H.F. Lee Energy Complex Ash Basins

Topographic Map and Discharge Assessment Plan

NPDES Permit NC0003417

December 30, 2014

DUKE ENERGY®

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List of Figures and Tables

Section 1 - Introduction

The purpose of this document is to address the requirements of North Carolina General Statute (GS)130A-309.210(a) *topographic map* and (b) *Assessment of Discharges from Coal Combustion Residuals Surface Impoundments to the Surface Waters of the State*, as modified by North Carolina Senate Bill 729, for the H.F. Lee Energy Complex (Lee Plant) ash basins operated under National Pollutant Discharge Elimination System (NPDES) Permit NC0003417.

The following requirements are contained in General Statute (GS) 130A-309.210(a):

(1) The owner of a coal combustion residuals surface impoundment shall identify all discharges from the impoundment as provided in this subsection. The requirements for identifying all discharges from an impoundment set out in this subsection are in addition to any other requirements for identifying discharges applicable to the owners of coal combustion residuals surface impoundments.

(2) No later than December 31, 2014, the owner of a coal combustion residuals surface impoundment shall submit a topographic map that identifies the location of all (i) outfalls from engineered channels designed or improved for the purpose of collecting water from the toe of the impoundment and (ii) seeps and weeps discharging from the impoundment that are not captured by engineered channels designed or improved for the purpose of collecting water from the toe of the impoundment to the Department. The topographic map shall comply with all of the following:

a. Be at a scale as required by the Department.

b. Specify the latitude and longitude of each toe drain outfall, seep, and weep.

c. Specify whether the discharge from each toe drain outfall, seep, and weep is continuous or intermittent.

d. Provide an average flow measurement of the discharge from each toe drain outfall, seep, and weep including a description of the method used to measure average flow.

e. Specify whether the discharge from each toe drain outfall, seep, and weep identified reaches the surface waters of the State. If the discharge from a toe drain outfall, seep, or weep reaches the surface waters of the State, the map shall specify the latitude and longitude of where the discharge reaches the surface waters of the State.

f. Include any other information related to the topographic map required by the Department.

The following requirements are contained in General Statute (GS) 130A-309.210(b):

b) Assessment of Discharges from Coal Combustion Residuals Surface Impoundments to the Surface Waters of the State. The owner of a coal combustion residuals surface impoundment shall conduct an assessment of discharges from the coal combustion *residuals surface impoundment to the surface waters of the State as provided in this subsection. The requirements for assessment of discharges from the coal combustion residuals surface impoundment to the surface waters of the State set out in this subsection are in addition to any other requirements for the assessment of discharges from coal combustion residuals surface impoundments to surface waters of the State applicable to the owners of coal combustion residuals surface impoundments.*

(1) No later than December 31, 2014, the owner of a coal combustion residuals surface impoundment shall submit a proposed Discharge Assessment Plan to the Department. The Discharge Assessment Plan shall include information sufficient to allow the Department to determine whether any discharge, including a discharge from a toe drain outfall, seep, or weep, has reached the surface waters of the State and has caused a violation of surface water quality standards. The Discharge Assessment Plan shall include, at a minimum, all of the following:

a. Upstream and downstream sampling locations within all channels that could potentially carry a discharge.

b. A description of the surface water quality analyses that will be performed.

c. A sampling schedule, including frequency and duration of sampling activities.

d. Reporting requirements.

e. Any other information related to the identification of new discharges required by the Department.

(2) The Department shall approve the Discharge Assessment Plan if it determines that the Plan complies with the requirements of this subsection and will be sufficient to protect public health, safety, and welfare; the environment; and natural resources.

(3) No later than 30 days from the approval of the Discharge Assessment Plan, the owner shall begin implementation of the Plan in accordance with the Plan's schedule.

The North Carolina Senate Bill 729 establishes the submittal date of this topographic map and Discharge Assessment Plan no later than December 31, 2014.

The topographic map, developed to satisfy the requirements of GS130A-309.210(a), was utilized as the basis for developing the assessment procedures presented in this plan, required by GS130A-309.210(b).

Section 2 - Site Background

2.1 Plant Description

The Lee Plant was a coal-fired electricity-generating facility located west of Goldsboro in Wayne County, North Carolina (Figure 1). The project began commercial operation in 1951. Additional coal units were added in the late 1950s and early 1960s, and four oil-fueled combustion turbine units in the late 1960s and early 1970s. The three coal-fired units were retired in September 2012 followed by four oil-fueled combustion turbine units in October 2012. In December 2012, the H.F. Lee Combined Cycle Plant was brought on-line. The combined cycle plant applies two sources of energy, combustion and steam turbines, to convert natural gas to electricity.

The property encompasses approximately 2,100 acres, including the ash basins, a cooling pond (located to the east of the plant operations area), and the Neuse River.

2.2 Ash Basin Description

Ash generated from coal combustion was conveyed to the ash basins, which include the inactive and active basins. Combined, the active and inactive ash basins encompass approximately 314 acres (171 acres for the inactive ash basins and 143 acres for the active ash basin). The inactive ash basins were built as three cells in approximately the late 1950s and early 1960s. The active ash basin was constructed in the late 1970s. Sluicing fly ash and bottom ash at the active basin was discontinued in late 2012 to early 2013 as the Lee Plant ended production of coal combustion residuals. The active basin discharges treated wastewater to the Neuse River through an NPDES permitted outfall.

2.3 Site Geologic/Soil Framework

The Lee Plant lies within the Coastal Plain Physiographic Province which is approximately 90 to 150 miles wide, extending from the Atlantic Ocean westward to its boundary with the Piedmont province. Of the two natural subdivisions of the Coastal Plain, the Lee Plant is located on the Inner Coastal Plain consisting of gently rolling land between the Tidewater region and the Fall Line.

The site consists of surficial sand of post Miocene age, which is typically less than 40 feet thick. Underlying the surficial sand is the Yorktown and Duplin Formation (undifferentiated) of late Miocene age. The Yorktown Formation is a fossiliferrous clay with varying amounts of fine-grained sand, bluish gray, and shell material commonly concentrated in lenses; mainly in areas north of Neuse River. The Duplin Formation consists of shelly, medium- to coarse-grained sand, sandy marl, and limestone, bluish gray; mainly in areas south of Neuse River. The thickness of this unit varies, but, based on previous site work, is typically less than 60 feet thick in the vicinity of the Lee Plant. Below the Yorktown/Duplin Formations is the Cape Fear Formation. The lithology and the thickness of this unit varies regionally but has been described as a yellow conglomeritic marl containing abundant phosphate and quartz pebbles, sharks teeth, and fish vertebrae (North Carolina Geological Survey, 1985).

Surface topography at the Lee Plant slopes downward toward the Neuse River and groundwater flows the same direction. Vertical groundwater flow is anticipated to be limited by a local clay confining layer within the Yorktown Formation at an elevation of approximately 30 feet mean sea level.

2.4 Topographic Map and Identification of Discharges

A topographic map is presented in Figure 2 to meet the requirements of GS 130A-309.210(a) in the identification of outfalls from engineered channels, as well as seeps and weeps.

Seepage is the movement of wastewater from the ash basin through the ash basin embankment, the embankment foundation, the embankment abutments, basin rim, through residual material in areas adjacent to the ash basin. A seep is defined in this document as an expression of seepage at the ground surface. A weep is understood to have the same meaning as a seep.

Indicators of seepage include areas where water is observed on the ground surface and/or where vegetation suggests the presence of seepage. Seepage can emerge anywhere on the downstream face, beyond the toe, or on the downstream abutments at elevations below normal pool. Seepage may vary in appearance from a "soft," wet area to a flowing "spring." Seepage may show up first as only an area where the vegetation is lusher and darker green than surrounding vegetation. Cattails, reeds, mosses, and other marsh vegetation often become established in a seepage area. (NCDENR, 2007) However, in many instances, indicators of seeps do not necessarily indicate the presence of seeps. Areas of apparent iron staining and/or excess iron bacteria may also indicate the presence of a seep.

Locations of seepage at the ground surface adjacent to the ash basin have been identified and are shown in Figure 2. These areas include the earthen embankments which impound the ash basin as well as adjacent areas where water from the ash basin may have infiltrated into the underlying residual materials and expressed as seepage.

2.4.1 Engineered Drainage System for Earthen Dam

Earth dams are subject to seepage through the embankment, foundation, and abutments. Seepage control is necessary to prevent excessive uplift pressures, instability of the downstream slope, piping through the embankment and/or foundation, and erosion of material by migration into open joints in the foundation and abutments. The control of seepage is performed by the use of engineered drains such as blanket drains, trench drains, and/or toe drains. In certain cases horizontal pipes may be installed into the embankment to collect and control seepage. It is standard engineering practice to collect the seepage and convey seepage away from the dam.

The active ash basin dam includes an NPDES permitted outfall. The engineered drainage system features, or outfalls, associated with the ash basin dam are shown as required by GS 130A-309.210(a)(2)(i) on Figure 2.

2.4.2 Non-Engineered Seep Identification

Topographic maps of the site were reviewed to identify regions of the site where there was a potential for ash basin related seepage to be present. These regions were determined by comparing ash basin full pond elevations to adjacent topography with ground surface elevations lower than the ash basin full pond elevation. Synterra staff performed site observations within these identified areas as part of NPDES inspections during the reapplication process during August and October 2014 and documented locations where seepage was apparent at the time of the site visit. These seeps are identified as required by GS 130A-309.210(a)(2)(ii) on Figure 2.

Section 3 - Discharge Assessment Plan

3.1 Purpose of Assessment

The purpose of the assessment is to determine whether existing, known discharges from toe drain outfalls, seeps, and weeps associated with the coal combustion residuals surface impoundment (ash basin) have reached the surface waters of the State and have caused a violation of surface water quality standards as required by North Carolina General Statute 130A-309.210(b).

Figure 2 and Table 1 present the background and downstream sampling locations to be considered as part of this Discharge Assessment Plan (DAP). These locations may be assessed by comparing surface water sampling analytical results of the associated background location with the corresponding downstream location. For discharges located at the toe of a dam, an upstream location within the channel may not have been possible to isolate for comparison given the proximity to the ash basin, which would have the same chemical composition as the discharge itself. As such, the upstream location was established upstream of the ash basin and is considered "background." For discharges located a distance from the ash basin, an identified upstream, or "background" location for sampling may be compared to the downstream portion of the discharge channel. The background and downstream sampling locations are shown on Figure 2 with "B" and "D" identifiers, respectively, and the corresponding Seep locations associated with the sampling locations are indicated on Table 1.

3.2 Assessment Procedure

The assessment procedure associated with the Lee Plant ash basins is provided within this section. In addition to the specific requirements for the assessment, Section 3.2 also provides the general requirements, the frequency of assessment, documentation requirements, and a description of the surface water quality analyses that will be performed.

3.2.1 General Assessment Requirements

Assessments are to be performed in three phases as follows:

- Observation and sampling (assessment site visit),
- Evaluation, and
- Assessment reporting.

The assessment site visit shall be performed when the background and downstream locations are accessible and not influenced by weather events. Locations on or adjacent to the ash basin embankments should be performed within two months after mowing, if possible. In addition, the assessment site visit should not be performed if the following precipitation amounts have occurred in the respective time period preceding the planned assessment site visit:

- Precipitation of 0.1 inches or greater within 72 hours or
- Precipitation of 0.5 inches or greater within 96 hours

The assessments shall be performed under the direction of a qualified Professional Engineer or Professional Geologist on a semi-annual basis within two nonadjacent quarters. The date of the initial assessment site visit shall be selected no later than 30 days from the approval of the Discharge Assessment Plan and should fall within one of the semi-annual timeframes. Additional seep locations that may have been identified and documented in an Identification of New Discharge report(s) shall be reviewed prior to performing an assessment site visit, if available.

3.2.2 Observation and Sampling

The initial assessment site visit should be performed to document baseline conditions of the discharge channel, including location, extent (i.e., dimensions of affected area), and flow of each discharge. Discharge channel background and downstream locations should be verified using a Global Positioning System (GPS) device. Photographs should be taken from vantage points that can be replicated during subsequent semi-annual assessments.

Initial and subsequent assessment site visits shall document a minimum of the following to respond to the requirements in 130A-309.210.1(b):

- Record the most recent ash basin water surface elevation and compare to the seep and outfall and associated discharge location surface water elevations.
- For each discharge channel, the observer shall note the following as applicable on the day of the assessment site visit:
    - Is the discharge channel flowing at the time of the assessment site visit?
    - Does the discharge channel visibly flow into a Water of the U.S. at the time of the assessment site visit?
    - How far away is the nearest Water of the U.S.?
    - Document evidence that flow has or could reach a Water of the U.S. (e.g., description of flow, including extent and/or direction) and describe the observed condition. Evidence that flow could or has reached a Water of the U.S. may be indicated by an inspection of the adjacent and downstream topographic drainage features.
    - Observe and document the condition of the discharge channel and outfall of the engineered channel or seep location with photographs. Photographs are to be taken from similar direction and scale as photographs taken during the initial assessment site visit.
- Record flow rate within the discharge channel, if measureable, using the following methods:
    - Timed-volumetric method: Collect a volume of water from the discharge of the PVC pipe directly into an appropriately sized container. Measure volumes (in mL) in the field utilizing a graduated container. Record the amount of time (in seconds) needed to collect the volume of water and calculate the flows (in MGD) for the timed-volume.

  - A V-notch weir apparatus will be installed, if necessary, during the initial assessment site visit to impound seepage at locations with a defined channel. Once the impounded seep reaches equilibrium discharge, flows will be measured using the timed-volumetric method described above.

  - Area-velocity method: Measure point velocities and water depth at a minimum of 20 stations along a transect setup perpendicular to the direction of flow using a Swoffer® 3000 flow meter mounted to a standard United States Geologic Survey (USGS) top-set wading rod. Utilize the average velocity and cross-sectional area of the wetted channel to calculate flows in MGD.

- Collect water quality samples using the following methods:

  - Collect background and downstream samples during a period with minimal preceding rainfall to minimize potential effects of stormwater runoff. Collect samples from the discharge channel at the flow measurement devices or directly from the discharge into sample bottles while minimizing disturbance and entrainment of soil/sediment. After collection, samples will be preserved and stored according to parameter-specific methods and delivered to the laboratory under proper Chain-of-Custody (COC) procedures.

  - Analytical parameters for analysis include: Fluoride, Arsenic, Cadmium, Copper, Chromium, Nickel, Lead, Selenium, and Mercury. This list includes all parameters previously identified for seep sampling at Duke Energy power plants for which relevant stream water quality standards are in place. (This list is responsive to the statutory requirement for the discharge assessment to allow determination whether discharges from toe drain outfalls, seeps, or weeps have reached surface waters and caused a violation of surface water quality standards.) Analyses shall be conducted by Duke Energy's Huntersville Analytical Laboratory (NC Wastewater Certification #248) and Pace Analytical Laboratories (NC Wastewater Certification # 12). Laboratory analytical methods used for each constituent are provided in Table 2.

  - Seep in-situ measurements: In-situ field parameters (temperature and pH) shall be measured utilizing calibrated field meters either at the discharge of the seep directly, at the discharge of the flow measurement devices, or in the water pool created behind the device, if sufficient water depth did not exist at the device discharge.

  - Neuse River and Ash Basin Sample Collection Method: Water quality samples and in-situ measurements from the Neuse River shall be collected at a location upstream and downstream of the ash basins. Additionally, water samples and in-situ measurements shall be collected from an in-process ash basin location. The grab samples shall be collected from the river and basin's surface (0.3 m) directly into appropriate sample bottles.

3.2.3 Evaluation

Evaluation of the data from the initial assessment site visit will establish baseline conditions and will serve as the basis for comparison for subsequent assessment site visit results. Evaluation of observations and sampling results shall include location, extent (i.e., dimensions of affected area), and flow of each discharge. The analytical results of the upstream and downstream locations shall be compared to the 15A NCAC 2B standards for surface water quality upon receipt to identify potential exceedances.

3.2.4 Assessment Reporting

Each assessment site visit shall be documented by the individual performing the assessment, as described in Section 3.2.2 to meet the requirements in 130A-309.210.1(b). The report should contain site background, observation and sampling methodology, and a summary of the observations and descriptions of the discharge channels observed, changes in observations compared to previous assessment events, estimates of flows quantities, and photographs of discharges and outfalls of engineered channels designed or improved for collecting water from the impoundment. Photographs are to be numbered and captioned. The flow and analytical results shall be recorded and presented in tables similar to the examples provided as Tables 1 and 3. The analytical results shall be compared to the 15A NCAC 2B standards for surface water quality and exceedances highlighted. This information shall be compiled, reviewed, and submitted to NCDENR within 90 days from the Observation and Sampling event.

Section 4 - References

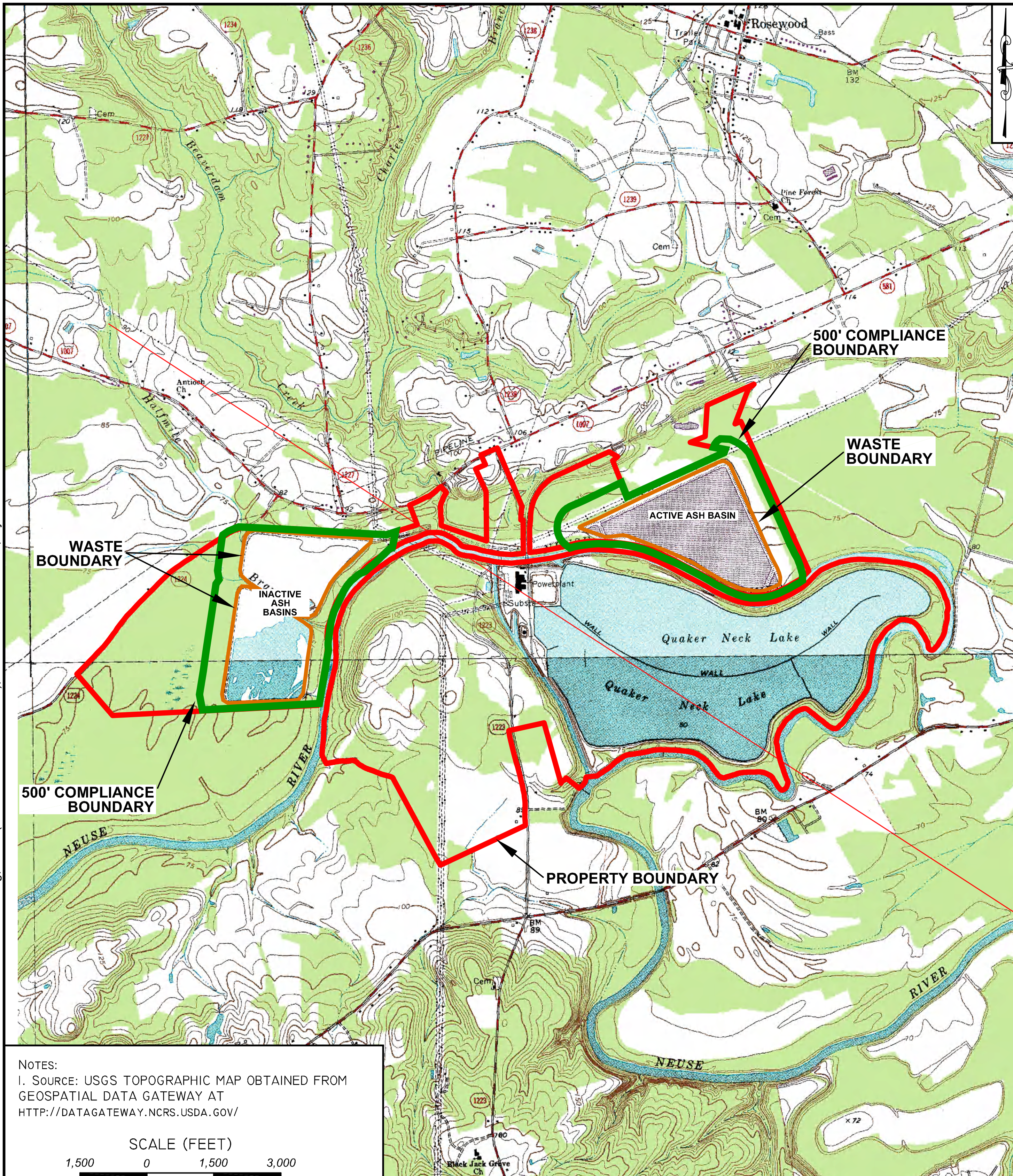
North Carolina Geological Survey, 1985, *Geologic map of North Carolina*: North Carolina Geological Survey, General Geologic Map, scale 1:500000.

North Carolina Department of Environment and Natural Resources, 2007. *Dam Operation, Maintenance, and Inspection Manual*, North Carolina Department of Environment and Natural Resources, Division of Land Resources, Land Quality Division, 1985 (Revised 2007).

FIGURES

AND

TABLES



NOTES:
1. SOURCE: USGS TOPOGRAPHIC MAP OBTAINED FROM GEOSPATIAL DATA GATEWAY AT HTTP://DATAGATEWAY.NCRS.USDA.GOV/

SCALE (FEET)
1,500 0 1,500 3,000

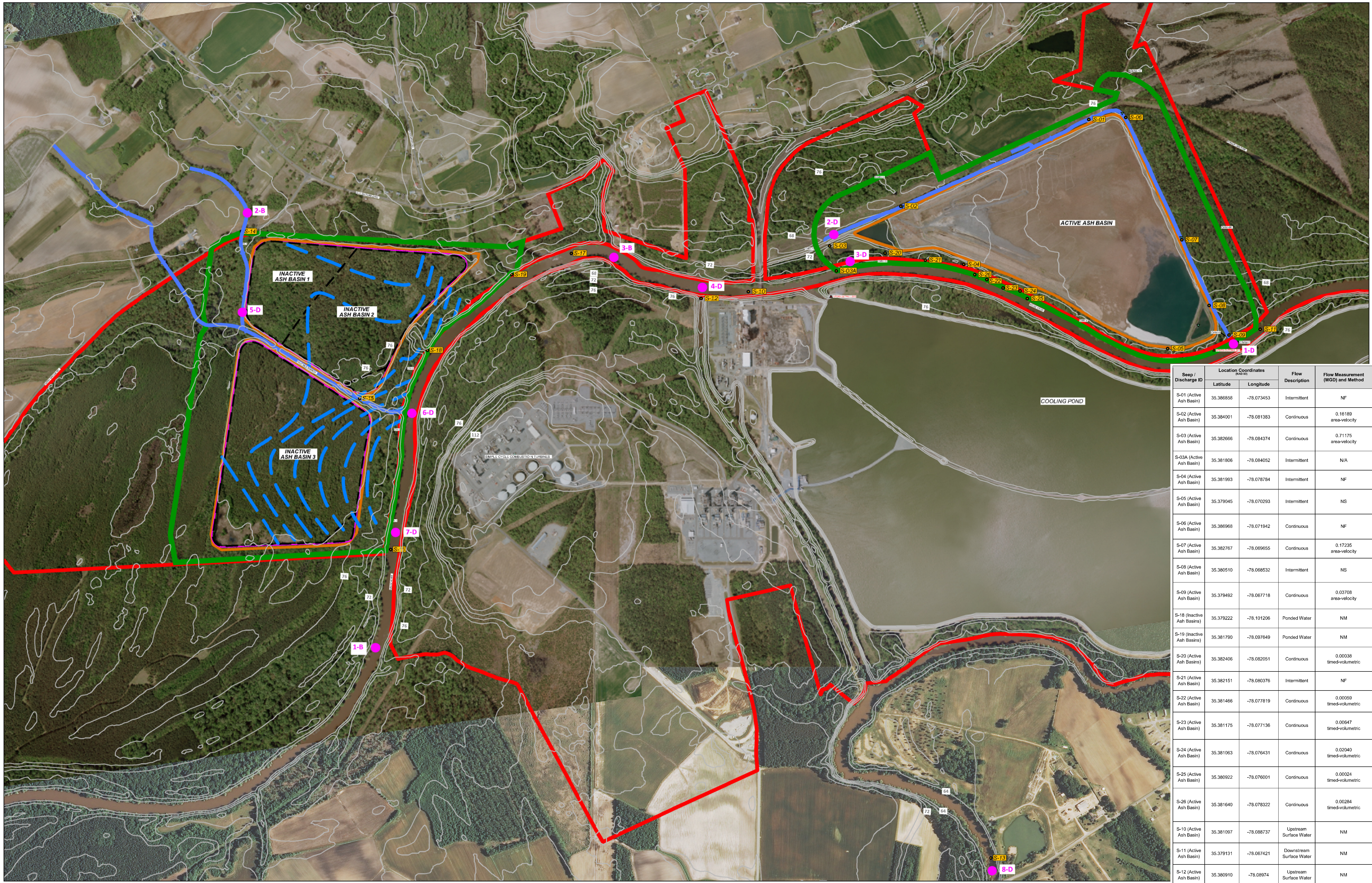
C:\pwworking\tpa\d0641001\DUKE LEE ACTIVE - INACTIVE-FIG 1 USGS.dwg, FIG 1 (USGS SITE LOCATION), 12/16/2014 5:08:33 PM, ctynes

HDR
License Number: F-0116
440 South Church Street Charlotte, NC 28202

SITE LOCATION MAP
DUKE ENERGY PROGRESS
H.F. LEE ENERGY COMPLEX
NPDES PERMIT #NC0003417
GOLDSBORO, NORTH CAROLINA

DATE
DEC. 16, 2014

FIGURE
1



LEGEND

- S-01 SEEP SAMPLE LOCATION
- NPDES OUTFALL 001 NPDES OUTFALL LOCATION
- CW-3 COMPLIANCE GROUNDWATER MONITORING WELL
- DUKE ENERGY PROGRESS LEE PLANT
- 500 ft COMPLIANCE BOUNDARY
- WASTE BOUNDARY
- ASH BASIN BOUNDARY (APPROXIMATE)
- FLOW DIRECTION (APPROXIMATE)
- 1-B BACKGROUND SAMPLING LOCATIONS
- 1-D DISCHARGE SAMPLING LOCATIONS
- TOPOGRAPHIC CONTOUR (4 FT INTERVAL)

GRAPHIC SCALE
600 0 300 600 1200
(IN FEET)

Seep / Discharge ID	Location Coordinates (NAD 83)		Flow Description	Flow Measurement (MGD) and Method	Background Location	Discharge Location and Discharge Sampling Location	Discharge Location Coordinates (NAD 83)	
	Latitude	Longitude					Latitude	Longitude
S-01 (Active Ash Basin)	35.386858	-78.073453	Intermittent	NF	2-B	North of active ash basin at toe of dike; flows west 2-D	35.383042	-78.084203
S-02 (Active Ash Basin)	35.384001	-78.081383	Continuous	0.16189 area-velocity		North of active ash basin at toe of dike; flows west 2-D		
S-03 (Active Ash Basin)	35.382666	-78.084374	Continuous	0.71175 area-velocity		West side of active ash basin; flows underneath road 3-D	35.381667	-78.084364
S-03A (Active Ash Basin)	35.381806	-78.084052	Intermittent	N/A		Downgradient of S-X at confluence of Neuse River 3-D		
S-04 (Active Ash Basin)	35.381993	-78.078784	Intermittent	NF		Stagnant pond inland from river terrace 3-D		
S-05 (Active Ash Basin)	35.379045	-78.070293	Intermittent	NS		Riprap area on southeast corner of active ash basin 3-D		
S-06 (Active Ash Basin)	35.386968	-78.071942	Continuous	NF		East of active ash basin at toe of dike; flows south 1-D	35.379183	-78.067533
S-07 (Active Ash Basin)	35.382767	-78.069655	Continuous	0.17235 area-velocity		East of active ash basin at toe of dike; flows south 1-D		
S-08 (Active Ash Basin)	35.380510	-78.068532	Intermittent	NS		Riprap area east side of southeast corner of active ash basin 1-D		
S-09 (Active Ash Basin)	35.379492	-78.067718	Continuous	0.03708 area-velocity		East side of ash basin at toe of dike; flows from S-06, -07 1-D		
S-18 (Inactive Ash Basins)	35.379222	-78.101206	Ponded Water	NM	3-B	Pond inland from river terrace 6-D	35.377061	-78.101858
S-19 (Inactive Ash Basins)	35.381790	-78.097649	Ponded Water	NM		Pond inland from river terrace 6-D		
S-20 (Active Ash Basins)	35.382406	-78.082051	Continuous	0.00038 timed-volumetric	2-B	Near well CMW-10 along south side of active ash basin 3-D	35.382117	-78.083525
S-21 (Active Ash Basin)	35.382151	-78.080376	Intermittent	NF		Along south side of active ash basin 3-D		
S-22 (Active Ash Basin)	35.381466	-78.077819	Continuous	0.00059 timed-volumetric		Along south side of active ash basin 3-D		
S-23 (Active Ash Basin)	35.381175	-78.077136	Continuous	0.00647 timed-volumetric		Along south side of active ash basin in Neuse floodplain 3-D		
S-24 (Active Ash Basin)	35.381063	-78.076431	Continuous	0.02040 timed-volumetric		Along south side of active ash basin in Neuse floodplain 3-D		
S-25 (Active Ash Basin)	35.380922	-78.076001	Continuous	0.00024 timed-volumetric		Along south side of active ash basin 3-D		
S-26 (Active Ash Basin)	35.381640	-78.078322	Continuous	0.00284 timed-volumetric		Within the Neuse River bank downgradient of the south side of the active ash basin 3-D		
S-10 (Active Ash Basin)	35.381097	-78.088737	Upstream Surface Water	NM		Neuse River upstream from active ash basin 4-D	35.381281	-78.089667
S-11 (Active Ash Basin)	35.379131	-78.067421	Downstream Surface Water	NM		Neuse River downstream from active ash basin 1-D	35.379183	-78.067533
S-12 (Active Ash Basin)	35.380910	-78.08974	Upstream Surface Water	NM		Bypass canal upstream of plant 4-D	35.381281	-78.089667
S-13 (Active Ash Basin)	35.360761	-78.077689	Downstream Surface Water	NM	1-B	Neuse River downstream of bypass 8-D	35.361225	-78.077814
S-14 (Inactive Ash Basins)	35.383346	-78.108965	Upstream Surface Water	0.22587 area-velocity	2-B	Halfmile Branch upstream of inactive ash basin 5-D	35.380567	78.108944
S-15 (Inactive Ash Basins)	35.377430	-78.104218	Downstream Surface Water	1.10706 area-velocity		Halfmile Branch downstream of inactive ash basin 6-D	35.377061	-78.101858
S-16 (Inactive Ash Basins)	35.372416	-78.102819	Upstream Surface Water	NM	3-B	Neuse River upstream of inactive ash basin 7-D	35.372947	-78.102575
S-17 (Inactive Ash Basins)	35.382494	-78.09514	Downstream Surface Water	NM		Neuse River downstream of inactive ash basin 6-D	35.377061	-78.101858

SOURCES:

1. 2012 AERIAL PHOTOGRAPH OBTAINED FROM THE NRCS GEOSPATIAL DATA GATEWAY AT *http://datagateway.nrcs.usda.gov/*
2. 2014 AERIAL PHOTOGRAPH WAS OBTAINED FROM WSP FLOWN ON APRIL 17, 2014.
3. PARCEL BOUNDARY WAS OBTAINED FROM WAYNE COUNTY GIS DATA AT *http://www.waynegov.com/page/214*
4. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE COORDINATE SYSTEM FIPS 3200 (NAD 83).

HDR

TOPOGRAPHIC MAP WITH IDENTIFIED SEEPS AND OUTFALLS
DUKE ENERGY CAROLINAS, LLC
H.F. LEE ENERGY COMPLEX
NPDES PERMIT #NC0003417
GOLDSBORO, NORTH CAROLINA

DATE
DECEMBER, 2014

FIGURE
2

Table 1 – HF Lee Energy Complex Ash Basin –Seep and Associated Discharge Locations and Descriptions

Seep / Discharge ID	Location Coordinates (NAD 83)		Flow Description	Flow Measurement (MGD) and Method	Background Location	Discharge Location and Discharge Sampling Location	Discharge Location Coordinates (NAD 83)	
	Latitude	Longitude					Latitude	Longitude
S-01 (Active Ash Basin)	35.386858	-78.073453	Intermittent	NF	2-B	North of active ash basin at toe of dike; flows west 2-D	35.383042	-78.084203
S-02 (Active Ash Basin)	35.384001	-78.081383	Continuous	0.16189 area-velocity		North of active ash basin at toe of dike; flows west 2-D		
S-03 (Active Ash Basin)	35.382666	-78.084374	Continuous	0.71175 area-velocity		West side of active ash basin; flows underneath road 3-D	35.381667	-78.084364
S-03A (Active Ash Basin)	35.381806	-78.084052	Intermittent	N/A		Downgradient of S-X at confluence of Neuse River 3-D		
S-04 (Active Ash Basin)	35.381993	-78.078784	Intermittent	NF		Stagnant pond inland from river terrace 3-D		
S-05 (Active Ash Basin)	35.379045	-78.070293	Intermittent	NS		Riprap area on southeast corner of active ash basin 3-D		
S-06 (Active Ash Basin)	35.386968	-78.071942	Continuous	NF		East of active ash basin at toe of dike; flows south 1-D	35.379183	-78.067533
S-07 (Active Ash Basin)	35.382767	-78.069655	Continuous	0.17235 area-velocity		East of active ash basin at toe of dike; flows south 1-D		
S-08 (Active Ash Basin)	35.380510	-78.068532	Intermittent	NS		Riprap area east side of southeast corner of active ash basin 1-D		
S-09 (Active Ash Basin)	35.379492	-78.067718	Continuous	0.03708 area-velocity		East side of ash basin at toe of dike; flows from S-06, -07 1-D		
S-18 (Inactive Ash Basins)	35.379222	-78.101206	Ponded Water	NM	4-B	Pond inland from river terrace 6-D	35.377061	-78.101858
S-19 (Inactive Ash	35.381790	-78.097649	Ponded Water	NM		Pond inland from river terrace 6-D		

Seep / Discharge ID	Location Coordinates (NAD 83)		Flow Description	Flow Measurement (MGD) and Method	Background Location	Discharge Location and Discharge Sampling Location	Discharge Location Coordinates (NAD 83)	
	Latitude	Longitude					Latitude	Longitude
Basins)								
S-20 (Active Ash Basins)	35.382406	-78.082051	Continuous	0.00038 timed-volumetric	2-B	Near well CMW-10 along south side of active ash basin 3-D	35.382117	-78.083525
S-21 (Active Ash Basin)	35.382151	-78.080376	Intermittent	NF		Along south side of active ash basin 3-D		
S-22 (Active Ash Basin)	35.381466	-78.077819	Continuous	0.00059 timed-volumetric		Along south side of active ash basin 3-D		
S-23 (Active Ash Basin)	35.381175	-78.077136	Continuous	0.00647 timed-volumetric		Along south side of active ash basin in Neuse floodplain 3-D		
S-24 (Active Ash Basin)	35.381063	-78.076431	Continuous	0.02040 timed-volumetric		Along south side of active ash basin in Neuse floodplain 3-D		
S-25 (Active Ash Basin)	35.380922	-78.076001	Continuous	0.00024 timed-volumetric		Along south side of active ash basin 3-D		
S-26 (Active Ash Basin)	35.381640	-78.078322	Continuous	0.00284 timed-volumetric		Within the Neuse River bank downgradient of the south side of the active ash basin 3-D		
S-10 (Active Ash Basin)	35.381097	-78.088737	Upstream Surface Water	NM		Neuse River upstream from active ash basin 4-D	35.381281	-78.089667
S-11 (Active Ash Basin)	35.379131	-78.067421	Downstream Surface Water	NM		Neuse River downstream from active ash basin 1-D	35.379183	-78.067533
S-12 (Active Ash Basin)	35.380910	-78.08974	Upstream Surface Water	NM		Bypass canal upstream of plant 4-D	35.381281	-78.089667
S-13 (Active Ash Basin)	35.360761	-78.077689	Downstream Surface Water	NM	1-B	Neuse River downstream of bypass 8-D	35.361225	-78.077814
S-14 (Inactive Ash Basins)	35.383346	-78.108965	Upstream Surface Water	0.22587 area-velocity	3-B	Halfmile Branch upstream of inactive ash basin 5-D	35.380567	78.108944
S-15 (Inactive Ash Basins)	35.377430	-78.104218	Downstream Surface Water	1.10706 area-velocity		Halfmile Branch downstream of inactive ash basin	35.377061	-78.101858

Seep / Discharge ID	Location Coordinates (NAD 83)		Flow Description	Flow Measurement (MGD) and Method	Background Location	Discharge Location and Discharge Sampling Location	Discharge Location Coordinates (NAD 83)	
	Latitude	Longitude					Latitude	Longitude
						6-D		
S-16 (Inactive Ash Basins)	35.372416	-78.102819	Upstream Surface Water	NM	4-B	Neuse River upstream of inactive ash basin 7-D	35.372947	-78.102575
S-17 (Inactive Ash Basins)	35.382494	-78.09514	Downstream Surface Water	NM		Neuse River downstream of inactive ash basin 6-D	35.377061	-78.101858

Notes:

Flow description for each seep sample location is based on observation during site visits performed by Synterra August 2014

Table 2 – Laboratory Analytical Methods

Parameter	Method	Reporting Limit	Units	Laboratory
Fluoride (F)	EPA 300.0	1	mg/l	Duke Energy
Mercury (Hg)	EPA 245.1	0.05	µg/l	Duke Energy
Arsenic (As)	EPA 200.8	1	µg/l	Duke Energy
Cadmium (Cd)	EPA 200.8	1	µg/l	Duke Energy
Chromium (Cr)	EPA 200.8	1	µg/l	Duke Energy
Copper (Cu)	EPA 200.8	1	µg/l	Duke Energy
Lead (Pb)	EPA 200.8	1	µg/l	Duke Energy
Nickel (Ni)	EPA 200.8	1	µg/l	Duke Energy
Selenium (Se)	EPA 200.8	1	µg/l	Duke Energy

Table 3 – HF Lee Energy Complex Ash Basin – Example of Surface Water/Seep Monitoring Flow and Analysis Results Table

Parameter	Units	S-01	S-02	S-03	S-04	S-06	S-07	S-09	S-10	S-11	S-2	S-13	S-14	S-15	S-16	S-17	S-20	S-21	S-22	S-23	S-24	S-25	S-26
Fluoride	mg/l	< 0.1	0.32	0.30	0.54	0.10	0.37	0.51	0.13	0.13	0.13	0.13	0.10	0.11	0.13	0.13	0.16	0.11	0.51	0.64	0.48	0.58	0.72
Hg - Mercury (71900)	µg/l	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
As - Arsenic (01002)	µg/l	2.56	126	89.6	1470	1.33	90.7	91.6	< 1	1.43	< 1	< 1	< 1	2.43	< 1	< 1	3.03	2.54	3.86	129	330	145	769
Cd - Cadmium (01027)	µg/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cr - Chromium (01034)	µg/l	1.21	< 1	< 1	< 1	1.36	< 1	< 1	1.97	1.89	1.85	2.02	< 1	1.55	2.27	2.24	1.32	1.19	< 1	< 1	< 1	1.41	2.82
Cu - Copper (01042)	µg/l	1.09	< 1	< 1	1.25	1.35	< 1	< 1	3.10	2.62	2.78	2.88	< 1	1.92	3.14	3.20	3.60	3.70	< 1	< 1	< 1	1.13	2.65
Pb - Lead (01051)	µg/l	1.31	< 1	< 1	< 1	1.8	< 1	< 1	2.32	2.00	2.22	2.04	< 1	1.27	2.45	2.36	1.98	1.17	< 1	< 1	< 1	1.75	4.68
Ni - Nickel (01067)	µg/l	< 1	< 1	< 1	< 1	1.57	1.26	1.27	1.52	1.59	1.46	1.47	< 1	1.47	1.86	1.57	3.92	3.37	< 1	< 1	< 1	1.03	1.91
Se - Selenium (01147)	µg/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
pH	s.u.	5.9	6.6	7.1	7.2	6.1	7.0	7.5	6.6	6.5	6.7	6.6	6.0	5.8	6.7	6.5	7.3	5.8	6.9	7.1	6.6	7.5	7.23
Temp.	°C	23	23	26	28	24	22	22	26	26	26	25	26	24	26	26	26	25	24	20	19	22	18.8
Flow	MGD	NF	0.0162	0.7118	NF	NF	0.1724	0.0371	NM	NM	NM	NM	0.2259	1.1071	NM	NM	0.0004	NF	0.0006	0.0065	0.0204	0.0002	0.0028

Notes:

1. Samples collected August 2014 by Synterra.