected above its MCL of 30 ug/L in the groundwater samples collected from monitoring wells W-55, W-56, and W-59. The exceedance of the groundwater MCL for uranium is localized to an area adjacent to the plant building. Additional assessment is ongoing to define the localized extent of the uranium MCL exceedance. Of the 35 monitoring wells with detections of uranium in groundwater, 27 are several orders of magnitude below the MCL. **Figures 23 and 24** illustrate the total uranium concentrations detected during the Fall 2018 and the January 2019 sampling periods, respectively. The highest total uranium concentration of 187 ug/L was detected in groundwater from monitoring well W-55 during the Fall 2018 sampling event.

As previously mentioned, uranium concentration trends will be evaluated when enough data exists to support trend analysis and will replace the trend analysis for gross alpha. Gross alpha detections may include other naturally occurring alpha emitters or may be associated with uranium from facility operations.

Based on a review of gross alpha concentration trends for groundwater in time-series plots from 2013-2019 from eight monitoring wells, the site gross alpha fluctuates over time. Groundwater from these monitoring wells were selected for trend analysis by including wells that are within the area of highest gross alpha concentrations and along the edges of the highest gross alpha detections. Monitoring wells W-55, W-56 and W-59 were installed in September 2018, therefore trend analysis cannot currently be evaluated for gross alpha/uranium concentrations in groundwater from these monitoring wells.

The gross alpha trend plot is included as **Figure D3** in **Appendix D**. Gross alpha concentrations in well W-30 historically exhibited the highest gross alpha concentrations with a maximum gross alpha concentration of 60 pCi/L being measured in groundwater from this well in July 2018. From 2014-2015, groundwater from this well had an overall decreasing trend, from December 2015 through July 2018 an overall increasing trend and an overall decreasing trend from July 2018 to October 2018. Gross alpha concentration in monitoring well W-30 increased in January 2019 when compared to the October 2018 concentration but remains within historic gross alpha concentration ranges. Gross alpha concentrations in groundwater from the remaining monitoring wells also fluctuated since 2013 but remains within historic ranges.

4.2.6 Tc-99

Tc-99 was detected in groundwater from 13 of the 61 monitoring wells (**Table 4**) with Tc-99 detected above its MCL of 900 picocuries per liter (pCi/L) in the groundwater samples collected from two lower surficial aquifer monitoring wells (W-6 and W-11). **Figures 25 and 26** illustrate the Tc-99 concentrations detected during the Fall 2018 and the January 2019 sampling periods, respectively. The highest Tc-99 concentration was detected in groundwater from monitoring well W-11 at a concentration of 4,200 pCi/L in January 2019. Additional assessment is ongoing to define the extent of the Tc-99 MCL exceedance in groundwater.

Tc-99 concentration trends will be evaluated when enough data exists to support trend analysis and will replace trend analysis for gross beta. Tc-99 is the only known beta emitter at CFFF. Based on a review of gross beta concentration trends for groundwater in time-series plots from 2013-2019 for groundwater from ten monitoring wells, the site gross beta concentrations are relatively stable over time with minor fluctuations. Groundwater from these monitoring wells were selected for trend analysis by including wells that are within the area of highest gross beta concentrations and along the edges of the highest gross beta detections. Groundwater from monitoring wells W-6 and W-11 was not previously monitored on a schedule. Therefore, recent data regarding gross beta concentration trends does not exist for these monitoring wells.

The gross beta trend plot is included as **Figure D4** in **Appendix D**. Gross beta concentrations in groundwater from these monitoring wells have fluctuated over time, but have generally decreased or remained stable since April 2017. Groundwater from monitoring well W-17 historically exhibited the highest gross beta concentrations with a maximum gross beta concentration of 592 pCi/L being measured in groundwater from this well in January 2016. Because this monitoring well was not required to be sampled as part of the site's NPDES permit requirements, monitoring of groundwater from this well ceased after April 2016 but resumed in the Fall of 2018. The gross beta concentrations in groundwater from monitoring well W-17 in October 2018 and January 2019 are less than historical concentrations from October 2013 through April 2016.

4.3 Non-routine Groundwater Sampling

During 2018-2019, non-routine groundwater sampling was conducted at CFFF to coincide with additional investigative activities at the site. Groundwater analytical results from non-routine groundwater sampling events are displayed in **Table 4**.

Monitoring Well W-28

In July of 2018, the site had a leak from HF Spiking Station 2 and subsequently conducted an extensive environmental sampling campaign of the soil underneath the impacted area and excavated 154.13 tons of soil and concrete. To monitor the potential migration of any chemicals in the subsurface prior to completion of the remediation

activities, the site has sampled groundwater from the nearest downgradient monitoring well W-28 on a quarterly basis.

Recovery Well RW-1

RW-1 was an existing well at CFFF that was out of service. It was evaluated and determined to be a properly functioning well. It has been added back to the site's monitoring network, redeveloped and subsequently had a groundwater sample collected in April 2019.

Southern Storage Area (SSA) Operable Unit (OU)

On June 18, 2019, Westinghouse submitted a work plan to DHEC to investigate the SSAOU. The SSAOU investigation was submitted as Addendum 1 of the overall Remedial Investigation being performed under the Consent Agreement CA-19-02-HW. The SSAOU, in part, is used for the intermodal storage of materials awaiting uranium (U) recovery. On May 30, 2019, a scheduled inspection of intermodal containers (sea-lands) within the SSAOU was completed and identified impaired roofing and degraded drums due to rainwater intrusion in one sea-land, C-40. The groundwater wells associated with the SSAOU (W-7A, W-10, W-11, W-13R, W-15, W-16, and W-32) were sampled on June 4-5, 2019. The results were received on June 21, 2019, and submitted to the Department on August 1, 2019, in the July 2019 CA Progress Report. These results indicated that the intermodal storage has not contributed to the state of the groundwater beneath the site.

5. Conclusions and Recommendations

5.1 Conclusions

The following conclusions are based upon review of the groundwater monitoring data collected during the Fall 2018 and January 2019 sampling periods:

- Groundwater in the upper surficial aquifer flows radially toward the southwest, south, and southeast. Groundwater flow in the lower surficial aquifer is similar but with a more western component of flow west of the facility area. Groundwater flow in the Black Mingo aquifer is toward the west-southwest. The shape of the potentiometric surfaces and groundwater flow patterns in the surficial and Black Mingo aquifers are similar during the Fall 2018 and January 2019.
- CVOCs detected during the Fall 2018 and January 2019 monitoring periods exceeding MCLs were primarily PCE and, to a lesser extent, TCE. One additional daughter product of PCE reductive dechlorination, cis-1,2 DCE, was detected in groundwater at the WCFFF site at concentrations below the MCL. Trans-1,2-Dichloroethene and vinyl chloride were not detected in groundwater from the monitoring wells.
- The groundwater analytical results indicate that there are PCE and TCE groundwater plumes in the upper and lower portions of the surficial aquifer west of the plant building and in the upper surficial aquifer south of the plant building.
- The plumes in the western CVOC plume appears to emanate from the vicinity of WL2 and from a source(s) between the plant building and WL2. Elevated PCE concentrations in the western CVOC plume extend from the upper surficial aquifer to the lower surficial aquifer. Concentrations of TCE above its MCL occur primarily in the lower surficial aquifer. It is currently not known whether the PCE concentrations in exceedance of its MCL in the groundwater samples from monitoring well W-19B is a result of the plume emanating from the WL2/plant areas or another source.
- The southern CVOC plume is located in the southern portion of the developed area of the facility and upgradient of the man-made pond. Elevated PCE concentrations within this plume appear to be within the upper surficial aquifer only, based on previous conclusions (AECOM, 2017). PCE concentrations in this plume are an order of magnitude lower than the PCE concentrations in the western plume and do not appear to be related to a specific potential source area of the WCFFF site. There are no known processes in this area that currently use PCE or used PCE in the past.
- Nitrate concentrations during the Fall 2018 and January 2019 periods exceeding MCLs were in areas west, southwest, and south of the WWTP. The highest nitrate concentrations were observed in the groundwater samples collected from upper surficial monitoring wells south of the SL area of the WWTP.
- Fluoride concentrations during the Fall 2018 and January 2019 periods exceeding MCLs were in areas west, southwest, and south of the WWTP. The highest fluoride concentrations were observed in the groundwater samples collected from upper surficial monitoring wells in the area of the southern portion of the WWTP. The aerial extent of the fluoride plume is primarily in the area of the facility WWTP and extending to areas to the west, southwest, and south.
- Uranium concentrations exceeded the MCL during the Fall of 2018 and January 2019 in three upper surficial monitoring wells located near the southwest side of the facility building. The exceedance of uranium MCL in groundwater is localized near the plant building and further assessment of groundwater in this area is ongoing.
- Tc-99 concentrations exceeded the MCL during the Fall of 2018 and January 2019 in two lower surficial monitoring wells. Additional assessment is ongoing to assess the source of Tc-99 in groundwater.
- Based upon historical and current groundwater analytical results, no off-site impacts of COPCs are known or believed to have occurred.
- COPCs were not detected in Black Mingo aquifer monitoring wells.

5.2 Recommendations

Westinghouse will continue to perform comprehensive evaluations of groundwater and other environmental media to determine the full nature and extent of impacts from historic operations at the CFFF. Westinghouse has also instituted new programmatic controls to prevent impacts from current operations.

Based upon the above conclusions, continued semiannual monitoring in accordance with the NPDES Permit is recommended. The next groundwater sampling periods are scheduled for the Fall 2019 and Spring 2020.

6. References

AECOM, 2013. Remedial Investigation Report, Westinghouse Electric Company, Columbia Fuel Fabrication Facility, Richland County, South Carolina, December 31.

AECOM, 2014. Preliminary Baseline Risk Assessment, Westinghouse Columbia Fuel Fabrication Facility, 5801 Bluff Road, Hopkins, South Carolina, February 7, 2014.

AECOM, 2019a. Final Remedial Investigation Work Plan, Westinghouse Columbia Fuel Fabrication Facility, 5801 Bluff Road, Hopkins, South Carolina, June 2019.

AECOM, 2019b. Preliminary Human Health Risk Assessment, Westinghouse Columbia Fuel Fabrication Facility, 5801 Bluff Road, Hopkins, South Carolina, March 2019.

JUSTIA US Law website (USA/SCDHEC vs SCRDI et al. lawsuit), http://law.justia.com/cases/federal/district-courts/FSupp/653/984/2400694/, reviewed by Mr. Jeremy Grant of AECOM on September 24, 2017.

Rust, 1995. Conceptual Design Report, Westinghouse Commercial Fuel Division, Columbia, South Carolina, September 8, 1995.

S&ME, 1982. Ground-Water Hydrology of the Westinghouse Electric Corporation Plant, Richland County, South Carolina, March 1, 1982.

Tables

Table 1
Monitoring Well Construction Details
Westinghouse Columbia Fuel Fabrication Facility
AECOM Project No. 60595649

Well Number	Northing	Easting	Date Installed	Ground Surface Elevation (ft msl)	Top of Casing Elevation (ft msl)	Casing Stickup (ft)	Well Diameter (in)	Casing Type	Total Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Classification
RW-1	NS	NS	4/1/1995	NS	NS	NS	4.0	Steel	30.00	10	19.20-30	Black Mingo
W-RW2	745325.1547	2023458.2190	3/10/1995	136.98	139.93	2.95	4.0	Steel	32.30	10	19-29.2	Lower Surficial
W-3A	744340.2273	2023926.2926	6/11/1985	117.64	120.08	2.44	2.0	PVC	82.50	10	72.5-82.5	Black Mingo
W-4	744343.6686	2023959.5730	1977	116.50	116.09	-0.41	4.0	PVC	12.00	2	10-12	Upper Surficial
W-6	744963.2941	2024109.6154	5/15/1980	136.96	136.46	-0.50	2.0	PVC	28.50	5	23.5-28.5	Lower Surficial
W-7A	744907.4275	2023872.2237	2/19/1992	132.94	135.06	2.12	2.0	PVC	18.00	5	13-18	Upper Surficial
W-10	744897.8502	2023659.8964	5/14/1980	136.89	136.81	-0.08	2.0	PVC	23.50	5	18.5-23.5	Upper Surficial
W-11	744743.0468	2023914.5566	5/14/1980	138.45	140.76	2.31	2.0	PVC	28.50	3	25.5-28.5	Lower Surficial
W-13R	744648.7070	2024279.2522	10/8/2010	136.38	136.13	-0.25	2.0	PVC	20.00	5	15-20	Upper Surficial
W-14A	744603.1956	2024478.6507	5/4/1988	136.22	137.83	1.61	2.0	PVC	28.50	5	23.5-28.5	Upper Surficial
W-15	744663.4226	2023716.7929	5/15/1980	126.67	127.90	1.23	2.0	PVC	18.50	5	13.5-18.5	Upper Surficial
W-16	744602.3196	2024060.2560	5/15/1980	125.64	124.93	-0.71	2.0	PVC	18.50	3	15.5-18.5	Upper Surficial
W-17	745055.2186	2023785.3818	5/30/1980	137.57	139.27	1.70	2.0	PVC	28.00	5	23.5-28	Lower Surficial
W-18R	745012.6889	2023939.2527	Unknown	137.15	136.71	-0.44	2.0	PVC	17.50	5	12.5-17.5	Upper Surficial
W-19B	746172.6764	2022552.9543	3/17/1995	140.58	142.85	2.27	4.0	PVC	40.50	10	30-40.5	Lower Surficial
W-20	743739.6310	2022975.3834	7/10/1980	113.27	116.16	2.89	2.0	PVC	16.30	5	11.5-16.3	Upper Surficial
W-22	744960.9243	2024116.3963	7/12/1980	137.08	136.51	-0.57	2.0	PVC	17.80	5	13.4-17.8	Upper Surficial
W-23R	744674.7363	2024851.2620	7/22/2011	137.45	140.47	3.02	2.0	PVC	20.50	5	15.5-20.5	Upper Surficial
W-24	746742.5552	2027344.7554	7/9/1980	139.83	141.94	2.11	2.0	PVC	15.10	5	10.1-15.1	Upper Surficial
W-25	742114.3330	2022728.9859	7/9/1980	114.70	114.70	0.00	2.0	PVC	27.70	5	22.9-27.7	Upper Surficial
W-26	744855.2926	2023417.6899	7/11/1980	140.59	142.21	1.62	2.0	PVC	30.50	5	25.5-30.5	Upper Surficial
W-27	744383.9028	2023708.2286	7/13/1980	120.22	121.87	1.65	2.0	PVC	18.90	5	14.1-18.9	Upper Surficial
W-28	745121.7794	2024317.4127	7/13/1980	136.98	138.88	1.90	2.0	PVC	14.70	5	9.8-14.7	Upper Surficial
W-29	745182.7704	2024101.6410	7/12/1980	136.96	138.61	1.65	2.0	PVC	15.10	5	10-15.1	Upper Surficial
W-30	745095.1563	2024150.8369	7/11/1980	136.87	138.81	1.94	2.0	PVC	15.20	5	10.2-15.2	Upper Surficial
W-32	744742.1011	2023919.8088	7/15/1980	138.33	140.61	2.28	2.0	PVC	22.50	5	17-22.5	Upper Surficial
W-33	745402.9946	2023548.6640	7/15/1980	138.06	139.33	1.27	2.0	PVC	20.70	5	15.1-20.7	Lower Surficial
W-35	745716.6972	2024227.9328	2/18/1992	136.59	139.07	2.48	2.0	PVC	21.00	5	16-21	Upper Surficial
W-36	746084.8252	2024573.1745	2/19/1992	134.16	136.29	2.13	2.0	PVC	20.00	5	15-20	Upper Surficial
W-37	745407.3901	2024230.7318	2/11/1992	136.58	139.04	2.46	2.0	PVC	20.50	5	15.5-20.5	Upper Surficial
W-38	745250.3065	2024192.9679	2/18/1992	136.71	136.51	-0.20	2.0	PVC	20.00	5	15-20	Upper Surficial
W-39	745587.4130	2023656.6724	1/27/1994	139.08	141.15	2.07	2.0	PVC	22.00	10	12-22	Upper/Lower Surficial
W-40	745646.5324	2024112.4795	7/18/1984	136.42	139.26	2.84	2.0	PVC	15.00	10	5-15	Upper Surficial
W-41R	745372.8885	2023252.5925	Unknown	131.02	133.81	2.79	2.0	PVC	24.00	10	14-24	Upper Surficial
W-42	745072.3463	2023203.3177	1/27/1994	137.83	140.96	3.13	2.0	PVC	30.00	10	20-30	Upper Surficial

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Westinghouse Columbia Fuel Fabrication Facility
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Well Number	Northing	Easting	Date Installed	Ground Surface Elevation (ft msl)	Top of Casing Elevation (ft msl)	Casing Stickup (ft)	Well Diameter (in)	Casing Type	Total Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Classification
W-43	745904.3053	2023600.1186	1/27/1994	138.09	141.33	3.24	2.0	PVC	20.50	10	10.5-20.5	Upper Surficial
W-44	745579.8931	2022950.1077	2/1/1994	131.93	134.86	2.93	2.0	PVC	26.00	10	16-26	Lower Surficial
W-45	745644.0322	2024296.0965	7/18/1984	137.20	140.02	2.82	2.0	PVC	16.00	10	6-16	Upper Surficial
W-46	745154.5936	2023494.4570	3/27/1995	132.39	134.74	2.35	4.0	PVC	25.50	10	15.5-25.5	Upper Surficial
W-47	744633.7657	2023515.8706	3/31/1995	140.70	141.90	1.20	4.0	PVC	44.80	10	34.3-44.8	Lower Surficial
W-48	744913.2226	2023290.4438	3/30/1995	139.74	142.56	2.82	4.0	PVC	41.30	10	30.7-41.3	Lower Surficial
W-49	745073.2286	2023192.6302	3/15/1995	137.82	140.25	2.43	2.0	PVC	115.00	10	105-115	Black Mingo
W-50	745637.2219	2024107.3993	3/21/1995	136.79	139.58	2.79	2.0	PVC	124.50	10	114.5-124.5	Black Mingo
W-51	745583.8582	2024270.8300	9/19/2018	136.67	136.51	-0.16	2.0	PVC	15.00	5	10-15	Upper Surficial
W-52	745542.3624	2024260.1657	9/19/2018	136.71	136.19	-0.52	2.0	PVC	15.00	5	10-15	Upper Surficial
W-53	745495.9968	2024247.5619	9/19/2018	136.83	136.54	-0.29	2.0	PVC	15.00	5	10-15	Upper Surficial
W-54	745442.5511	2024229.9796	9/19/2018	136.79	136.52	-0.27	2.0	PVC	15.00	5	10-15	Upper Surficial
W-55	745397.6509	2024214.0049	9/20/2018	136.90	136.63	-0.27	2.0	PVC	15.00	5	10-15	Upper Surficial
W-56	745351.3097	2024203.7460	9/20/2018	136.83	136.68	-0.15	2.0	PVC	15.00	5	10-15	Upper Surficial
W-57	745307.4270	2024190.7853	9/20/2018	136.90	136.73	-0.17	2.0	PVC	15.00	5	10-15	Upper Surficial
W-58	745254.0864	2024176.3347	9/18/2018	136.85	136.37	-0.48	2.0	PVC	15.00	5	10-15	Upper Surficial
W-59	745219.3681	2024165.8802	9/18/2018	136.10	136.42	0.32	2.0	PVC	15.00	5	10-15	Upper Surficial
W-60	745835.5835	2023286.8131	10/8/2018	137.25	140.20	2.95	2.0	PVC	37.00	5	32-37	Lower Surficial
W-61	745829.2570	2023288.2599	10/9/2018	137.34	140.60	3.26	2.0	PVC	23.00	10	13-23	Upper Surficial
W-62	745485.4613	2022726.0792	10/9/2018	125.63	128.38	2.75	2.0	PVC	24.00	5	19-24	Lower Surficial
W-63	745098.1342	2023019.4184	10/10/2018	138.78	141.02	2.24	2.0	PVC	42.00	5	37-42	Lower Surficial
W-64	744643.8030	2023511.3331	10/10/2018	140.15	142.75	2.60	2.0	PVC	31.00	10	21-31	Upper Surficial
W-65	745693.7040	2024027.4543	10/12/2018	138.17	140.95	2.78	2.0	PVC	31.50	5	26.5-31.5	Lower Surficial
W-66	745687.8186	2024027.1699	10/12/2018	138.01	140.91	2.90	2.0	PVC	22.00	10	12-22	Upper Surficial
W-67	744459.5852	2024485.7938	10/15/2018	132.60	135.26	2.66	2.0	PVC	31.00	10	21-31	Upper Surficial
W-68	745329.2457	2022496.217	11/1/2018	113.40	116.53	3.13	2.0	PVC	18.00	5	13-18	Lower Surficial

Notes:

ft = feet

in = inches

ft msl = feet above mean sea level

ft bgs = feet below ground surface

NS - not surveyed

Top of casing and ground surface elevations surveyed by AECOM during November 2018

Horizontal coordinates are referenced to the State Plane Coordinate System and the North American Datum of 1983 (NAD 83).

Vertical locations are referenced to the North American Vertical Datum of 1988 (NAVD 88).

Table 2
Groundwater Levels and Elevations
Westinghouse Columbia Fuel Fabrication Facility
AECOM Project No. 60595649

Well Number	Date Measured	Ground Surface Elevation (ft)	Top of Casing Elevation (ft)	Depth to Water (ft btoc)	Groundwater Elevation (ft)	Screen Interval (ft bgs)
RW-1	NM	NS	NS	NM	NS	19.2-30
RW-2R	11/26/18	136.98	139.93	17.91	122.02	19.0-29.2
	01/17/19			17.86	122.07	
W-3A	11/26/18	117.64	120.08	4.66	115.42	72.5-82.5
	01/17/19			4.01	116.07	
W-4	11/26/18	116.50	116.09	3.41	112.68	10.0-12.0
	01/17/19			2.04	114.05	
W-6	11/26/18	136.96	136.46	9.65	126.81	23.5-28.5
	01/17/19			9.44	127.02	
W-7A	11/26/18	132.94	135.06	10.58	124.48	13.0-18.0
	01/17/19			10.65	124.41	
W-10	11/26/18	136.89	136.81	15.27	121.54	18.5-23.5
	01/17/19			14.84	121.97	
W-11	11/26/18	138.45	140.76	17.17	123.59	25.5-28.5
	01/17/19			17.16	123.60	
W-13R	11/26/18	136.38	136.13	11.00	125.13	15.5-18.5
	01/17/19			10.81	125.32	
W-14	11/26/18	136.22	137.83	15.65	122.18	23.5-28.5
	01/17/19			16.13	121.70	
W-15	11/26/18	126.67	127.90	11.25	116.65	13.5-18.5
	01/17/19			11.24	116.66	
W-16	11/26/18	125.64	124.93	3.60	124.30	15.5-18.5
	01/17/19			1.73	126.17	
W-17	11/26/18	137.57	139.27	13.57	125.70	23.5-28.0
	01/17/19			13.51	125.76	
W-18R	11/26/18	137.15	136.71	10.90	125.81	12.5-17.5
	01/17/19			10.82	125.89	
W-19B	11/26/18	140.58	142.85	25.72	117.13	30.0-40.5
	01/17/19			24.65	118.20	
W-20	11/26/18	113.27	116.16	5.77	110.39	11.5-16.3
	01/17/19			6.15	110.01	
W-22	11/26/18	137.08	136.51	9.70	126.81	13.4-17.8
	01/17/19			9.61	126.90	
W-23R	11/26/18	137.45	140.47	19.10	121.37	15.0-20.0
	01/17/19			18.08	122.39	
W-24	11/26/18	139.83	141.94	7.62	134.32	10.1-15.1
	01/17/19			7.30	134.64	
W-25	11/26/18	114.70	114.70	5.05	109.65	22.9-27.7
	01/17/19			6.58	108.12	
W-26	11/26/18	140.59	142.21	24.82	117.39	25.5-30.5
	01/17/19			24.46	117.75	
W-27	11/26/18	120.22	121.87	9.43	112.44	14.1-18.9
	01/17/19			9.46	112.41	

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Well Number	Date Measured	Ground Surface Elevation (ft)	Top of Casing Elevation (ft)	Depth to Water (ft btoc)	Groundwater Elevation (ft)	Screen Interval (ft bgs)
W-28	11/26/18	136.98	138.88	11.30	127.58	9.8-14.7
	01/17/19			11.14	127.74	
W-29	11/26/18	136.96	138.61	10.95	127.66	10.0-15.1
	01/17/19			10.82	127.79	
W-30	11/26/18	136.87	138.81	11.30	127.51	10.2-15.2
	01/17/19			11.17	127.64	
W-32	11/26/18	138.33	140.61	17.93	122.68	17.0-22.5
	01/17/19			17.95	122.66	
W-33	11/26/18	138.06	139.33	15.02	124.31	15.1-20.7
	01/17/19			14.92	124.41	
W-35	11/26/18	136.59	139.07	10.40	128.67	16.0-21.0
	01/17/19			9.99	129.08	
W-36	11/26/18	134.16	136.29	7.10	129.19	15.0-20.0
	01/17/19			6.58	129.71	
W-37	11/26/18	136.58	139.04	10.71	128.33	15.5-20.5
	01/17/19			10.35	128.69	
W-38	11/26/18	136.71	136.51	8.70	127.81	15.0-20.0
	01/17/19			8.55	127.96	
W-39	11/26/18	139.08	141.15	15.02	126.13	12.0-22.0
	01/17/19			14.95	126.20	
W-40	11/26/18	136.42	139.26	10.60	128.66	5.0-15.0
	01/17/19			10.23	129.03	
W-41R	11/26/18	131.02	133.81	15.32	118.49	14.0-24.0
	01/17/19			15.05	118.76	
W-42	11/26/18	137.83	140.96	24.02	116.94	20.0-30.0
	01/17/19			24.44	116.52	
W-43	11/26/18	138.09	141.33	12.65	128.68	10.5-20.5
	01/17/19			13.14	128.19	
W-44	11/26/18	131.93	134.86	18.24	116.62	16.0-26.0
	01/17/19			17.62	117.24	
W-45	11/26/18	137.20	140.02	11.55	128.47	6.0-16.0
	01/17/19			11.09	128.93	
W-46	11/26/18	132.39	134.74	13.20	121.54	15.5-25.5
	01/17/19			13.32	121.42	
W-47	11/26/18	140.70	141.90	25.46	116.44	34.3-44.8
	01/17/19			25.11	116.79	
W-48	11/26/18	139.74	142.56	25.55	117.01	30.7-41.3
	01/17/19			25.38	117.18	
W-49	11/26/18	137.82	140.25	26.33	113.92	105.0-115.0
	01/17/19			26.16	114.09	
W-50	11/26/18	136.79	139.58	21.35	118.23	114.5-124.5
	01/17/19			20.93	118.65	

Table 2
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Westinghouse Columbia Fuel Fabrication Facility
AECOM Project No. 60595649

Well Number	Date Measured	Ground Surface Elevation (ft)	Top of Casing Elevation (ft)	Depth to Water (ft btoc)	Groundwater Elevation (ft)	Screen Interval (ft bgs)
W-51	11/26/18	136.67	136.51	7.97	128.54	10.0-15.0
	01/17/19			7.53	128.98	
W-52	11/26/18	136.71	136.19	7.80	128.39	10.0-15.0
	01/17/19			7.39	128.80	
W-53	11/26/18	136.83	136.54	8.13	128.41	10.0-15.0
	01/17/19			7.76	128.78	
W-54	11/26/18	136.79	136.52	8.20	128.32	10.0-15.0
	01/17/19			7.83	128.69	
W-55	11/26/18	136.90	136.63	8.38	128.25	10.0-15.0
	01/17/19			8.01	128.62	
W-56	11/26/18	136.83	136.68	8.50	128.18	10.0-15.0
	01/17/19			8.02	128.66	
W-57	11/26/18	136.90	136.73	8.74	127.99	10.0-15.0
	01/17/19			8.31	128.42	
W-58	11/26/18	136.85	136.37	8.92	127.45	10.0-15.0
	01/17/19			8.52	127.85	
W-59	11/26/18	136.10	136.42	8.70	127.72	10.0-15.0
	01/17/19			8.64	127.78	
W-60	11/26/18	137.25	140.20	22.46	117.74	32.0-37.0
	01/17/19			21.49	118.71	
W-61	11/26/18	137.34	140.60	17.39	123.21	13.0-23.0
	01/17/19			16.72	123.88	
W-62	11/26/18	125.63	128.38	13.49	114.89	19.0-24.0
	01/17/19			12.92	115.46	
W-63	11/26/18	138.78	141.02	25.85	115.17	37.0-42.0
	01/17/19			26.04	114.98	
W-64	11/26/18	140.15	142.75	25.76	116.99	21.0-31.0
	01/17/19			25.39	117.36	
W-65	11/26/18	138.17	140.95	12.59	128.36	26.5-31.5
	01/17/19			12.30	128.65	
W-66	11/26/18	138.01	140.91	12.36	128.55	12.0-22.0
	01/17/19			11.98	128.93	
W-67	11/26/18	132.60	135.26	16.76	118.50	21.0-31.0
	01/17/19			16.39	118.87	
W-68	11/26/18	113.40	116.53	5.36	111.17	13.0-18.0
	01/17/19			5.33	111.20	

Notes:
ft bgs = feet below ground surface
ft btoc = feet below top of casing
ft = elevations are in feet above mean sea level based on the North American Vertical Datum of 1988 (NAVD-88)
NS - not surveyed
NM = not measured

Table 3
Summary of Groundwater Field Parameter Data
Westinghouse Columbia Fuel Fabrication Facility
AECOM Project No. 60595649

Well	Sample Date	Field pH (S.U.)	Field Sp Cond (µS/cm)	DO (mg/L)	ORP (mV)	Field Turbidity (NTU)
RW-1	4/16/2019	5.18	89	5.77	310.4	17.36
WRW-2	10/16/18	4.55	196	1.12	327	2.26
	01/22/19	4.86	151	1.24	304	1.39
W-3A	10/29/18	4.50	25	0.94	200	5.93
	11/29/18	4.55	26	0.65	203	1.26
	01/29/19	4.75	23	1.33	165	2.40
W-4	Oct/Dec-18	Dry	Dry	Dry	Dry	Dry
	01/28/19	6.50	227	1.07	92	18.91
W-6	11/05/18	5.90	920	1.29	163	9.14
	01/15/19	5.98	1350	0.64	292	4.95
W-7A	10/19/18	6.86	329	0.44	215	1.94
	01/14/19	6.96	3270	0.31	209	0.49
	06/04/19	6.98	3186	2.00	190	1.29
W-10	10/19/18	5.89	488	0.40	215	0.68
	01/14/19	6.18	436	0.44	193	0.63
	06/04/19	6.26	584	2.70	187	0.43
W-11	11/05/18	5.37	560	0.65	262	8.70
	12/5/2018	5.45	610	0.73	259	5.43
	01/11/19	5.35	585	1.00	248	25.63
	06/05/19	4.98	478	4.80	257	7.58
W-13R	10/19/18	6.12	760	0.49	184	6.63
	01/10/19	6.31	790	0.48	133	4.32
	06/06/19	6.00	600	2.10	196	7.47
W-14	10/18/18	5.76	82	2.04	201	8.00
	01/25/19	6.06	330	0.83	126	5.50
W-15	10/17/18	5.75	590	0.24	226	5.12
	01/23/19	6.07	51	0.55	202	3.20
	06/04/19	6.03	543	3.30	203	4.60
W-16	10/18/18	6.14	412	0.37	139	1.26
	01/28/19	6.04	267	0.47	166	10.03
	06/04/19	6.26	386	1.50	39	7.97
W-17	10/25/18	6.59	417	0.69	228	2.21
	01/25/19	6.15	330	0.46	108	0.50
W-18R	10/23/18	7.51	5050	1.69	163	6.53
	01/15/19	7.60	4520	2.16	239	1.26
W-19B	11/04/18	5.00	85	4.79	284	1.29
	01/23/19	5.27	66	3.64	241	1.79
W-20	10/30/18	5.36	109	0.40	183	5.75
	01/29/19	5.22	95	1.82	169	2.77
W-22	10/23/18	5.51	950	0.35	256	8.32
	01/15/19	5.60	760	0.46	271	17.72
	01/22/19	5.59	830	0.32	272	8.18
W-23R	10/18/18	4.93	55	3.79	311	0.53
	01/28/19	4.85	51	3.48	203	3.45
W-24	10/16/18	5.11	52	0.50	114	7.83
	01/25/19	4.99	39	0.94	145	9.01
W-25	Oct/Dec-18	NS	NS	NS	NS	NS
	01/30/19	6.26	116	0.20	79	54.45

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Well	Sample Date	Field pH (S.U.)	Field Sp Cond (µS/cm)	DO (mg/L)	ORP (mV)	Field Turbidity (NTU)
W-26	10/16/18	5.42	216	0.66	264	12.54
	01/24/19	5.59	199	0.58	198	2.13
W-27	10/29/18	6.25	377	0.44	-88	3.29
	11/28/18	6.53	397	0.73	-80	4.19
	01/29/19	6.28	336	0.40	-55	9.00
W-28	10/23/18	5.63	1020	0.46	246	3.35
	01/18/19	5.91	880	0.54	238	2.76
	04/16/19	6.12	732	0.90	277	2.40
	07/11/19	6.15	721	10.60	270	1.24
W-29	10/23/18	8.57	550	0.44	147	1.85
	01/10/19	8.76	492	0.36	148	0.31
W-30	10/23/18	6.39	650	0.66	171	2.68
	01/15/19	6.54	650	0.40	186	1.31
W-32	10/19/18	6.83	2370	0.38	231.3	3.2
	01/11/19	6.77	2220	0.60	217.3	8.08
	06/05/19	6.84	2141	3.2	233.2	1.9
W-33	10/16/18	5.32	182	0.94	234	1.84
	01/22/19	5.57	141	1.49	151	0.64
W-35	11/01/18	5.55	184	1.70	261	5.05
	01/22/19	5.65	165	2.91	165	4.40
W-36	11/01/18	5.22	40	0.55	203.2	7.8
	01/18/19	5.69	38	0.88	237.5	9.14
W-37	10/18/18	5.69	201	2.49	268	3.42
	01/14/19	5.74	168	3.07	236	8.13
W-38	10/18/18	4.88	217	1.41	327	3.94
	01/09/19	4.84	215	1.10	284	1.80
W-39	10/25/18	5.56	1090	2.41	255	2.81
	01/21/19	5.41	71	2.11	185	3.83
W-40	11/29/19	6.23	102	6.72	222	9.13
	01/24/19	6.38	80	8.86	143	42.60
W-41R	10/18/18	5.23	580	3.17	273	3.03
	01/23/19	5.47	383	5.25	217	2.32
W-42	11/04/18	4.93	83	0.87	317	7.10
	01/25/19	4.81	53	0.82	232	4.31
W-43	10/29/18	5.06	101	3.97	299	4.83
	11/28/18	5.36	113	4.43	251	3.51
	01/21/19	5.30	97	3.46	123	2.42
W-44	10/17/18	4.83	94	4.12	307	2.81
	01/23/19	4.92	69	3.92	247	1.45
W-45	11/04/18	5.11	114	0.84	180	9.99
	01/18/19	6.64	256	0.26	52	8.00
W-46	11/04/18	5.54	200	0.48	271	1.63
	01/22/19	5.84	150	2.57	401	1.22
W-47	10/25/18	5.98	870	1.10	195	4.70
	01/24/19	5.75	69	0.89	211	1.41
W-48	10/25/18	5.47	131	1.11	242	3.50
	01/24/19	5.02	97	2.00	225	1.48
W-49	12/13/2018	4.26	32	0.51	169	6.90
	01/29/19	4.94	29	2.29	145	9.20

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Well	Sample Date	Field pH (S.U.)	Field Sp Cond (µS/cm)	DO (mg/L)	ORP (mV)	Field Turbidity (NTU)
W-50	Oct/Dec-18	NS	NS	NS	NS	NS
	01/24/19	4.59	29	1.82	139	1.00
W-51	10/28/18	6.70	206	0.29	-142	8.86
	01/25/19	6.67	195	0.25	-138	8.30
W-52	10/28/18	6.22	232	0.56	18	3.27
	01/26/19	5.62	239	1.60	100	9.60
W-53	10/28/18	7.28	243	0.65	184	2.66
	01/26/19	5.96	183	0.70	29	4.10
W-54	10/28/18	5.90	180	3.24	118	5.20
	01/26/19	5.62	148	3.72	133	5.40
W-55	10/27/18	5.75	204	2.93	170	8.87
	01/26/19	5.64	165	4.32	136	7.00
W-56	10/27/18	5.37	215	3.14	277	6.66
	01/26/19	5.36	173	3.17	173	3.60
W-57	10/27/18	5.52	198	2.73	264	2.23
	01/27/19	5.23	178	3.02	175	2.50
W-58	10/27/18	6.67	436	0.46	179	1.72
	01/27/19	6.45	364	0.43	169	1.10
W-59	10/27/18	6.58	454	1.84	196	2.24
	01/27/19	6.40	416	0.49	160	1.20
W-60	10/30/18	5.44	110	0.54	20	10.20
	01/17/19	5.56	92	1.04	68	5.74
W-61	10/30/18	6.10	174	4.33	100	4.50
	01/17/19	5.98	137	2.15	137	7.91
W-62	11/01/18	5.35	90	1.15	182	9.80
	01/18/19	5.25	71	2.15	167	10.24
W-63	10/31/18	6.86	1267	0.29	-130	30.10
	10/31/18	6.66	913	0.27	-104	13.80
	01/17/19	7.33	78	0.81	-155	9.94
W-64	11/01/18	6.05	749	0.56	152	3.24
	01/18/19	5.86	61	1.20	168	2.30
W-65	10/31/18	5.36	85	1.94	-24	0.00
	01/21/19	6.82	359	0.75	-84	4.32
W-66	10/31/18	5.70	141	0.33	72	4.73
	01/21/19	5.58	65	1.15	168	2.64
W-67	11/01/18	5.48	254	1.43	173	1.34
	01/18/19	5.49	205	0.78	154	2.52
W-68	11/06/18	5.27	99	3.66	7	3.53
	01/31/19	5.15	76	5.55	176	6.30

Notes:
S.U. = Standard Units
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ORP = Oxidation Reduction Potential
mV = millivolts

Table 4
Summary of Groundwater Analytical Results
Westinghouse Columbia Fuel Fabrication Facility
AECOM Project No. 60595649

Well	Sample Date	VOCs								SVOCs							Inorganics			Radionuclides								
		Benzene ug/L	Carbon Disulfide µg/L	Chloroform µg/L	cis-1,2-Dichloroethene µg/L	Ethylbenzene ug/L	Tetrachloroethene µg/L	Trichloroethene µg/L	Vinyl Chloride ug/L	1,1-Biphenyl m µg/L	2-Methylnaphthalene µg/L	Acenaphthene µg/L	Carbazole µg/L	Fluorene	Naphthalene µg/L	Phenanthrene µg/L	Fluoride mg/L *	Ammonia NH3(N) mg/L	Nitrate NO3 mg/L	Gross Alpha pCi/L	Isotopic U_{233234} pCi/L	Isotopic U_{235236} pCi/L	Isotopic U_{238} pCi/L	Isotopic U_{234} µg/L	Isotopic U_{235} µg/L	Isotopic U_{238} µg/L	Total U µg/L	Gross Beta pCi/L	Tc-99 pCi/L
USEPA MCL		5		80	70		5	5	2								4		10		84[--]	84[--]	84[--]	30	30	30	30		900
Action Level																				15								50	
RW-1	04/16/19	<1	<1	<1	<1	<1	1.3	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.104	0.044	2.5	<3.59	<0.396	<0.307	<0.401	<0.010	<0.010	<0.067	<0.067	5.56	<38.7
WRW-2	10/16/18	<1	<1	<1	<1	<1	**190**	**7.0**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.098	0.0192	**14**	<3.35	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	7.07	NA
	01/22/19	<1	<1	<1	<1	<1	**150**	**12**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.104	0.044	**14**	<3.77	0.323	0.366	0.495	<0.010	<0.010	0.079 J	0.079 J	9.11	<40
W3A	10/29/18	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Not Analyzed	0.0322	<0.020	<4.21	0.385	0.312	0.318	<0.010	<0.010	<0.067	<0.067	<4.81	<44.3
	11/29/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.067	0.0241	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	01/29/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.038	0.028	<0.020	<3.82	<0.306	<0.240	<0.194	<0.010	<0.010	<0.067	<0.067	<4.96	<29.4
W4	Oct/Dec-18	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	01/28/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**4.56**	0.0269	8.4	<4.54	0.541	0.318	<0.158	<0.010	<0.010	0.143 J	0.143 J	28.6	<45.4
W6	11/05/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.058	6.16	**14**	8.41	1.00	<0.344	<0.332	<0.01	<0.010	0.409	0.420	765	861
	01/15/19	<1	<1	<1	1.9	<1	**10**	1.8	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.136	60.5	**150**	**34.6**	0.397	<0.267	0.327	<0.010	<0.010	0.200	0.200	1,615	**2370**
W7A	10/19/18	<1	<1	<1	<1	<1	1.8	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**6.86**	65	**370**	<3.38 ***	Not Analyzed	Not Analyzed	Not Analyzed	<0.010	<0.010	0.691	0.691	**110 *** **	175
	01/14/19	<1	<1	<1	<1	<1	1.7	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**6.6**	62.5	**350**	<8.92	0.559	<0.264	0.558	<0.010	<0.010	0.719	0.719	**122.5**	160
	06/04/19	<1	<1	<1	<1	<1	2.1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**6.49**	65.5	**350**	13.3	0.378	<0.343	<0.319	<0.010	<0.010	0.812	0.812	**141.5**	176
W10	10/19/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	3.46	2.21	**21**	<4.78	NA	NA	NA	<0.010	<0.010	0.0841 J	0.0841 J	**68.7**	90.0
	01/14/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	3.42	4.62	**15**	<4.64	<0.399	<0.322	<0.364	<0.010	<0.010	0.0854 J	0.0854 J	**50.9**	80.9
	06/04/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	3.59	7.41	**22**	4.50	<0.384	<0.309	<0.275	<0.010	<0.010	0.114 J	0.114 J	**66.4**	88.7
W11	11/05/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.01	4.59	**57**	7.82	<0.315	<0.153	<0.198	<0.010	<0.010	<0.067	<0.067	**2,160**	**3570**
	12/05/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.00	6.4	**63**	14.2	<0.272	<0.34	<0.275	<0.010	<0.010	<0.067	<0.067	**2,450**	**3640**
	01/11/19	<1	<1	1.1	<1	<1	2.0	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.018	6.42	**64**	**17.0**	<0.497	<0.260	<0.368	<0.010	<0.010	0.192 J	0.192 J	**1,810**	**4200**
	06/05/19	<1	<1	1.2	<1	<1	1.9	1.3	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.005	4.37	**50**	**20.9**	<0.177	<0.156	<0.126	<0.010	<0.010	0.0696 J	0.0696 J	**2,060**	**2660**
W13R	10/19/18	<1	<1	<1	1.4	<1	**39**	3.1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**8.79**	38.8	**24**	<4.87	NA	NA	NA	<0.010	<0.010	0.131 J	0.131 J	**97.6 *** **	149
	01/10/19	<1	<1	<1	1.3	<1	**46**	3.7	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**8.29**	31.8	**21**	<4.28	<0.387	<0.288	<0.211	<0.010	<0.010	0.149 J	0.149 J	**73.5**	111
	06/06/19	<1	<1	<1	<1	<1	**14**	1.3	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**7.95**	28.1	**16**	<4.65	<0.337	<0.284	<0.18	<0.010	<0.010	0.128 J	0.128 J	**48.9**	60.9
W14	10/18/18	<1	<1	<1	<1	<1	**35**	**5.3**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.025	0.175	3.3	<4.01	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	<3.62	NA
	01/25/19	<1	<1	<1	<1	<1	**9.9**	2.1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.066	1.64	0.50	<4.05	<0.378	<0.382	<0.375	<0.010	<0.010	0.104 J	0.104 J	11.3	<31.0
W15	10/17/18	<1	<1	<1	1.2	<1	**11**	2.0	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.86	13.1	**44**	<4.99	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	**194.5 *** **	265
	01/23/19	<1	<1	<1	<1	<1	**8.4**	1.6	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	2.26	18.4	**49**	4.48 ***	<0.304	<0.287	<0.296	<0.010	<0.010	<0.067	<0.067	**145.5 *** **	233
	06/04/19	<1	<1	<1	1.2	<1	**13**	2.3	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.92	13.4	**44**	<4.99	<0.337	<0.258	<0.113	<0.010	<0.010	0.103 J	0.103 J	**186**	281
W16	10/18/18	<1	<1	<1	3.2	<1	**11**	2.9	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**8.62**	18.2	4.6	<4.97	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	17.2	NA
	01/28/19	<1	<1	<1	1.2	<1	**6.4**	1.7	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**7.61**	15.3	3.0	5.21	<0.401	<0.305	<0.380	<0.010	<0.010	0.113 J	0.113 J	15.4	<30.5
	06/04/19	<1	<1	<1	1.5	<1	**9.6**	2.4	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**8.36**	17.1	3.8	<4.47	<0.412	<0.346	<0.243	<0.010	<0.010	0.0846 J	0.0846 J	18.3	<35.9
W17	10/25/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**4.02**	12.9	4.5	<4.87	NA	NA	NA	<0.010	<0.010	0.157 J	0.157 J	**254 *** **	348
	01/25/19	<1	<1	<1	<1	<1	1.7	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	2.44	5.58	**12**	<3.84	<0.336	<0.321	<0.287	<0.010	<0.010	0.0939 J	0.0939 J	**308**	476
W18R	10/23/18	<1	<1	1.6	<1	<1	2.8	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**4.8**	86.5	**710**	14.3 ***	1.85	<0.303	1.19	<0.010	0.0453 J	4.42	4.47	**131 *** **	208
	01/15/19	<1	<1	1.4	<1	<1	2.2	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**5.56**	95.0	**750**	**<17.65**	4.62	0.528	2.07	<0.010	0.062 J	5.03	5.09	**123.5**	168
W19B	11/04/18	<5	<5	<5	<5	<5	**120**	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.016	0.0202	4.3	<3.69	<0.311	<0.278	<0.268	<0.010	<0.010	<0.067	<0.067	<3.68	<45.7
	01/23/19	<1	<1	<1	<1	<1	**92**	**1.9**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.024	0.0839	3.8	4.23	0.525	0.138	0.297	<0.010	<0.010	<0.067	<0.067	<4.77	<39.8
W20	10/30/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.048	0.027	<0.020	<3.86	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	<3.55	NA
	01/29/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.049	0.0396	0.035	<4.55	<0.374	<0.333	<0.287	<0.010	<0.010	<0.067	<0.067	<4.49	<32.2
W22	10/23/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**4.59**	35.1	**71**	<4.81	NA	NA	NA	<0.010	0.0128 J	0.698	0.711	17.1	NA
	1/15/2019 - 1/22/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**5.16**	27.4	**59**	<4.99	1.18	0.437	0.672	<0.010	0.0138 J	0.696	0.710	18.2	<28.8
W23R	10/18/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.139	0.0612	0.81	<4.13	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	<4.43	NA
	01/28/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.011	0.0191	1.2	<4.09	<0.280	<0.305	<0.284	<0.010	<0.010	<0.067	<0.067	<3.48	<30.2
W24	10/16/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.025	0.0182	0.042	<4.32	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	<4.85	NA
	01/25/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.026	0.0207	0.13	<4.30	<0.252	<0.290	<0.171	<0.010	<0.010	<0.067	<0.067	<3.28	<29.7
W25	Oct/Dec-18	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	01/30/19	<5	<5	<5	<5	<5	<5	<5	<4	<0.8	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.101	1.14	<0.020	<4.43	0.640	<0.376	0.466	<0.010	<0.010	0.419	0.419	5.32	<47.6
W26	10/16/18	<1	<1	<1	1.1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.63	1.24	3.5	<4.92	NA	NA	NA	<0.010	<0.010	0.0947 J	0.0947 J	12.5	NA
	01/24/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.59	1.53	3.3	<4.49	<0.373	<0.241	<0.301	<0.010	<0.010	<0.067	<0.067	13.4	<34.7
W27	11/28/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	4.65	8.43	0.037	4.36	0.268	0.243	0.262	<0.010	<0.010	<0.067	<0.067	8.85	<40
	01/29/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**4.33**	6.96	0.029	<4.88	<0.337	<0.279	<0.288	<0.010	<0.010	<0.067	<0.067	6.18	<35.5
W28	10/23/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**4.63**	0.721	7.8	<4.97	NA	NA	NA	<0.010	0.0106 J	0.531	0.541	7.30	NA
	01/18/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**5.16**	0.442	7.2	<6.04	0.369	<0.243	<0.304	<0.010	<0.010	0.456	0.456	7.28	<30.9
	04/16/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**5.16**	0.442	7.4	<6.04	0.369	<0.243	<0.304	<0.010	0.013 J	0.491	0.504	7.28	<30.9
	07/11/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**5.16**	0.442	7.4	<4.77	0.806	<0.368	0.295	<0.010	0.0117 J	0.573	0.585	8.47	<42.9
W29	10/23/18	<1	<1	<1	<1	<1	1.5	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**9.69**	29	7.3	<4.69	NA	NA	NA	<0.010	0.0385 J	2.24	2.28	3.98	NA
	01/10/19	<1	<1	<1	<1	<1	1.6	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**7.94**	22	6.4	5.04	1.38	<0.319	0.746	<0.010	0.0333 J	2.17	2.21	<3.96	<29.8
W30	10/23/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**8.94**	1.49	**47**	**23.7 *** **	15.0	0.509	4.40	<0.010	0.298	12.4	12.7	26.5 ***	NA
	01/15/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	**9.06**	0.956	**45**	**38.6**	29.3	2.83	10.1	<0.010	0.533	22.4	22.9	30.8	<33.8
W32	10/19/18	<1	<1	<1	<1	<1	1.5	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	3.61	62.5	**240**	4.23 ***	NA	NA	NA	<0.010	<0.010	0.223	0.223	**127 *** **	259
	01/11/19	<1	<1	<1	<1	<1	1.3	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	3.26	54.5	**210**	8.41	0.360	<0.210	<0.307	<0.010	<0.010	0.296	0.296	**176**	307
	06/05/16	<1	<1	<1	<1	<1	1.6	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	3.56	53.5	**210**	8.88	0.325	<0.158	<0.261	<0.010	<0.010	0.310	0.310	**206**	273
W33	10/16/18	<1	<1	<1	2.0	<1	**190**	**17**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.187	0.0112	**10**	<4.81	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	5.22	NA
	01/22/19	<1	<1	<1	<1	<1	**140**	**18**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.193	0.054	**10**	<2.30	<0.307	<0.289	<0.234	<0.010	<0.010	<0.067	<0.067	<3.32	<29.4

Table 4
Summary of Groundwater Analytical Results
Westinghouse Columbia Fuel Fabrication Facility
AECOM Project No. 60595649

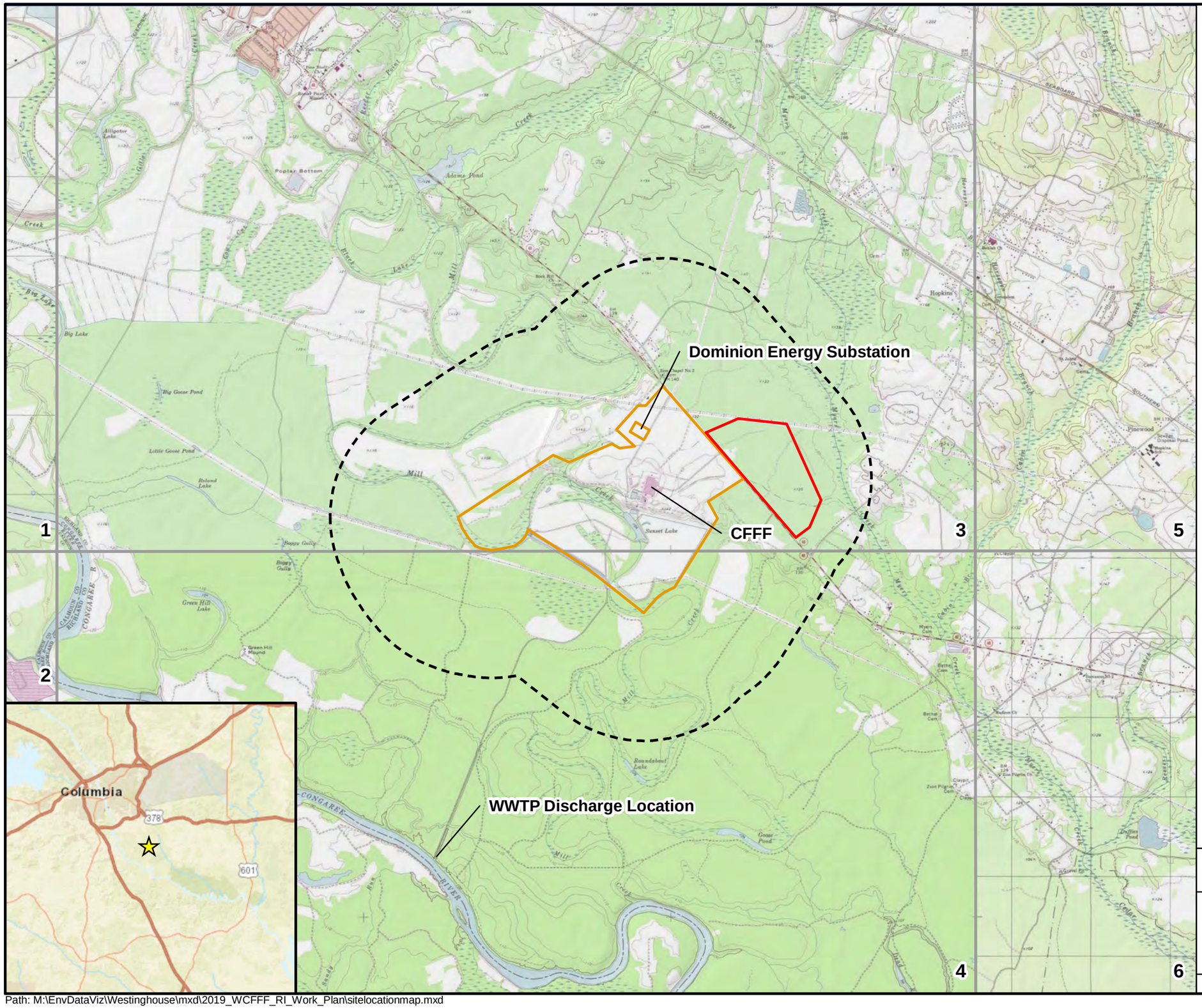
Well	Sample Date	VOCs								SVOCs							Inorganics			Radionuclides								
		Benzene ug/L	Carbon Disulfide µg/L	Chloroform µg/L	cis-1,2-Dichloroethene µg/L	Ethylbenzene ug/L	Tetrachloroethene µg/L	Trichloroethene µg/L	Vinyl Chloride ug/L	1,1-Biphenyl m µg/L	2-Methylnaphthalene µg/L	Acenaphthene µg/L	Carbazole µg/L	Fluorene	Naphthalene µg/L	Phenanthrene µg/L	Fluoride mg/L *	Ammonia NH3(N) mg/L	Nitrate NO3 mg/L	Gross Alpha pCi/L	Isotopic U_{233234} pCi/L	Isotopic U_{235236} pCi/L	Isotopic U_{238} pCi/L	Isotopic U_{234} µg/L	Isotopic U_{235} µg/L	Isotopic U_{238} µg/L	Total U µg/L	Gross Beta pCi/L	Tc-99 pCi/L
USEPA MCL		5		80	70		5	5	2								4		10		84 [--]	84 [--]	84 [--]	30	30	30	30		900
Action Level																				15								50	
W35	11/01/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.026	0.0147	5.5	<3.51	<0.304	<0.307	<0.249	<0.010	<0.010	<0.067	<0.067	<4.35	<39
	01/22/19	<1	<1	<1	<1	<1	2.1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.007	0.0449	4.2	<3.71	<0.272	<0.240	0.489	<0.010	<0.010	<0.067	<0.067	<4.97	<40.2
W36	11/01/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.005	0.0527	0.27	<3.71	<0.357	<0.267	<0.35	<0.010	<0.010	<0.067	<0.067	<3.4	<39.5
	01/18/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.005	0.0408	0.055	<3.46	0.433	0.240	<0.222	<0.010	<0.010	<0.067	<0.067	<4.52	<42.2
W37	10/18/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.03	0.0268	2.8	<4.37	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	<3.57	NA
	01/14/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.01	0.0218	3.6	<2.99	<0.280	<0.260	0.238	<0.010	<0.010	<0.067	<0.067	<4.69	<43.6
W38	10/18/18	<1	<1	<1	<1	<1	3.6	**11**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.127	0.0268	5.6	<3.77	NA	NA	NA	<0.010	<0.010	0.196 J	0.196 J	<2.94	NA
	01/09/19	<1	<1	<1	<1	<1	3.2	**9.5**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.104	0.0321	5.0	<3.63	0.606	0.210	0.309	<0.010	<0.010	0.197	0.197	<4.49	<42.4
W39	10/25/18	<5	<5	<5	<5	<5	**300**	<5	<5	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.099	0.0318	**120**	<4.90	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	12.1	NA
	01/21/19	<1	<1	<1	3.8	<1	**190**	3.5	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.009	0.067	**96**	<4.86	0.367	0.340	<0.234	<0.010	<0.010	<0.067	<0.067	12.6	<42.7
W40	11/29/19	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.124	0.0203	4.6	6.93	<0.225	<0.198	<0.16	<0.010	<0.010	0.067	0.067	5.20	<36.4
	01/24/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.164	0.0552	2.6	3.21	0.519	<0.302	0.409	<0.010	<0.010	0.142 J	0.142 J	<4.66	<48.4
W41R	10/17/18	<5	<5	<5	<5	<5	**310**	**23**	<5	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.041	0.033	**55**	<4.89	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	12.1	NA
	01/23/19	<1	<1	<1	5.0	<1	**200**	**6.9**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.056	0.0777	**44**	<4.32	0.281	<0.300	<0.182	<0.010	<0.010	<0.067	<0.067	8.44	<41.1
W42	11/04/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.49	0.429	4.0	<3.5	<0.329	<0.271	<0.339	<0.010	<0.010	<0.067	<0.067	<2.98	<40.6
	01/25/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.51	0.153	3.6	<3.39	0.376	0.420	0.280	<0.010	<0.010	<0.067	<0.067	8.61	<41.4
W43	11/28/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.020	0.0196	7.1	<3.97	0.331	0.280	0.274	<0.010	<0.010	<0.067	<0.067	<4.79	<38.5
	01/21/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.008	0.0316	9.0	<4.53	0.727	0.443	0.246	<0.010	<0.010	<0.067	<0.067	3.36	<41.4
W44	10/17/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.019	0.017	3.5	<4.65	NA	NA	NA	<0.010	<0.010	<0.067	<0.067	<4.87	NA
	01/23/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.046	0.091	2.9	<4.22	<0.379	<0.342	<0.287	<0.010	<0.010	<0.067	<0.067	4.49	<42.1
W45	11/04/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	0.9	<0.8	0.861	0.409	0.95	4.47	3.55	0.371	0.907	<0.010	0.0586	2.53	2.59	<4.69	<39.2
	01/18/19	2.8	<1	<1	<1	6.6	<1	<1	<1	7.2	7.2	1.5	6.6	2.4	18	1.4	0.614	1.390	0.74	5.34	1.35	0.351	0.541	<0.010	0.0244 J	1.02	1.05	<4.96	<43.5
W46	11/04/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.033	0.0144	7.6	<3.57	<0.306	<0.268	<0.255	<0.010	<0.010	<0.067	<0.067	48.6	49.7
	01/22/19	<1	<1	<1	<1	<1	1.7	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.015	0.0569	7.6	<4.75	<0.386	0.270	0.362	<0.010	<0.010	<0.067	<0.067	41.3	<41.4
W47	10/25/18	<1	<1	<1	<1	<1	3.1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	4	22.9	84	<4.75	NA	NA	NA	<0.010	<0.010	0.0797 J	0.0797 J	**105 *****	113
	01/24/19	<1	<1	<1	<1	<1	2.4	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	4.23	20	71	5.21 ***	0.382	<0.256	0.283	<0.010	<0.010	<0.067	<0.067	**91.2 *****	97.8
W48	10/25/18	<1	<1	<1	2.2	<1	**150**	4.9	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.529	0.0322	5.3	<4.09	NA	NA	NA	<0.010	<0.010	0.0922 J	0.0922 J	14.8	NA
	01/24/19	<1	<1	<1	2.1	<1	**180**	**5.1**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.341	0.0678	5.0	3.90	0.294	0.425	<0.195	<0.010	<0.010	<0.067	<0.067	15.7	<39.7
W49	12/13/18	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.011	0.0235	<0.020	<4.6	<0.382	<0.488	<0.418	<0.010	<0.010	0.104 J	0.104 J	<4.57	<41.6
	01/29/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.003	0.0152	<0.020	3.87	<0.361	<0.270	<0.260	<0.010	<0.010	0.0731 J	0.0731 J	<3.28	<41.8
W50	Oct/Dec-18	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	01/24/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.006	0.0609	<0.020	<3.17	0.685	0.265	<0.245	<0.010	<0.010	0.0876 J	0.0876 J	<4.23	<39.9
W51	10/28/18	<5	<5	<5	<5	<5	<5	<5	<2	13	<0.8	<0.8	4.5	<0.8	<0.8	1.8	0.304	0.274	0.030	<3.85	0.161	<0.105	<0.150	<0.010	<0.010	<0.067	<0.067	4.67	<43.5
	01/25/19	<1	<1	<1	2.7	<1	<1	<1	12	<0.8	<0.8	4.9	1.3	4.2	1.8	0.258	0.1	0.023	<3.97	<0.294	<0.319	<0.193	<0.010	<0.010	<0.067	<0.067	<4.45	<43.5
W52	10/28/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.957	0.0476	2.3	<4.57	0.146	<0.0895	<0.105	<0.010	<0.010	<0.067	<0.067	6.58	<42.3
	01/26/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.08	0.0342	2.4	<3.14	0.368	<0.211	<0.197	<0.010	<0.010	<0.067	<0.067	<4.17	<42.2
W53	10/28/18	<5	<5	<5	19	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.262	0.0611	0.67	4.68	0.199	<0.172	<0.130	<0.010	<0.010	0.0784 J	0.0784 J	7.06	<41.0
	01/26/19	<1	<1	<1	46	<1	4.6	<1	2.1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.069	0.0412	0.063	<3.2	0.376	<0.215	<0.232	<0.010	<0.010	<0.067	<0.067	<4.09	<39.7
W54	10/28/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.264	0.0198	2.9	<3.31	<0.201	<0.0862	0.118	<0.010	<0.010	<0.067	<0.067	<4.46	<41.9
	01/26/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.153	0.0083	3.0	<3.47	0.779	0.286	0.405	<0.010	<0.010	<0.067	<0.067	<4.04	<37.2
W55	10/27/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.06	0.0342	3.3	**425 *****	**308**	15.4	64.8	0.0519	6.07	**181**	**187**	**64.2 *****	<40.9
	01/26/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.065	0.0059	3.5	**466 *****	**283**	19.1	69.4	0.0459 J	5.60	**172**	**178**	**84 *****	<39
W56	10/27/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.135	0.0213	6.5	**342 *****	**274**	13.5	58.8	0.0452 J	5.02	**153**	**158**	**57.4 *****	<42.4
	01/26/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.152	0.0078	4.1	**257 *****	**176**	12.1	43.7	0.0343 J	4.05	**128**	**132**	**57.1 *****	<41.4
W57	10/27/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.068	0.0144	6.6	4.13	0.856	0.125	0.354	<0.010	0.019 J	0.591	0.610	<4.84	<43.5
	01/27/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.0	0.0739	5.7	<3.39	0.570	<0.246	0.304	<0.010	<0.010	0.247	0.247	<3.67	<39.7
W58	10/27/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.117	14.8	**16**	<4.16	1.28	0.159	0.399	<0.010	0.0218 J	0.776	0.798	11.2	<41.1
	01/27/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.1	17.9	**11**	7.03	3.04	0.500	1.17	<0.010	0.0444 J	1.51	1.55	5.66	<42.2
W59	10/27/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.08	6.69	**21**	**71.1 *****	51.7	2.70	11.1	<0.010	0.919	**30.2**	**31.1**	17.1 ***	<41.4
	01/27/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.08	9.29	**21**	**80.7 *****	42.7	3.19	10.1	<0.010	0.856	28.4	29.2	16.8 ***	<37.8
W60	10/30/18	<5	9.4	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.11	<3.45	<0.286	<3.45	<0.286	<0.144	<0.215	<0.010	<0.010	<0.067	<0.067	<3.55	<37.6
	01/17/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.007	0.0798	0.020	<3.47	0.409	0.290	0.452	<0.010	<0.010	<0.067	<0.067	<3.93	<37.2
W61	10/30/18	<5	<5	5.2	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.086	0.0206	0.051	<3.49	<0.288	<0.287	<0.294	<0.010	<0.010	<0.067	<0.067	3.82	<38
	01/17/19	<1	<1	<1	<1	<1	<1	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.075	0.0408	0.48	<3.39	0.557	0.359	0.365	<0.010	<0.010	<0.067	<0.067	5.01	<42.8
W62	11/01/18	<1	<1	<1	<1	<1	48	1.9	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.02	0.0177	3.6	<3.36	<0.322	<0.289	<0.278	<0.010	<0.010	0.0843	0.0843	<2.65	<42.2
	01/18/19	<1	<1	<1	<1	<1	51	1.9	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.01	0.0375	3.9	<3.44	<0.428	<0.347	<0.334	<0.010	<0.010	0.0831 J	0.0831 J	<3.9	<36.8
W63	10/31/18	<5	<5	<5	<5	<5	<5	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.474	0.0647	0.86	<4.99	0.755	<0.126	0.669	<0.010	<0.010	1.02	1.02	5.84	<40.6
	01/17/19	<1	<1	<1	<1	<1	1.4	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.502	0.0632	0.16	<4.68	0.669	<0.321	1.02	<0.010	<0.010	0.891	0.891	<4.35	<35.5
W64	11/01/18	<1	<1	<1	<1	<1	1.5	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	3.26	20.7	**49**	<4.94	<0.292	<0.247	<0.199	<0.010	<0.010	0.140	0.140	**76.3**	74.7
	01/18/19	<1	<1	<1	<1	<1	1.8	<1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	**4.32**	21.9	**61**	<4.65 ***	0.516	0.261	0.211	<0.010	<0.010	<0.067	<0.067	**88.5 *****	118
W65	10/31/18	<25	25	25	25	<25	**210**	**93**	<10	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	3.08	0.0185	0.39	<3.57	<0.325	<0.268	<0.334	<0.010	<0.010	<0.067	<0.067	<3.61	<37.6
	01/21/19	<5	<5	<5	<5	<5	**230**	**94**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.48	0.0329	0.40	<4.00	<0.389	<0.253	0.236	<0.010	<0.010	<0.067	<0.067	<4.00	<39.3
W66	10/31/18	<5	5.0	<5	<5	<5	**66**	<5	<2	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	1.19	0.0687	**18**	<3.42	<0.288	<0.281	<0.261	<0.010	<0.010	<0.067	<0.067	<3.79	<38.4
	01/21/19	<5	<5	<5	<5	<5	**200**	**11**	<5	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.162	0.0231	2.0	<3.97	<0.454	<0.333	0.331	<0.010	<0.010	<0.067	<0.067	<3.60	<44.7

Table 4
Summary of Groundwater Analytical Results
Westinghouse Columbia Fuel Fabrication Facility
AECOM Project No. 60595649

Well	Sample Date	VOCs								SVOCs								Inorganics			Radionuclides									
		Benzene ug/L	Carbon Disulfide µg/L	Chloroform µg/L	cis-1,2-Dichloroethene µg/L	Ethylbenzene ug/L	Tetrachloroethene µg/L	Trichloroethene µg/L	Vinyl Chloride ug/L	1,1-Biphenyl m µg/L	2-Methylnaphthalene µg/L	Acenaphthene µg/L	Carbazole µg/L	Fluorene	Naphthalene µg/L	Phenanthrene µg/L	Fluoride mg/L *	Ammonia NH3(N) mg/L	Nitrate NO3 mg/L	Gross Alpha pCi/L	Isotopic U_{233234} pCi/L	Isotopic U_{235236} pCi/L	Isotopic U_{238} pCi/L	Isotopic U_{234} µg/L	Isotopic U_{235} µg/L	Isotopic U_{238} µg/L	Total U µg/L	Gross Beta pCi/L	Tc-99 pCi/L
USEPA MCL		5		80	70		5	5	2								4		10		84~	84~	84~	30	30	30	30		900
Action Level																				15								50	
W67	11/01/18	<1	<1	<1	1.7	<1	**41**	**8.4**	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.063	1.26	**17**	<4.1	<0.306	<0.325	0.239	<0.010	<0.010	<0.067	<0.067	**73.4**	82.9
	01/18/19	<1	<1	<1	1.6	<1	**38**	8.1	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.008	1.41	**17**	<4.04	<0.397	0.314	0.410	<0.010	<0.010	<0.067	<0.067	**67.5**	114
W68	11/06/18	<1	<1	<1	<1	<1	**130**	2.7	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.047	0.0264	3.4	<3.51	<0.328	<0.244	<0.289	<0.010	<0.010	0.0802	0.0802	<3.38	<37.4
	01/31/19	<1	<1	<1	<1	<1	**150**	2.5	<1	<4	<0.8	<0.8	<4	<0.8	<0.8	<0.8	0.009	0.0219	3.3	<3.42	0.440	0.368	0.398	<0.010	<0.010	<0.067	<0.067	<3.75	<45.0

Notes:
µg/L - Micrograms per liter
~ - Calculated value for comparison based on the site's specific uranium enrichment
* - PQL= 0.5 before May 2018 and 0.1 since
** - PQL= 1.0 before May 2018 and 0.1 since
LOQ - Limit of Quantification
MCL - Maximum contaminent level
MDC - Minimum detectable concentration
mg/L - Milligrams per liter
pCi/L - Picocuries per liter
PQL - Practical Quantitation Limit
RL - Reporting (Requested) Limit
SCDHEC - South Carolina Department of Health and Environment Control
USEPA - United States Environmental Protection Agency
Beginning July 2018, Westinghouse procedure is to analyze Tc-99 for all samples with >50 pCi/L gross beta results.
J value is estimated, usually because it is above the detection limit but below the reporting limit
*** - indicates an average of two analyses

Figures



Legend

1 Mile Buffer of Facility Property Boundary

Locations

- Property Line
- SCRDI Bluff Road (Superfund Site)
- Topographic Quadrangle Boundary

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

0 2,000 4,000 Feet

1:48,000

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

Datum: North American 1983

Data Source: Esri/USGS

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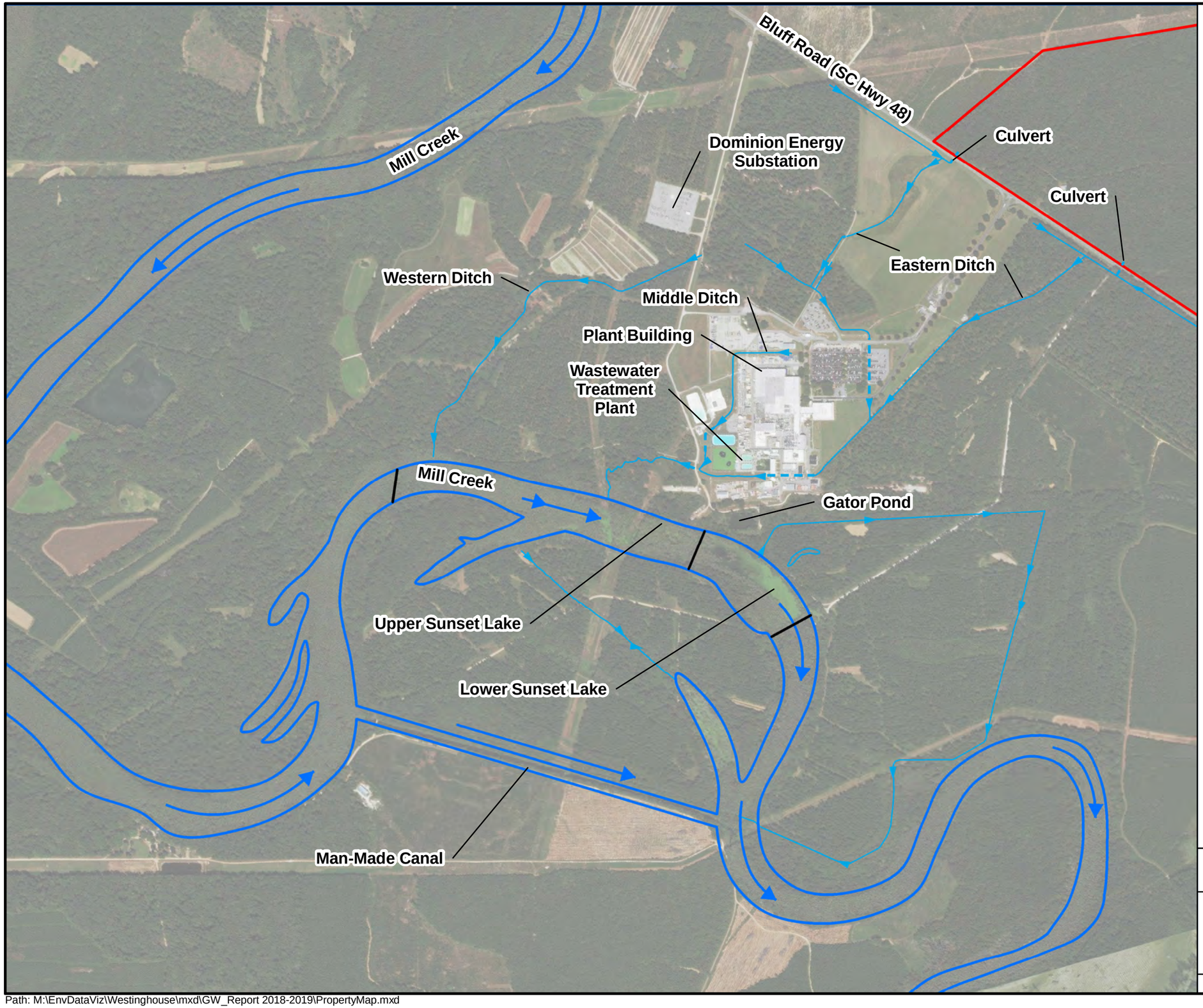
Site Location Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	LJG	September 2019	**FIGURE 1**

Path: M:\EnvDataViz\Westinghouse\mxd\2019_WCFFF_RI_Work_Plan\sitelocationmap.mxd



Legend

- Mill Creek Flow Direction
- Ditch
- Culvert
- Property Line
- SCRDI Bluff Road (Superfund Site)
- Mill Creek
- Dike Location

0 500 1,000 Feet

1:12,000

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

Datum: North American 1983

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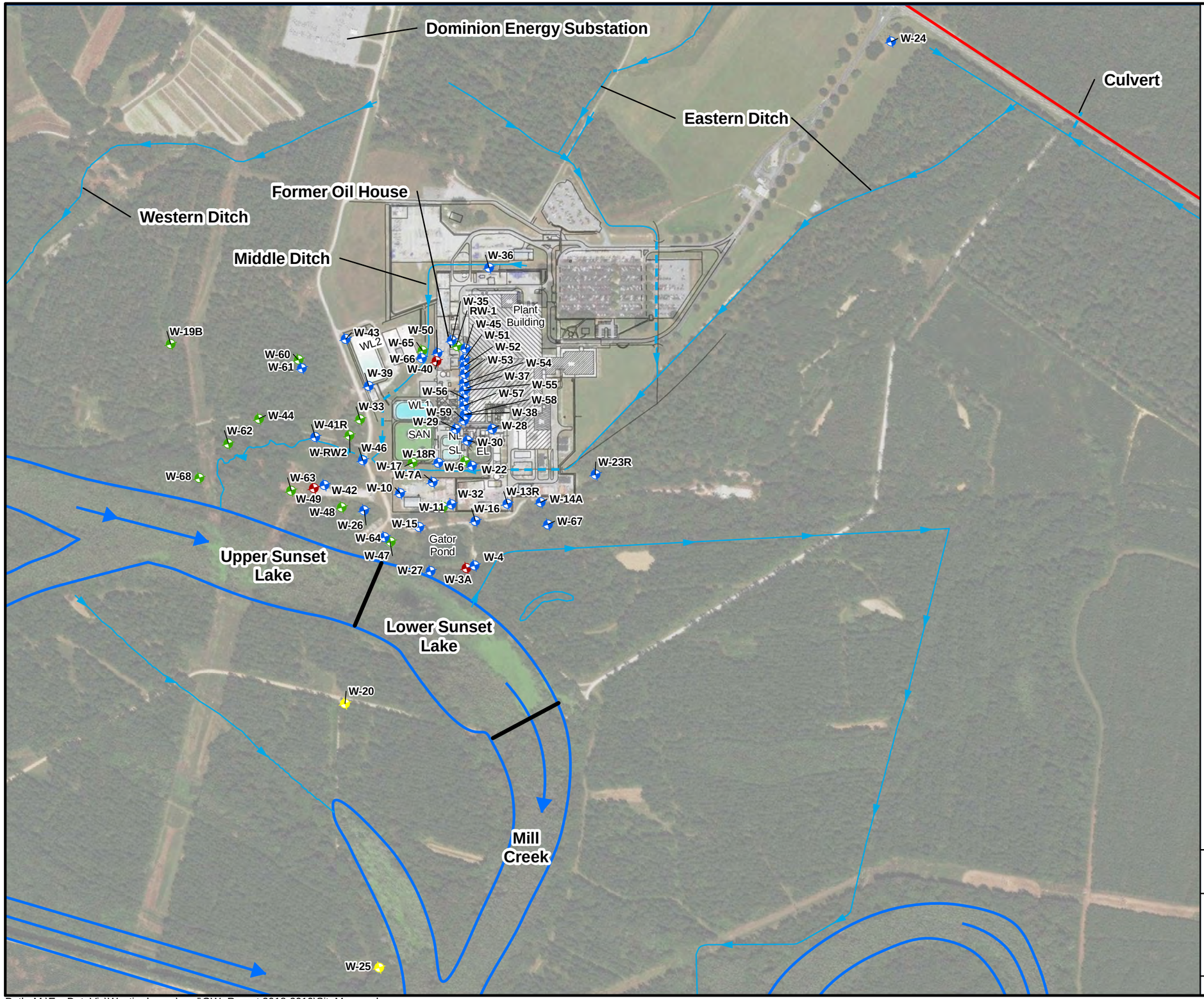
Property Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	LJG	August 2019	**FIGURE 2**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\PropertyMap.mxd



Legend

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

Groundwater Monitoring Wells

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

- Mill Creek
- Property Line
- SCRDI Bluff Road (Superfund Site)
- Dike Location

0 300 600 Feet

1:7,200

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

Datum: North American 1983

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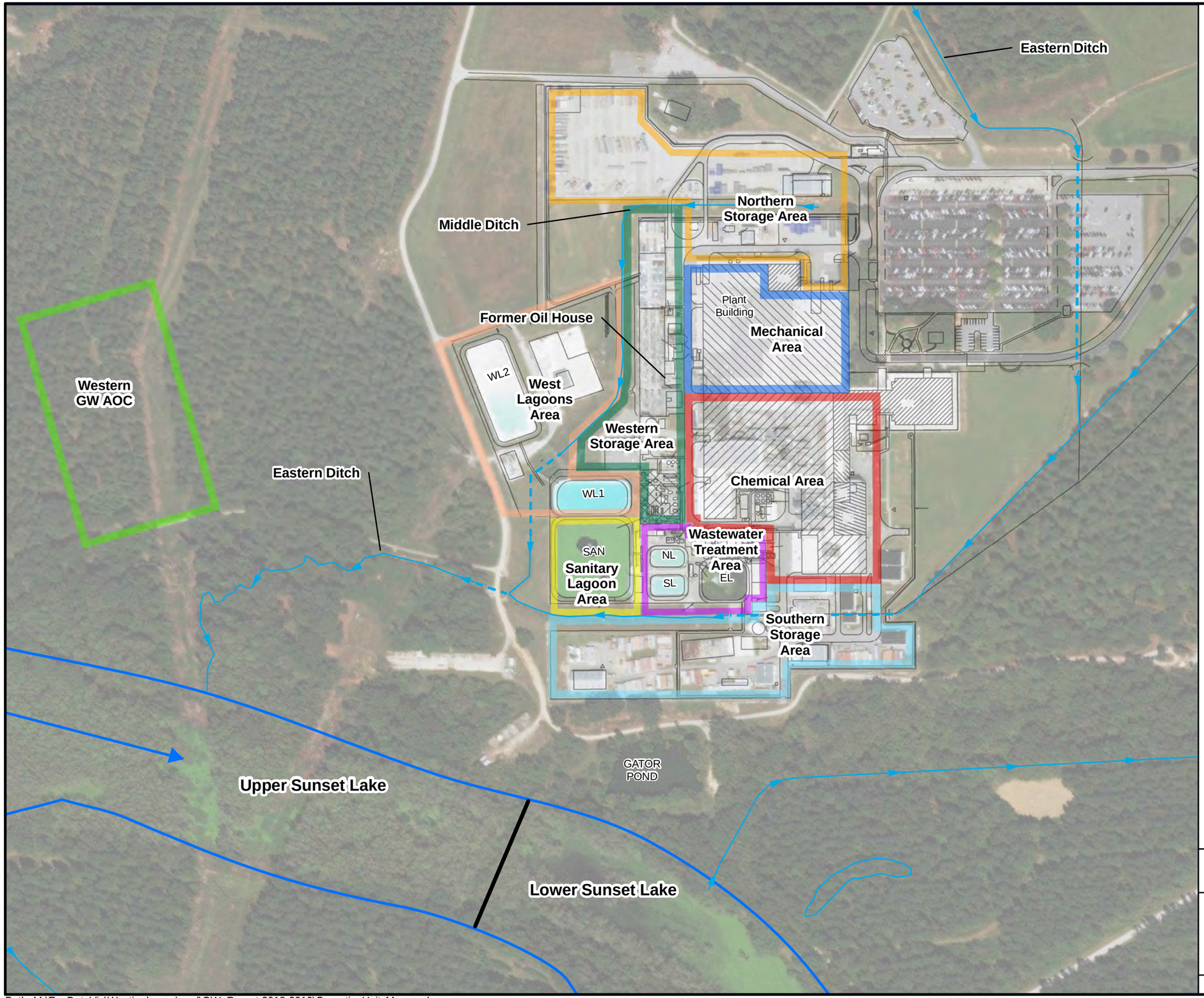
Site Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	LJG	August 2019	**FIGURE 3**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\SiteMap.mxd



Legend

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

Operable Units

- Chemical Area
- Mechanical Area
- Northern Storage Area
- Sanitary Lagoon Area
- Southern Storage Area
- Wastewater Treatment Area
- West Lagoons Area
- Western Storage Area
- Western GW AOC

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Operational Units Map

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	LJG	August 2019	**FIGURE 4**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\OperationUnitsMap.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Potentiometric Line (C.I. = 4 feet, dashed where inferred)
- Direction of Groundwater Flow
- Ditch
- Culvert

129.19	Groundwater Elevation
EL	East Lagoon
NL	North Lagoon
SL	South Lagoon
SAN	Sanitary Lagoon
WL1	West Lagoon 1
WL2	West Lagoon 2

Note:

Based upon data collected on November 26, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

AECOM

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Upper Surficial Aquifer Potentiometric Map November 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 5**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F5 UpperSurfical_Pot-Nov2018.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Potentiometric Line (C.I. = 4 feet)
- Direction of Groundwater Flow
- Ditch
- Culvert
- 128.36 Groundwater Elevation
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

Note:

Based upon data collected on November 26, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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Lower Surficial Aquifer Potentiometric Map November 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 6**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F6 LowerSurfical_Pot-Nov2018.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Potentiometric Line (C.I. = 2 feet)
- Direction of Groundwater Flow
- Ditch
- Culvert
- 118.23 Groundwater Elevation
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

Note:

Based upon data collected on November 26, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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Black Mingo Aquifer Potentiometric Map November 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 7**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F7 BlackMingo_Pot-Nov2018.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well
- Potentiometric Line (C.I. = 4 feet, dashed where inferred)
- Direction of Groundwater Flow
- Ditch
- Culvert

129.71	Groundwater Elevation
EL	East Lagoon
NL	North Lagoon
SL	South Lagoon
SAN	Sanitary Lagoon
WL1	West Lagoon 1
WL2	West Lagoon 2

Note:

Based upon data collected on January 17, 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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Upper Surficial Aquifer Potentiometric Map January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 8**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F8 UpperSurfical_Pot-Jan2019.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Potentiometric Line (C.I. = 4 feet)
- Direction of Groundwater Flow
- Ditch
- Culvert
- 128.65 Groundwater Elevation
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

Note:

Based upon data collected on January 17, 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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Lower Surficial Aquifer Potentiometric Map January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 9**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F9 LowerSurfical_Pot-Jan2019.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Potentiometric Line (C.I. = 2 feet)
- Direction of Groundwater Flow
- Ditch
- Culvert
- 118.65 Groundwater Elevation
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

Note:

Based upon data collected on January 17, 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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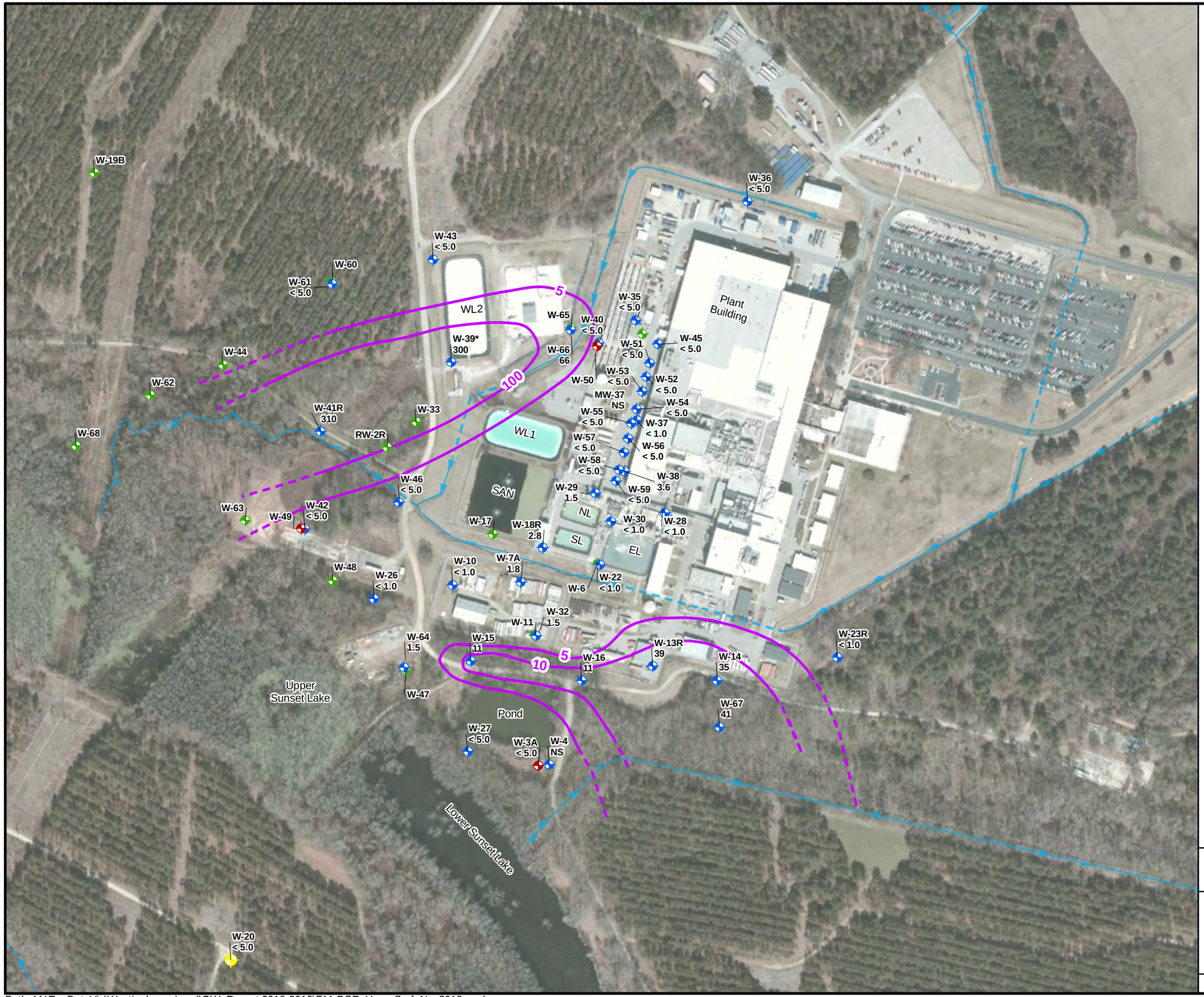
Black Mingo Aquifer Potentiometric Map January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 10**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F10 BlackMingo_Pot-Jan2019.mxd



Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- PCE Isoconcentration Contours (µg/L)
- Ditch
- Culvert
- 300 PCE Concentration in µg/L
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

Note:

Based upon data collected from October-December, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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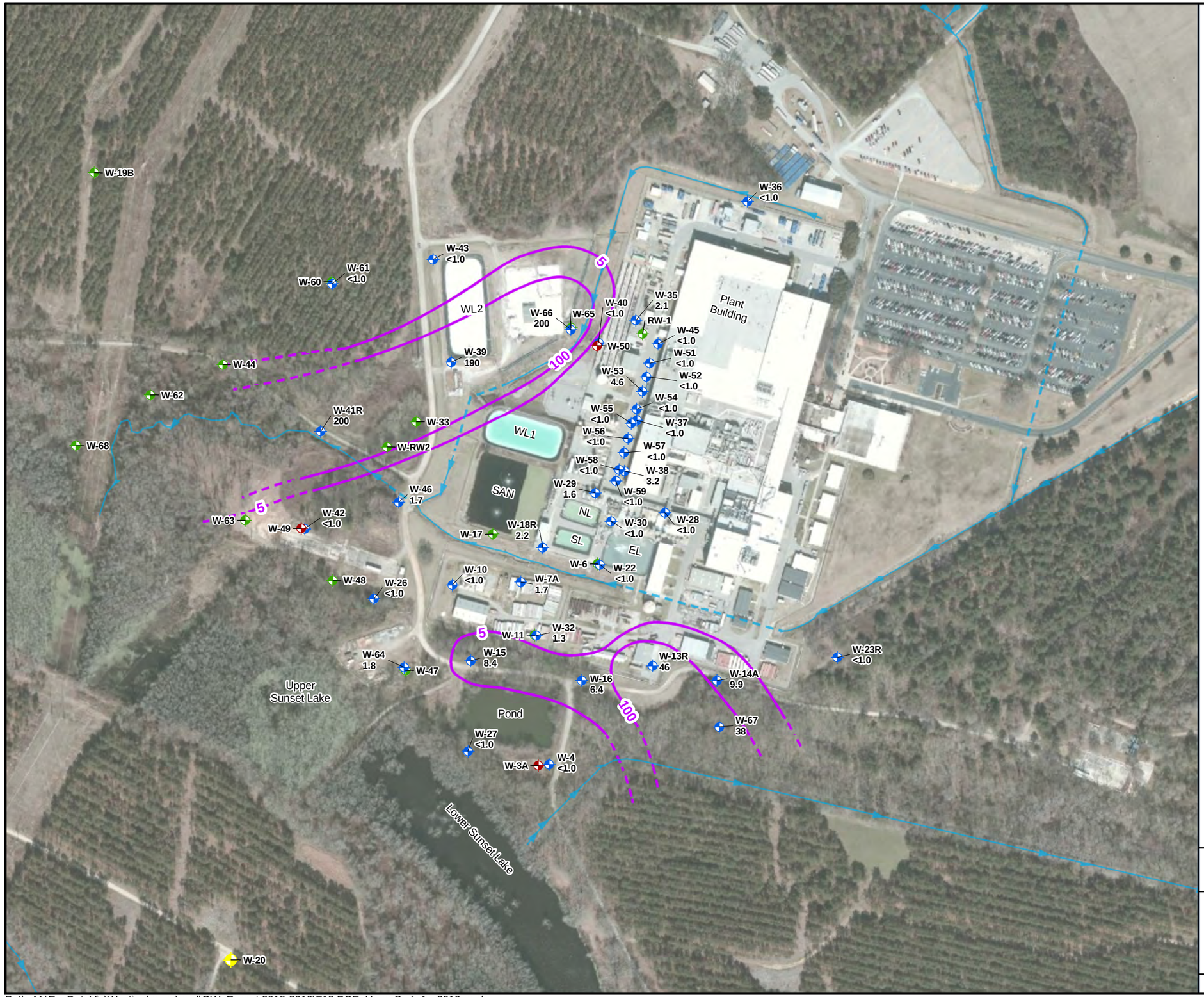
Extent of PCE in Upper Surficial Aquifer October - December 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 11**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F11 PCE_UpperSurf_Nov2018.mxd



Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- PCE Isoconcentration Contours (µg/L)
- Ditch
- Culvert
- 300 PCE Concentration in µg/L
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

Note:

Based upon data collected January 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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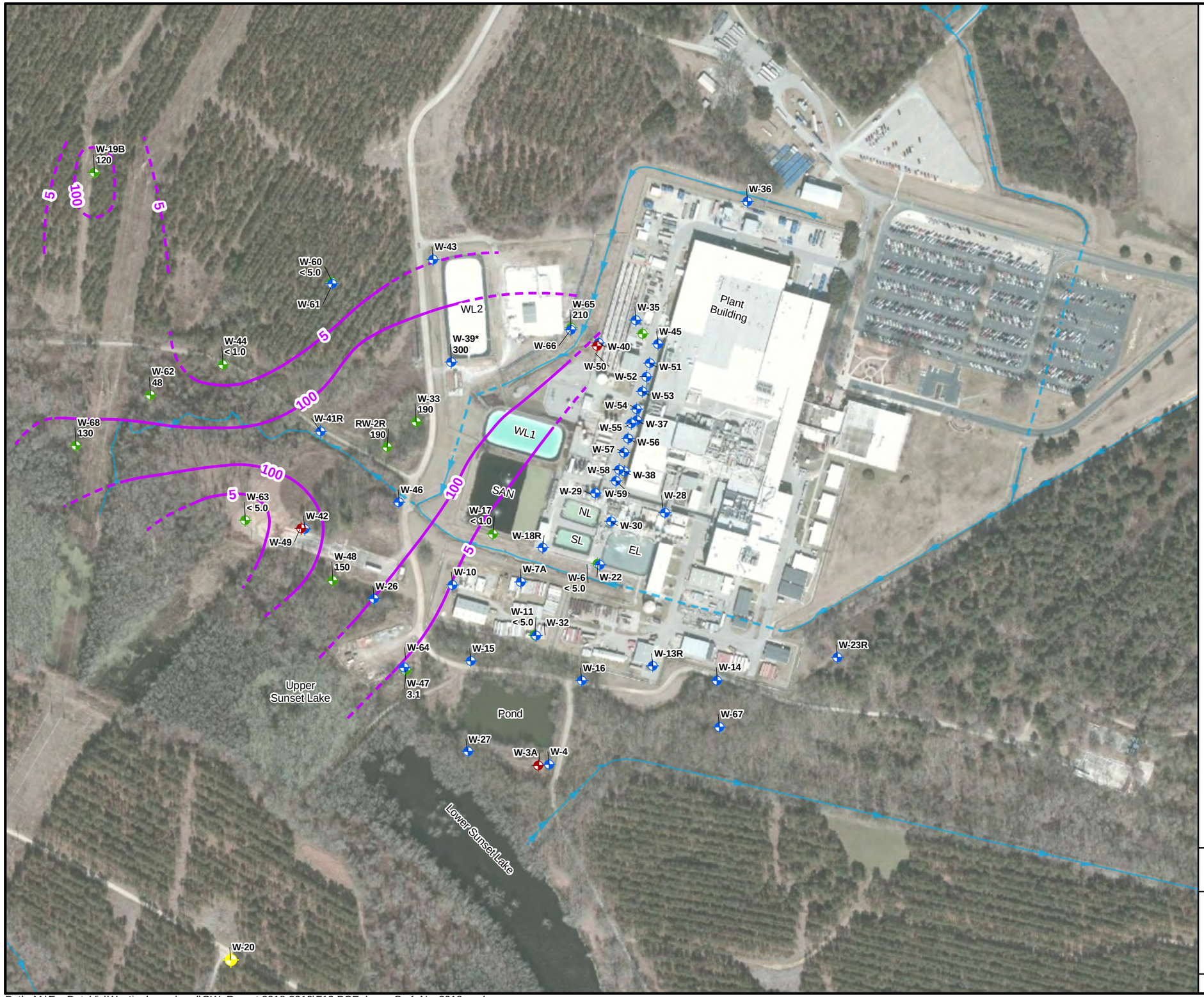
Extent of PCE in Upper Surficial Aquifer January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 12**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F12 PCE_UpperSurf_Jan2019.mxd



Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- PCE Isoconcentration Contours (µg/L)

210	PCE Concentration in µg/L
EL	East Lagoon
NL	North Lagoon
SL	South Lagoon
SAN	Sanitary Lagoon
WL1	West Lagoon 1
WL2	West Lagoon 2

Note:

Based upon data collected from October-December, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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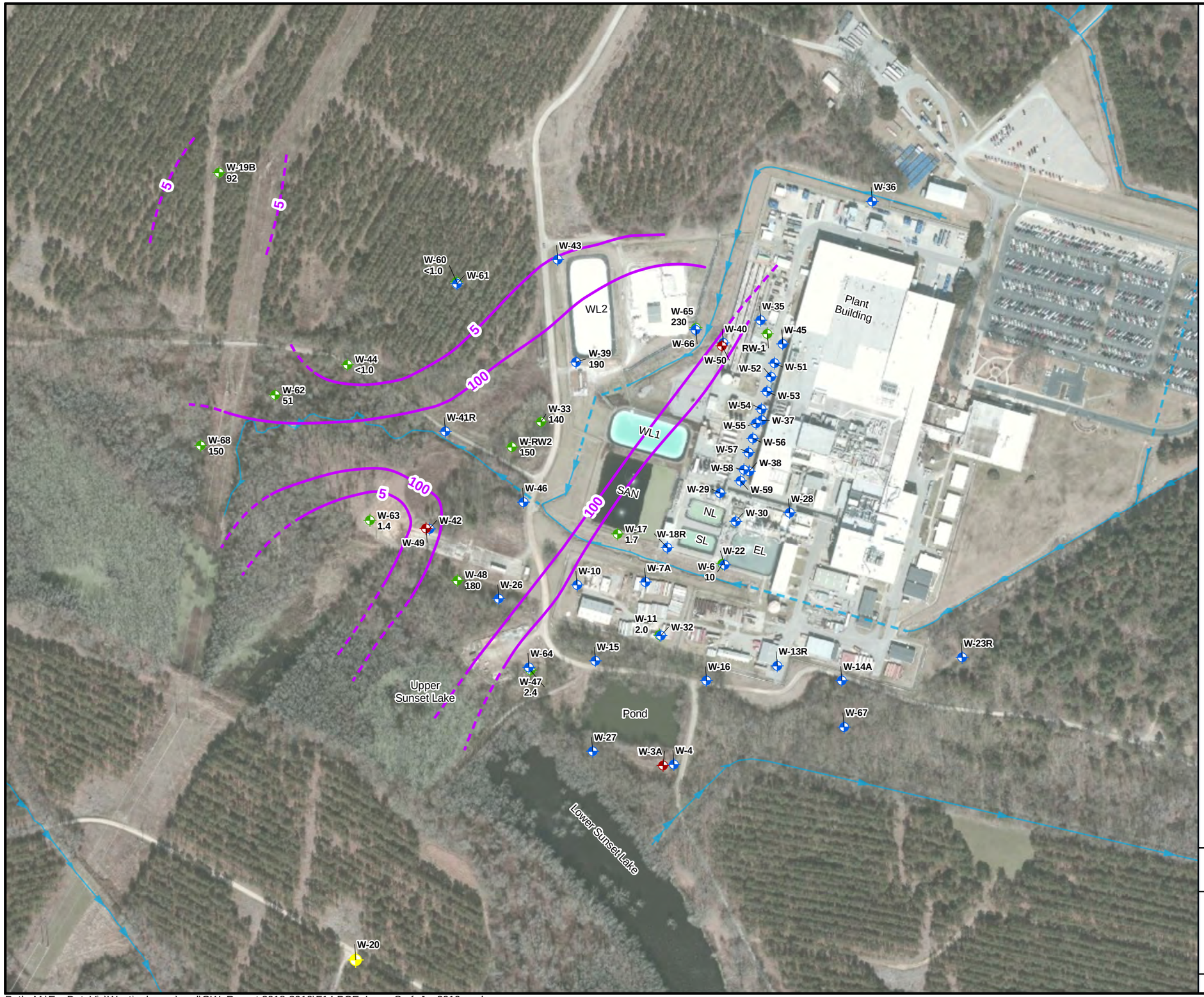
Extent of PCE in Lower Surficial Aquifer October - December 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60585917	CCS	August 2019	**FIGURE 13**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F13 PCE_LowerSurf_Nov2018.mxd



Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- PCE Isoconcentration Contours (µg/L)

230	PCE Concentration in µg/L
EL	East Lagoon
NL	North Lagoon
SL	South Lagoon
SAN	Sanitary Lagoon
WL1	West Lagoon 1
WL2	West Lagoon 2

Note:

Based upon data collected from January 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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Extent of PCE in Lower Surficial Aquifer January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60585917	CCS	August 2019	**FIGURE 14**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F14 PCE_LowerSurf_Jan2019.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- TCE Isoconcentration Contours (µg/L)
- 5.3 TCE Concentration in µg/L
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

Note:

Based upon data collected from October-December, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Extent of TCE in Upper Surficial Aquifer October - December 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 15**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F15 TCE_UpperSurf_Nov2018.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- TCE Isoconcentration Contours (µg/L)
- 8.1 TCE Concentration in µg/L
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

Note:

Based upon data collected from January 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Extent of TCE in Upper Surficial Aquifer January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 16**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F16 TCE_UpperSurf_Jan2019.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- TCE Isoconcentration Contours (µg/L)

93	TCE Concentration in µg/L
EL	East Lagoon
NL	North Lagoon
SL	South Lagoon
SAN	Sanitary Lagoon
WL1	West Lagoon 1
WL2	West Lagoon 2
NS	Not Sampled

Note:

Based upon data collected from October-December, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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Extent of TCE in Lower Surficial Aquifer October - December 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 17**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F17 TCE_LowerSurf_Nov2018.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- TCE Isoconcentration Contours (µg/L)

94	TCE Concentration in µg/L
EL	East Lagoon
NL	North Lagoon
SL	South Lagoon
SAN	Sanitary Lagoon
WL1	West Lagoon 1
WL2	West Lagoon 2
NS	Not Sampled

Note:

Based upon data collected from January 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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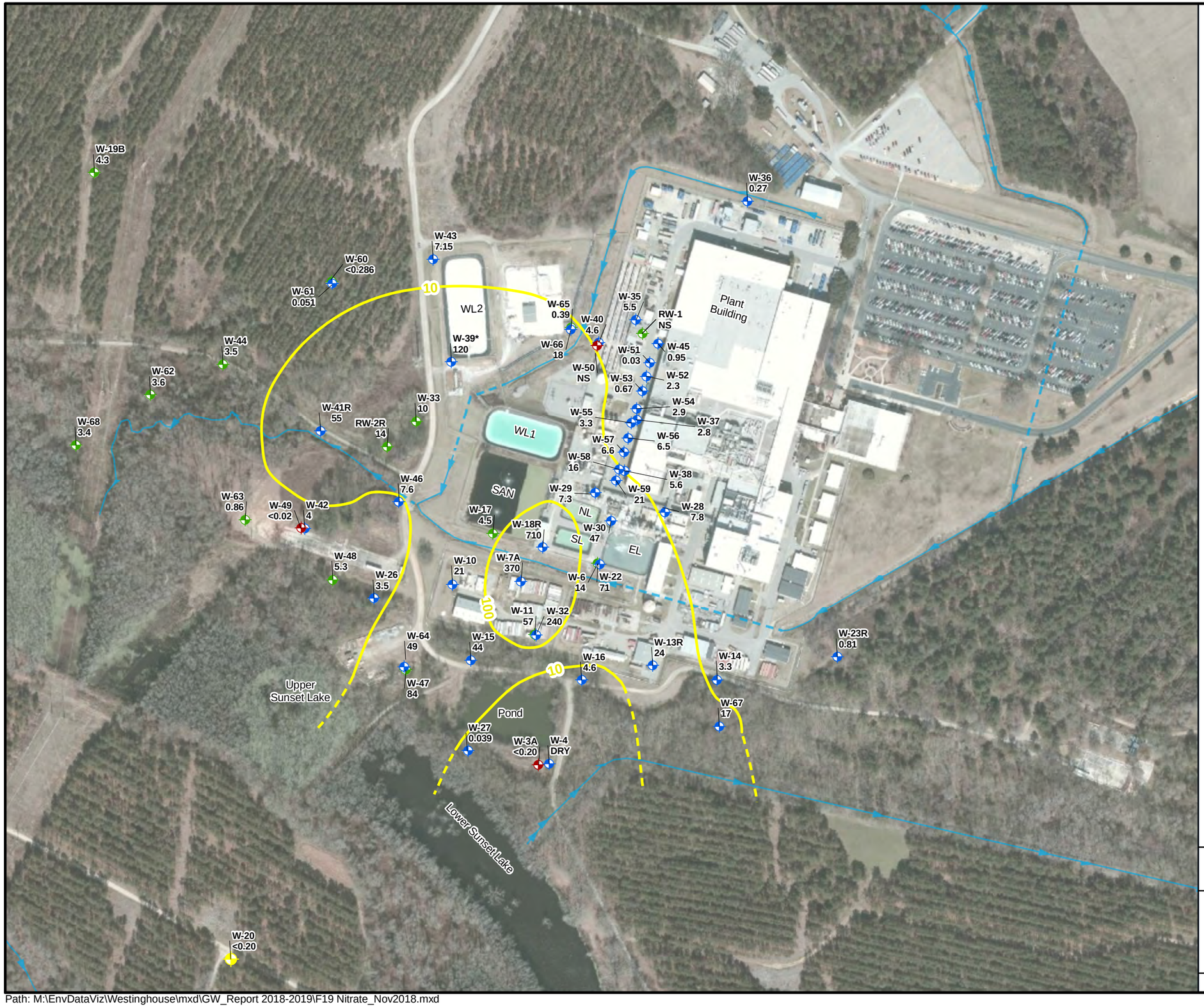
Extent of TCE in Lower Surficial Aquifer January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 18**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F18 TCE_LowerSurf_Jan2019.mxd



Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- Nitrate Isoconcentration Contours (mg/L)
- 7.8 Nitrate Concentration in µg/L
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2
- NS Not Sampled

Note:

Based upon data collected from October-December, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Extent of Nitrate in Groundwater October - December 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 19**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F19 Nitrate_Nov2018.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well
- Ditch
- Culvert
- Nitrate Isoconcentration Contours (mg/L)

7.2	Nitrate Concentration in µg/L
EL	East Lagoon
NL	North Lagoon
SL	South Lagoon
SAN	Sanitary Lagoon
WL1	West Lagoon 1
WL2	West Lagoon 2
NS	Not Sampled

Note:

Based upon data collected from January 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300

Feet

1:3,600

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

Datum: North American 1983

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Extent of Nitrate in Groundwater January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 20**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F20 Nitrate_Jan2019.mxd

W-19B 0.016
W-60 0.11
W-61 0.086
W-43 0.02
W-44 0.019
W-62 0.02
W-68 0.047
W-41R 0.041
RW-2R 0.098
W-33 0.187
W-46 0.033
W-63 0.474
W-49 0.011
W-42 1.49
W-48 0.529
W-26 1.63
W-20 0.048
WL2
WL1
SAN
NL
SL
EL
Plant Building
Upper Sunset Lake
Pond
Lower Sunset Lake
W-65 3.08
W-66 1.19
W-39 0.099
W-50 NS
W-40 0.124
W-35 0.026
RW-1 NS
W-45 0.861
W-51 0.304
W-53 0.262
W-52 0.957
W-54 0.264
W-55 0.06
W-37 0.03
W-57 0.068
W-56 0.135
W-58 0.117
W-38 0.127
W-29 9.69
W-59 1.08
W-17 4.02
W-18R 4.8
W-28 4.63
W-30 8.94
W-10 3.46
W-7A 6.86
W-6 0.058
W-22 4.59
W-11 0.01
W-32 3.61
W-64 3.26
W-15 1.86
W-16 8.62
W-13R 8.79
W-47 4
W-27 4.65
W-3A 0.067
W-4 DRY
W-36 0.005
W-14 0.025
W-23R 0.139
W-67 0.063
A
4

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- Fluoride Isoconcentration Contours (mg/L)

1.19	Fluoride Concentration in µg/L
EL	East Lagoon
NL	North Lagoon
SL	South Lagoon
SAN	Sanitary Lagoon
WL1	West Lagoon 1
WL2	West Lagoon 2
NS	Not Sampled

Note:

Based upon data collected from October-December, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Extent of Fluoride in Groundwater October - December 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 21**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F21 Flouride_Nov2018.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- Fluoride Isoconcentration Contours (mg/L)
- 1.19 Fluoride Concentration in µg/L
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2
- NS Not Sampled

Note:

Based upon data collected from January 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Extent of Fluoride in Groundwater January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 22**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F22 Flouride_Jan2019.mxd

W-19B <0.067
W-60 <0.067
W-61 <0.067
W-43 <0.067
W-44 <0.067
W-62 0.0843
W-68 0.0802
W-41R <0.067
W-RW2 <0.067
W-33 <0.067
W-46 <0.067
W-63 1.02
W-42 <0.067
W-49 Not Sampled
W-48 0.0922
W-26 0.0947
W-39 <0.067
W-65 <0.067
W-66 <0.067
W-40 <0.067
W-50 Not Sampled
W-35 <0.067
RW-1
W-45 2.58
W-51 <0.067
W-52 <0.067
W-53 0.0784
W-54 <0.067
W-55 187
W-37 <0.067
W-56 158
W-57 0.610
W-58 0.798
W-38 0.196
W-29 2.28
W-59 31.1
W-28 0.541
W-30 12.7
W-17 0.157
W-18R 4.47
W-6 0.420
W-22 0.711
W-10 0.0841
W-7A 0.691
W-32 0.223
W-11 <0.067
W-64 0.140
W-47 0.0797
W-15 <0.067
W-16 <0.067
W-13R 0.131
W-14A <0.067
W-23R <0.067
W-36 <0.067
W-67 <0.067
W-27 <0.067
W-3A <0.067
W-4 Dry - Not Sampled
W-20 <0.067
WL1
WL2
SAN
NL
SL
EL
Plant Building
Upper Sunset Lake
Pond
Lower Sunset Lake
30
30

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- Shoreline
- Uranium - ≥ to MCL of 30 pCi/L (October - November 2018)
- 30 Uranium Concentration in pCi/L
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2

Note:

Based upon data collected from October-December, 2018

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Extent of Uranium in Groundwater November 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60585917	CCS	August 2019	**FIGURE 23**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F23 Uranium_Nov2018.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- Shoreline
- Uranium - ≥ to MCL of 30 pCi/L (January 2019)
- 30 — Uranium Concentration in pCi/L
- EL — East Lagoon
- NL — North Lagoon
- SL — South Lagoon
- SAN — Sanitary Lagoon
- WL1 — West Lagoon 1
- WL2 — West Lagoon 2

Note:

Based upon data collected from January 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Extent of Uranium in Groundwater January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60585917	CCS	August 2019	**FIGURE 24**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F24 Uranium_Jan2019.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- Technetium-99 Isoconcentration Contours (pCi/L)
- 861 Technetium-99 Concentration in pCi/L
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2
- NA Not Analyzed

Note:

Based upon data collected from October-December, 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Extent of Technetium 99 in Groundwater October - December 2018

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 25**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F25 Tech99_Nov2019.mxd

Legend

- Black Mingo Monitoring Well Location
- Lower Surficial Monitoring Well Location
- Upper Surficial Monitoring Well Location
- Floodplain Aquifer Monitoring Well Location
- Ditch
- Culvert
- Technetium-99 Isoconcentration Contours (pCi/L)

2370	Technetium-99 Concentration in pCi/L
EL	East Lagoon
NL	North Lagoon
SL	South Lagoon
SAN	Sanitary Lagoon
WL1	West Lagoon 1
WL2	West Lagoon 2
NA	Not Analyzed

Note:

Based upon data collected from January 2019

* : Monitoring well W-39 is screened within the upper and lower surficial aquifer

N

0 150 300 Feet

1:3,600

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

Datum: North American 1983

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Extent of Technetium 99 in Groundwater January 2019

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	August 2019	**FIGURE 26**

Path: M:\EnvDataViz\Westinghouse\mxd\GW_Report 2018-2019\F26 Tech99_Jan2019.mxd