SEEP MONITORING REPORT - October 2014

For

W.H. Weatherspoon Power Plant
491 Power Plant Road
Lumberton, North Carolina 28358
Robeson County
NPDES Permit #NC0005363

Prepared for

Duke Energy Progress, Inc.
Raleigh, North Carolina

Submitted: October 2014

Howard Frank, NC PG 2409
Project Geologist

Kathy Webb, NC PG 1328
Project Manager

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EXECUTIVE SUMMARY

The following report summarizes an evaluation of the W.H. Weatherspoon Power Plant (Weatherspoon Plant) seepage flow surrounding the ash basin toward the cooling pond and the Lumber River. The evaluation included a detailed site reconnaissance to identify potential seeps followed by the collection of flow measurements and representative water quality samples at select locations. The site reconnaissance was conducted during the late winter (February) of 2014. Representative seep locations were evaluated for water quality and flow rates on August 18 and 19, 2014.

Wastewater discharges from the ash basin are permitted by the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Resources (DWR) under National Pollution Discharge Elimination System (NPDES) Permit NC0005363. The purpose of the evaluation was to determine additional potential outfalls for inclusion within the permit.

Eighteen seep locations were identified during wet weather conditions in late winter of 2014. However, only 11 locations contained sufficient water for sample collection in late August 2014. In addition to the 11 seep locations that were sampled, three surface water samples, two from the Lumber River, one from Jacob Swamp, and one wastewater sample from the ash basin, were also collected. Ten of the 18 seep locations flow toward the cooling pond, five locations appear to flow toward the Lumber River, and three locations appear to flow toward Jacob Swamp, which also flows toward the Lumber River.

The low volume of water characteristic of the seeps coupled with the relatively low constituent concentrations in the samples, suggest that there is little potential to influence water quality of the Lumber River. If reasonable potential analyses demonstrate that there is no potential to exceed water quality standards, then Duke Energy proposes to re-evaluate the seep locations listed in this document annually over the next 5-year permit cycle. These annual evaluations would be documented to verify the condition of the existing seeps and determine the presence of new seeps. DWR will be promptly notified if any new seeps are identified or any significant changes are observed for the existing seeps. If any existing or newly identified seeps are determined to reach the Lumber River and the seepage has reasonable potential to exceed a water quality standard, Duke Energy will take measures to either (1) stop the seepage, (2) capture and route the seep so that it is discharged through a NPDES permitted outfall, or (3) address the seep using Best Management Plans approved by DWR.

1.0 INTRODUCTION

Duke Energy Progress, Inc. (Duke Energy) owns and operates the W.H. Weatherspoon Power Plant (Weatherspoon Plant) site. The Weatherspoon Plant is located at 491 Power Plant Road, Lumberton, North Carolina. The property encompasses approximately 985 acres, including the 65-acre ash basin. The property includes the cooling pond, located to the south of the plant operations area. The property borders the Lumber River to the southwest as shown on **Figure 1**.

The Weatherspoon Plant is a former coal-fired electricity-generating facility. The Weatherspoon Plant started operations in 1949. Two additional units were added in the early 1950s. Four oil and natural gas fueled combustion turbines were added in the 1970s. As of October 2011, all of the coal-fired units were retired. The four oil and natural gas fueled units continue to operate to meet peak demand.

Wastewater discharges from the ash basin are permitted by the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Resources (DWR) under National Pollution Discharge Elimination System (NPDES) Permit NC0005363.

This report summarizes an evaluation of seepage flows across the Weatherspoon Plant. The evaluation included a detailed site reconnaissance to identify potential seeps, flow measurements of identified seeps, and collection of seep water and other surface water samples for chemical analysis. The site reconnaissance was conducted in February 2014. Seep sampling and flow measurements were completed on August 18 and 19, 2014.

2.0 SEEP MONITORING

2.1 Seep Identification

A detailed reconnaissance of the outside perimeter of the ash basin at the Weatherspoon Plant was conducted in February 2014 for the purpose of identifying and locating any potential seeps originating from the ash basin. Identified seeps were described, photographed, noted on a field map, and surveyed as to location using GPS (**Table 1**). Identified seeps were further evaluated in August 2014. During the August evaluation, it was observed that some of the seeps identified in February 2014 were dry, reflecting an intermittent or seasonal nature. The locations of seeps identified are presented on **Figure 2**.

2.2 Seep Flow Measurement

Flow measurements were made in August 2014 at water-bearing seep locations using either a Son-Tek FlowTracker ® Acoustic Doppler Velocimeter or the timed-volumetric method. The FlowTracker® measures stream velocity and discharge using sound waves. The timed-volumetric method was used at four locations where the flow was constrained in a location that prevented the FlowTracker® from recording a signal without interference.

The timed-volumetric method was employed by collecting a volume of water from the discharge of the seep directly into an appropriately sized container (graduated cylinder or bucket). The entire seep flow was routed to the container. The amount of time (in seconds) required to collect a known volume of water was recorded. Five timed volumes were recorded and the flow rate for the seep was calculated based on an average of the timed volume measurements.

The FlowTracker® was used to measure seep flows at the majority of sample locations. The method is designed for streams that can be waded following established procedures such as the U.S. Geological Survey standards. Use of the FlowTracker® was generally limited to channels of sufficient width (approximately 0.5 feet or greater) and depth (approximately 0.17 feet or greater). Flow measurements (water velocity and depth) within quality control bounds of the instrument were recorded manually for estimation of discharge at a seep.

Locations were selected where channel banks were fairly parallel. The channel width was measured at the water line and recorded. If the channel width was less than one foot, the average depth was recorded and three velocity measurements were taken. The average of the three velocity measurements and the channel volume (depth and width) were used to calculate the flow at a given location.

If the channel width at the water line was between 1.0 and 2.5 feet, velocity and depth were recorded at a minimum of three locations spaced evenly across the channel. If the channel width was between 2.5 and 5 feet, velocity and depth were recorded at a minimum of five evenly spaced locations. Flow measurements were not made on the Lumber River because the width, depth, and velocity of the river made it unsafe to enter the river and access the appropriate number of locations.

Consistent with USGS methodology, velocity measurements were collected at 60% of water depth.

The averages of the calculated flows (in MGD) for seeps with measurable flow in August 2014 are included in **Table 2.** Seepage flow is generally variable. Flow may increase or decrease depending on the amount of rainfall, groundwater levels, weather conditions, and other variables.

2.3 Seep Sample Collection

Eleven seep locations with sufficient water for sample recovery, wastewater from the ash basin, and three surface water bodies were sampled during August 2014 for water quality analysis. The sample locations are described in **Table 1** and shown on **Figure 2**.

To prevent dilution from stormwater runoff into seep flows, samples were collected during a period preceded by very low precipitation. For the week preceding the August sample collection, only 0.08 inches of rain fell in the area as recorded at the Lumberton Municipal Airport, located about three miles west of the Weatherspoon Plant (National Weather Service).

Samples were collected from the seep flows directly into sample containers. Care was taken to avoid disturbing and entraining particulate soil and sediment. During sample collection, in-situ field parameters (temperature, pH, and specific conductance) were measured utilizing a YSI Pro Plus multi-function meter. Turbidity was also measured in the field using a Hach 2100P turbidimeter.

In addition to samples collected from seeps, three surface water samples, two from the Lumber River and one from Jacob Swamp, were collected. The two sample locations on the Lumber River were accessed using a personal watercraft and were collected at a midstream location from a depth of approximately one meter. The sample from Jacob Swamp was accessed from a bridge along Old Whiteville Road.

- A surface water sample was collected from the Lumber River approximately 400 feet upstream of the Weatherspoon Plant property line (**Figure 2**).

- A surface water sample was collected from the Lumber River downstream of the Weatherspoon Plant, approximately 500 feet downstream of the mixing zone between the Lumber River and Jacob Swamp (**Figure 2**).
- A surface water sample was collected from Jacob Swamp on the south side of Old Whiteville Road from the bridge that crosses Jacob Swamp (**Figure 2**).

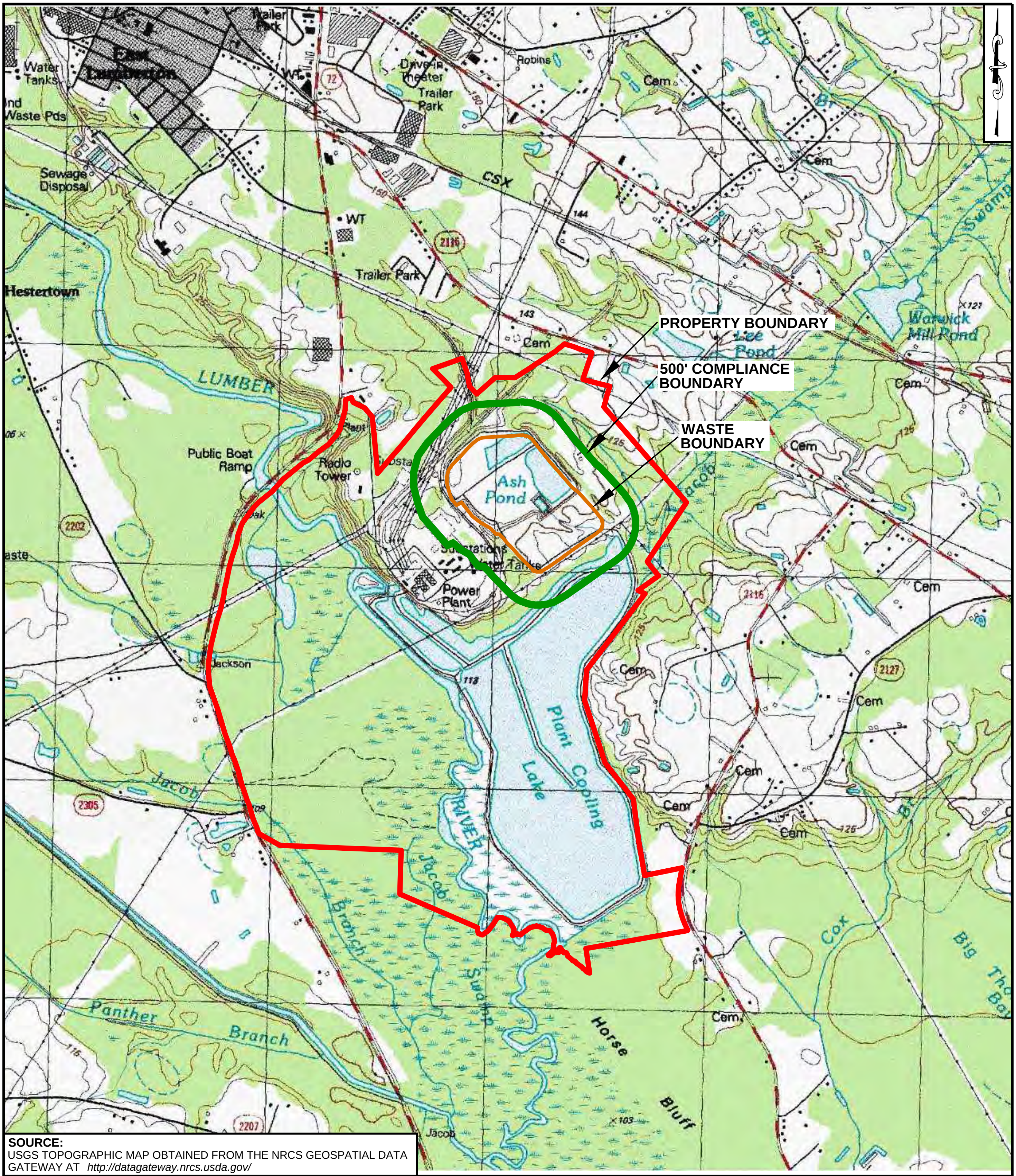
A wastewater sample was also collected of the ash basin.

Laboratory analyses were conducted by Duke Energy Analytical Lab Services in Huntersville, NC and Pace Analytical Laboratories (NC Wastewater Certifications #248 and #12). A summary of the laboratory and field data is provided in **Table 2**. A listing of analytical parameters and associated methods are included in **Table 3**. Sample handling, storage, and preservation methods are summarized in **Appendix A**.

3.0 RECOMMENDATIONS

The very low discharge of water characteristic of each seep location, including a number of seep locations that only flow during periods of wet weather, suggests minimal potential to influence water quality in surface water (Jacob Swamp and the Lumber River). If ongoing analyses demonstrates that there is no potential to exceed water quality standards, Duke Energy proposes to re-evaluate the identified seep locations listed in this document annually over the next five-year permit cycle. These annual evaluations would be documented and would verify the condition of the existing seeps and determine the presence of any newly developed seeps. DWR will be promptly notified if new seeps are identified or any significant changes are observed for the existing seeps. If any existing or newly identified seeps are determined to reach surface water (Jacob Swamp and the Lumber River) and the seepage has reasonable potential to exceed a water quality standard, Duke Energy will take measures to either (1) stop the seepage, (2) capture and route the seep so that it is discharged through a NPDES permitted outfall, or (3) address the seep using Best Management Plans approved by DWR.

FIGURES



SOURCE:
USGS TOPOGRAPHIC MAP OBTAINED FROM THE NRCS GEOSPATIAL DATA GATEWAY AT *http://datagateway.nrcs.usda.gov/*

synTerra

148 RIVER STREET, SUITE 220
GREENVILLE, SOUTH CAROLINA
PHONE 864-421-9999
www.synterracorp.com

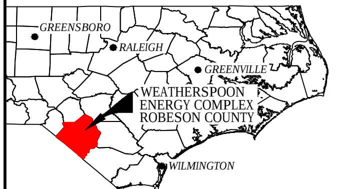
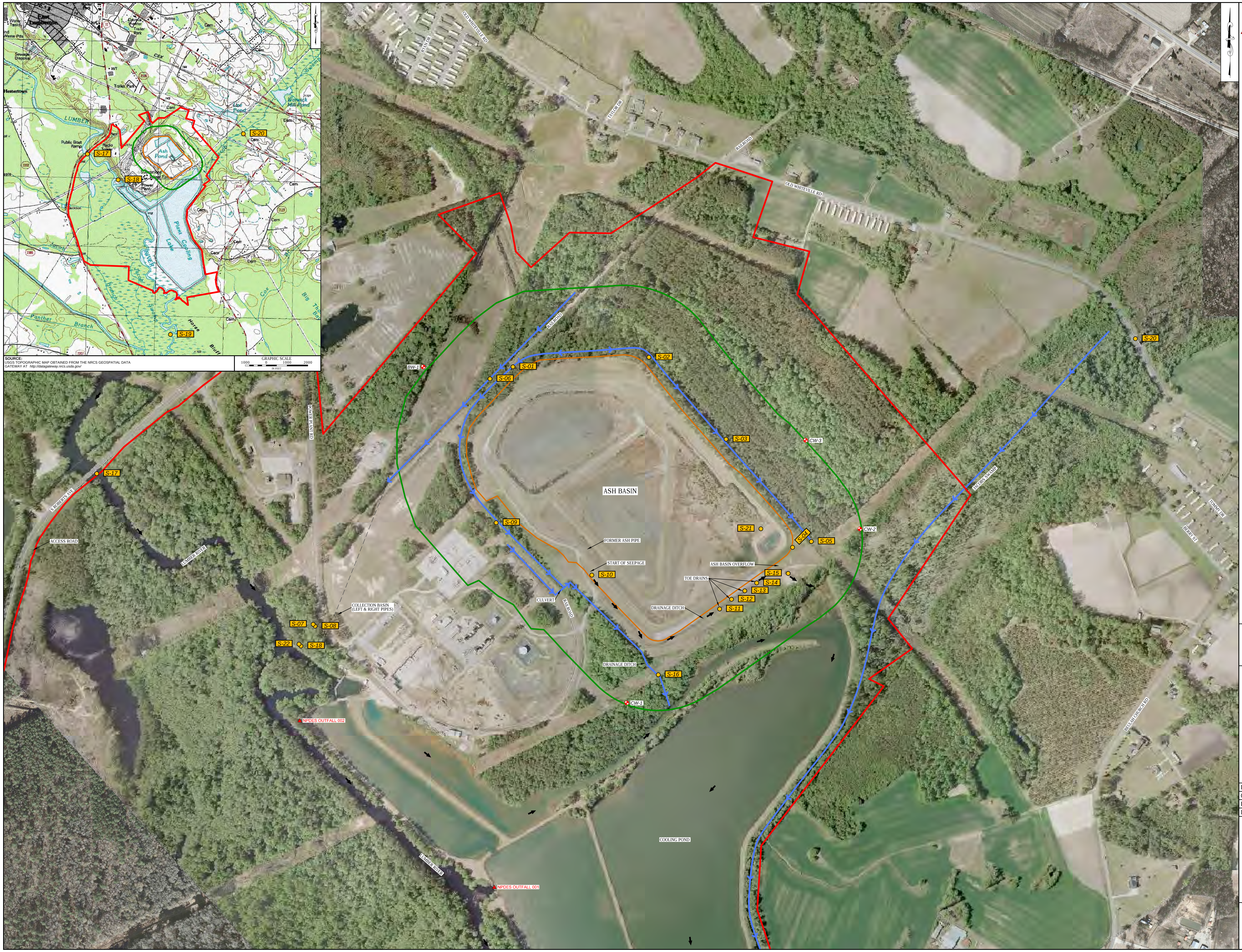


FIGURE 1
SITE LOCATION MAP
WEATHERSPOON POWER PLANT
491 POWER PLANT RD
LUMBERTON, NORTH CAROLINA
SOUTH EAST LUMBERTON, NC QUADRANGLE

DRAWN BY: S. ARLEDGE
PROJECT MANAGER: KATHY WEBB
LAYOUT: FIG 1 (USGS SITE LOCATION)

DATE: 2014-10-06
CONTOUR INTERVAL: 10 FEET
MAP DATE: 1993

GRAPHIC SCALE
1000 0 1000 2000
IN FEET



SOURCE:
USGS TOPOGRAPHIC MAP OBTAINED FROM THE NRCS GEOSPATIAL DATA GATEWAY AT *http://datagateway.nrcs.usda.gov/*

GRAPHIC SCALE
1000 0 1000 2000
IN FEET

LEGEND

● S-01	SEEP LOCATION
▲ NPDES OUTFALL 001	NPDES OUTFALL LOCATION
CW-3	COMPLIANCE GROUNDWATER MONITORING WELL
🟥	DUKE ENERGY PROGRESS WEATHERSPOON PLANT
—	500 ft COMPLIANCE BOUNDARY
—	WASTE BOUNDARY
– – – – –	ASH POND BOUNDARY (APPROXIMATE)
→	DRAINAGE FEATURE FLOW DIRECTION (APPROXIMATE)
←	SEEP AND WASTEWATER FLOW DIRECTION

SOURCES:

1. 2010 HIGH RESOLUTION AERIAL PHOTOGRAPHS OBTAINED FROM NC ONE MAP AT *http://data.nconemap.com/geoportal/catalog/raster/download.page*
2. 2014 AERIAL PHOTOGRAPH WAS OBTAINED FROM WSP FLOWN ON APRIL 17, 2014.
3. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE COORDINATE SYSTEM FIPS 3200 (NAD 83).

GRAPHIC SCALE
300 0 150 300 600
(IN FEET)

synTerra
148 River Street, Suite 220
Greenville, South Carolina 29601
864-421-9999
www.synterracorp.com

DRAWN BY:	S. ARLEDGE	DATE:	2014-10-06
CHECKED BY:	C. SUTTELL	DATE:	2014-10-06
PROJECT MANAGER:	K. WEBB		
LAYOUT NAME: FIG 2 (SEEP SAMPLE LOCATIONS)			

DUKE ENERGY PROGRESS

WEATHERSPOON POWER PLANT
491 POWER PLANT RD
LUMBERTON, NORTH CAROLINA

FIGURE 2
IDENTIFIED SEEPS AND WATER QUALITY SAMPLE LOCATION MAP

TABLES

TABLE 1
SEEP LOCATIONS AND DESCRIPTIONS
H.F. WEATHERSPOON POWER PLANT
DUKE ENERGY PROGRESS, INC., LUMBERTON, NORTH CAROLINA

SAMPLE ID **(***August 2014 sample description, if present***)**	**LATITUDE**	**LONGITUDE**	**FLOW DESCRIPTION**	**DESCRIPTION**
S-01	34.593324	-78.973004	Continuous	Small channel north of the ash basin between the toe of the dike and the railroad tracks. Flows west. Stagnant, no flow observed during August sampling event. Flows to S-09 and S-16 before discharging to cooling pond.
S-02	34.593513	-78.969757	Intermittent	Seepage area around riprap pile on the northeast side of the ash basin, near PZ-1. No surface water observed during August sampling event, but ground was moist. Evidence of seasonal seepage. Flows to S-05.
S-03	34.591892	-78.967913	Continuous	Small channel on the east side of the ash basin at the toe of the dike. Channel was wide, but the majority of the flow occurred in the middle of the channel. Flow meandered through wide, dispersed channel towards S-05.
S-04	34.589755	-78.966327	Intermittent	Southeast face of the ash basin dike. Ground was dry during August sampling event, but wetness and moist ground has been observed during previous site visits.
S-05	34.589871	-78.965880	Continuous	Small channel on east side of the ash basin at the toe of the dike. Channel was narrow and straight before emerging into a marshy area underneath a set of transmission lines.
S-06	34.593088	-78.973552	Continuous	Small channel north of the railroad tracks that run along the north side of the ash basin. Stagnant, no flow observed during August sampling event.
S-07	34.588211	-78.977747	Continuous	Discharge from 48-inch concrete pipe after flowing underneath Power Plant Road to the west. Pipe originates in a catchment basin on the east side of Power Plant Road. Left pipe if looking upstream. Flows toward S-18 and S-22 to the Lumber River.
S-08	34.588199	-78.977730	Continuous	Discharge from 48-inch concrete pipe after flowing underneath Power Plant Road to the west. Pipe originates in a catchment basin on the east side of Power Plant Road. Right pipe if looking upstream. Flow ultimately discharges from pipes at S-18 and S-22 to the Lumber River.
S-09	34.590244	-78.973407	Continuous	Small channel on the west side of the ash basin between the toe of the dike and the railroad tracks. Flow originates from S-01 and continues towards S-16.
S-10	34.589208	-78.971123	Intermittent	Seepage area immediately at the toe of the dike face of the west side of the ash basin. No surface water observed during August sampling event, but there was evidence of seasonal flow.
S-11	34.588537	-78.968071	Intermittent	Western toe drain/engineered outfall from the ash basin. No flow was observed during the August sampling event. Toe drain consists of a 6-inch corrugated pipe.
S-12	34.588729	-78.967785	Intermittent	Second westernmost toe drain/engineered outfall from the ash basin. No flow was observed during the August sampling event. Toe drain consists of a 6-inch corrugated pipe.
S-13	34.588896	-78.967469	Intermittent	Second easternmost toe drain/engineered outfall from the ash basin. No flow was observed during the August sampling event. Toe drain consists of a 6-inch corrugated pipe.
S-14	34.589052	-78.967185	Continuous	Eastern toe drain/engineered outfall from the ash basin. Flow was observed during the August sampling event. Flow discharges to small channel which flows to S-15 before discharging to the cooling pond.
S-15	34.589240	-78.966433	Continuous	Small channel located along south edge of the ash basin. Captures flow from S-10, S-11, S-12, S-13, and S-14 (when flowing). Sampled downstream of culvert underneath road that runs parallel to the ash basin along the south side. Discharges to cooling pond.
S-16	34.587238	-78.969535	Continuous	Very narrow, deeply incised channel. Very hard streambed. Downstream of S-09. Discharges to cooling pond.
S-17	34.591216	-78.982946	Upstream Surface Water	Surface water from the Lumber River upstream of the plant and just below the public boat ramp.
S-18	34.587809	-78.978069	Continuous	Flow from concrete pipe that runs underneath an old dike into the Lumber River. Downstream of S-07 and S-08.
S-19	34.567428	-78.969752	Downstream Surface Water	Surface water from Lumber River approximately 500 feet south of the cooling pond after the confluence with of Jacob Swamp.
S-20	34.593876	-78.958137	Upstream Surface Water	Surface water from Jacob Swamp upstream of the plant at Old Whiteville Road.
S-21	34.590123	-78.967084	Ash Pond Water	Wastewater from the southeast corner of the ash basin.
S-22	34.587810	-78.978079	Intermittent	Outlet of concrete pipe that runs underneath an old dike adjacent to the Lumber River. Downstream of S-07 and S-08. No flow observed during August sampling event.

Prepared by: AJY Checked by: RBI/HJF

TABLE 2
SEEP FLOWS AND ANALYTICAL RESULTS, AUGUST 18-19, 2014
H.F. WEATHERSPOON POWER PLANT
DUKE ENERGY PROGRESS, INC., LUMBERTON, NORTH CAROLINA

	Map ID	S-01	S-01	S-02	S-03	S-04	S-05	S-06	S-07	S-07	S-08	S-09	S-10
	Sample Description	PSW-01	PSW-01 Duplicate	PSW-02	PSW-03	PSW-04	PSW-05	PSW-06	PSW-07	PSW-07 Duplicate	PSW-08	PSW-09	PSW-10
Flow	**MGD**	NF	NF	NS	0.06172	NS	0.01987	NF	0.01267	0.01267	0.00141	0.03016	NS
Flow Measurement Method		--	--	--	AV	--	AV	--	TV	TV	TV	AV	--
Oil & Grease	**mg/L**	< 5.0	< 5.0	NS	< 5.0	NS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	NS
COD	**mg/L**	< 20	< 20	NS	< 20	NS	20	120	< 20	< 20	< 20	< 20	NS
Chloride	**mg/L**	16	16	NS	29	NS	35	8.6	3.6	3.6	2.2	17	NS
Fluoride	**mg/L**	< 0.1	< 0.1	NS	0.19	NS	0.23	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	NS
Sulfate	**mg/L**	57	57	NS	110	NS	110	27	3.3	3.3	1.6	78	NS
Mercury (Hg)	**ug/L**	< 1	< 1	NS	< 1	NS	< 1	< 1	< 1	< 1	< 1	< 1	NS
Aluminum (Al)	**mg/L**	0.108	0.141	NS	0.011	NS	0.031	4.05	0.055	0.043	0.031	0.12	NS
Barium (Ba)	**mg/L**	0.072	0.073	NS	0.139	NS	0.108	0.068	0.038	0.036	0.023	0.087	NS
Boron (B)	**mg/L**	0.799	0.785	NS	2.06	NS	2.15	0.060	< 0.05	< 0.05	< 0.05	0.828	NS
Calcium (Ca)	**mg/L**	40.2	39.7	NS	105	NS	98.4	7.31	1.99	1.96	1.62	56.6	NS
Hardness	**mg/L (CaCO3)**	132	130	NS	325	NS	305	27.7	8.53	8.42	5.56	178	NS
Iron (Fe)	**mg/L**	3.14	3.34	NS	1.28	NS	2.12	19.1	1.03	1.01	0.373	1.74	NS
Magnesium (Mg)	**mg/L**	7.62	7.52	NS	15.3	NS	14.4	2.29	0.865	0.857	0.370	8.82	NS
Manganese (Mn)	**mg/L**	0.156	0.162	NS	0.461	NS	0.274	0.066	0.014	0.014	< 0.005	0.137	NS
Zinc (Zn)	**mg/L**	< 0.005	< 0.005	NS	< 0.005	NS	< 0.005	0.026	< 0.005	< 0.005	< 0.005	< 0.005	NS
Antimony (Sb)	**ug/L**	< 1	< 1	NS	< 1	NS	< 1	< 1	< 1	< 1	< 1	< 1	NS
Arsenic (As)	**ug/L**	7.41	7.56	NS	292	NS	43.8	6.1	< 1	< 1	< 1	1.59	NS
Cadmium (Cd)	**ug/L**	< 1	< 1	NS	< 1	NS	< 1	< 1	< 1	< 1	< 1	< 1	NS
Chromium (Cr)	**ug/L**	< 1	< 1	NS	< 1	NS	< 1	1.72	< 1	< 1	< 1	< 1	NS
Copper (Cu)	**ug/L**	< 1	< 1	NS	< 1	NS	< 1	2.47	< 1	< 1	< 1	< 1	NS
Lead (Pb)	**ug/L**	< 1	< 1	NS	< 1	NS	< 1	2.39	< 1	< 1	< 1	< 1	NS
Molybdenum (Mo)	**ug/L**	2.04	1.82	NS	32.2	NS	93.8	< 1	< 1	< 1	< 1	2.89	NS
Nickel (Ni)	**ug/L**	< 1	1.01	NS	25.6	NS	18.0	6.73	< 1	< 1	< 1	2.22	NS
Selenium (Se)	**ug/L**	< 1	< 1	NS	< 1	NS	< 1	< 1	< 1	< 1	< 1	< 1	NS
Thallium (Tl) Low Level	**ug/L**	< 0.2	< 0.2	NS	< 0.2	NS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	NS
TDS	**mg/L**	240	230	NS	520	NS	480	86	28	27	< 25	300	NS
TSS	**mg/L**	18	18	NS	< 5	NS	< 5	200	< 5	< 5	< 5	< 5	NS
pH	**s.u.**	6.5	6.5	NS	7.3	NS	7.3	6.6	6.7	6.7	6.6	7.0	NS
Temperature	**°C**	25	25	NS	25	NS	25	28	25	25	24	29	NS
Specific conductance	**uS/cm**	388	388	NS	817	NS	816	132	38	38	23	479	NS
Turbidity	**NTU**	35.3	35.3	NS	6.88	NS	10.5	27.3	5.98	5.98	2.94	11.2	NS

Prepared by: AJY Checked by: RMB

NF - Stream flow not present during this sampling event or too low to be measured.

NS - No surface water present during this sampling event. Evidence of seasonal wetness.

NM - Not measured

TV - Timed Volume

AV - Area Velocity

MGD - Million Gallons Per Day

🟨 - Seep appears to flow to Lumber River

🟧 - Seep appears to flow to Jacob Swamp

🟦 - Seep appears to flow to Cooling Pond

TABLE 2
SEEP FLOWS AND ANALYTICAL RESULTS, AUGUST 18-19, 2014
H.F. WEATHERSPOON POWER PLANT
DUKE ENERGY PROGRESS, INC., LUMBERTON, NORTH CAROLINA

	Map ID	S-11	S-12	S-13	S-14	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22
	Sample Description	PSW-11	PSW-12	PSW-13	PSW-14	PSW-15	PSW-16	PSW-17	PSW-18	PSW-19	PSW-20	PSW-21	PSW-22
Flow	MGD	NS	NS	NS	0.00061	0.08781	0.02020	NM	0.01372	NM	NF	NF	NS
Flow Measurement Method		--	--	--	TV	AV	AV	--	TV	--	--	--	--
Oil & Grease	mg/L	NS	NS	NS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	NS
COD	mg/L	NS	NS	NS	40	< 20	< 20	52	< 20	53	56	24	NS
Chloride	mg/L	NS	NS	NS	36	35	20	13	3.4	12	12	6.2	NS
Fluoride	mg/L	NS	NS	NS	0.12	0.35	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.40	NS
Sulfate	mg/L	NS	NS	NS	57	9.0	140	7.3	2.8	7.1	3.2	79	NS
Mercury (Hg)	ug/L	NS	NS	NS	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NS
Aluminum (Al)	mg/L	NS	NS	NS	0.332	0.069	0.279	0.507	0.039	0.443	0.128	0.737	NS
Barium (Ba)	mg/L	NS	NS	NS	0.102	0.337	0.154	0.031	0.036	0.03	0.06	0.130	NS
Boron (B)	mg/L	NS	NS	NS	2.37	1.94	0.959	< 0.05	< 0.05	< 0.05	< 0.05	0.556	NS
Calcium (Ca)	mg/L	NS	NS	NS	52.7	80.2	62.0	3.33	1.99	3.30	15.7	29.4	NS
Hardness	mg/L (CaCO3)	NS	NS	NS	162	246	189	13.6	8.2	13.4	57.2	89.9	NS
Iron (Fe)	mg/L	NS	NS	NS	58.8	12	1.25	0.867	1.01	0.782	2.77	0.070	NS
Magnesium (Mg)	mg/L	NS	NS	NS	7.38	11.1	8.35	1.29	0.786	1.26	4.38	4.01	NS
Manganese (Mn)	mg/L	NS	NS	NS	0.213	0.803	0.231	0.079	0.019	0.056	0.122	0.018	NS
Zinc (Zn)	mg/L	NS	NS	NS	< 0.005	< 0.005	0.008	0.041	< 0.005	0.039	< 0.005	< 0.005	NS
Antimony (Sb)	ug/L	NS	NS	NS	< 1	< 1	< 1	2.25	< 1	2.02	< 1	3.65	NS
Arsenic (As)	ug/L	NS	NS	NS	3.74	12.1	1.60	< 1	< 1	< 1	< 1	86.8	NS
Cadmium (Cd)	ug/L	NS	NS	NS	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NS
Chromium (Cr)	ug/L	NS	NS	NS	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NS
Copper (Cu)	ug/L	NS	NS	NS	< 1	< 1	1.22	1.93	< 1	1.86	< 1	2.88	NS
Lead (Pb)	ug/L	NS	NS	NS	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NS
Molybdenum (Mo)	ug/L	NS	NS	NS	< 1	16.8	1.47	< 1	< 1	< 1	< 1	32.7	NS
Nickel (Ni)	ug/L	NS	NS	NS	2.06	6.13	7.93	< 1	< 1	< 1	< 1	2.91	NS
Selenium (Se)	ug/L	NS	NS	NS	< 1	< 1	< 1	< 1	< 1	< 1	< 1	11.5	NS
Thallium (Tl) Low Level	ug/L	NS	NS	NS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.398	NS
TDS	mg/L	NS	NS	NS	340	410	340	98	27	95	130	190	NS
TSS	mg/L	NS	NS	NS	130	27	36	7.0	< 5	< 5	11	< 5.0	NS
pH	s.u.	NS	NS	NS	6.5	7.0	7.4	5.9	6.0	5.8	5.9	9.0	NS
Temperature	°C	NS	NS	NS	24	26	28	26	24	26	24	34	NS
Specific conductance	uS/cm	NS	NS	NS	590	701	520	92	38	86.9	154	294	NS
Turbidity	NTU	NS	NS	NS	125	162	3.77	2.92	1.89	1.80	7.41	4.62	NS

Prepared by: AJY Checked by: RMB

NF - Stream flow not present during this sampling event or too low to be measured.

NS - No surface water present during this sampling event. Evidence of seasonal wetness.

NM - Not measured

TV - Timed Volume

AV - Area Velocity

MGD - Million Gallons Per Day

🟨 - Seep appears to flow to Lumber River

🟧 - Seep appears to flow to Jacob Swamp

🟦 - Seep appears to flow to Cooling Pond

TABLE 3
SEEP ANALYTICAL METHODS
H.F. WEATHERSPOON POWER PLANT
DUKE ENERGY PROGRESS, INC., LUMBERTON, NORTH CAROLINA

PARAMETER	METHOD	REPORTING LIMIT	UNITS	LAB
COD	HACH 8000	20	mg/L	Duke Energy
Aluminum (Al)	EPA 200.7	0.005	mg/L	Duke Energy
Antimony (Sb)	EPA 200.8	1	ug/L	Duke Energy
Arsenic (As)	EPA 200.8	1	ug/L	Duke Energy
Barium (Ba)	EPA 200.7	0.005	mg/L	Duke Energy
Boron (B)	EPA 200.7	0.05	mg/L	Duke Energy
Cadmium (Cd)	EPA 200.8	1	ug/L	Duke Energy
Calcium (Ca)	EPA 200.7	0.1	mg/L	Duke Energy
Chloride	EPA 300.0	5	mg/L	Duke Energy
Chromium (Cr)	EPA 200.8	1	ug/L	Duke Energy
Copper (Cu)	EPA 200.8	1	ug/L	Duke Energy
Fluoride	EPA 300.0	1	mg/L	Duke Energy
Hardness	EPA 200.7	0.19	mg/L (CaCO3)	Duke Energy
Iron (Fe)	EPA 200.7	0.01	mg/L	Duke Energy
Lead (Pb)	EPA 200.8	1	ug/L	Duke Energy
Magnesium (Mg)	EPA 200.7	0.05	mg/L	Duke Energy
Manganese (Mn)	EPA 200.7	0.005	mg/L	Duke Energy
Mercury (Hg)	EPA 245.1	0.05	ug/L	Duke Energy
Molybdenum (Mo)	EPA 200.8	1	ug/L	Duke Energy
Nickel (Ni)	EPA 200.8	1	ug/L	Duke Energy
Oil and Grease	EPA 1664B	5.0	mg/L	Pace Analytical
Selenium (Se)	EPA 200.8	1	ug/L	Duke Energy
Sulfate	EPA 300.0	5	mg/L	Duke Energy
TDS	SM2540C	25	mg/L	Duke Energy
Thallium (Tl) Low Level	EPA 200.8	0.2	ug/L	Duke Energy
TSS	SM2540D	5	mg/L	Duke Energy
Zinc (Zn)	EPA 200.7	0.005	mg/L	Duke Energy

Prepared By: RBI Checked By: KWW

APPENDIX A

ANALYTICAL SAMPLE HANDLING, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Parameter name	Container1	Preservation[2] [3]	Maximum holding time[4]
Table IB—Inorganic Tests:			
1. Acidity	P, FP, G	Cool, ≤6 °C[18]	14 days.
2. Alkalinity	P, FP, G	Cool, ≤6 °C[18]	14 days.
4. Ammonia	P, FP, G	Cool, ≤6 °C[18], H_2SO_4 to pH <2	28 days.
9. Biochemical oxygen demand	P, FP, G	Cool, ≤6 °C[18]	48 hours.
10. Boron	P, FP, or Quartz	HNO_3 to pH <2	6 months.
11. Bromide	P, FP, G	None required	28 days.
14. Biochemical oxygen demand, carbonaceous	P, FP G	Cool, ≤6 °C[18]	48 hours.
15. Chemical oxygen demand	P, FP, G	Cool, ≤6 °C[18], H_2SO_4 to pH <2	28 days.
16. Chloride	P, FP, G	None required	28 days.
17. Chlorine, total residual	P, G	None required	Analyze within 15 minutes.
21. Color	P, FP, G	Cool, ≤6 °C[18]	48 hours.
23-24. Cyanide, total or available (or CATC) and free	P, FP, G	Cool, ≤6 °C[18], NaOH to pH >10[5] [6], reducing agent if oxidizer present	14 days.
25. Fluoride	P	None required	28 days.
27. Hardness	P, FP, G	HNO_3 or H_2SO_4 to pH <2	6 months.
28. Hydrogen ion (pH)	P, FP, G	None required	Analyze within 15 minutes.
31, 43. Kjeldahl and organic N	P, FP, G	Cool, ≤6 °C[18], H_2SO_4 to pH <2	28 days.
Table IB—Metals:[7]			
18. Chromium VI	P, FP, G	Cool, ≤6 °C[18], pH = 9.3-9.7[20]	28 days.
35. Mercury (CVAA)	P, FP, G	HNO_3 to pH <2	28 days.
35. Mercury (CVAFS)	FP, G; and FP-lined cap[17]	5 mL/L 12N HCl or 5 mL/L BrCl[17]	90 days.[17]
3, 5-8, 12, 13, 19, 20, 22, 26, 29, 30, 32-34, 36, 37, 45, 47, 51, 52, 58-60, 62, 63, 70-72, 74, 75. Metals, except boron, chromium VI, and mercury	P, FP, G	HNO_3 to pH <2, or at least 24 hours prior to analysis[19]	6 months.
38. Nitrate	P, FP, G	Cool, ≤6 °C[18]	48 hours.
39. Nitrate-nitrite	P, FP, G	Cool, ≤6 °C[18], H_2SO_4 to pH <2	28 days.
40. Nitrite	P, FP, G	Cool, ≤6 °C[18]	48 hours.
41. Oil and grease	G	Cool to ≤6 °C[18], HCl or H_2SO_4 to pH <2	28 days.
42. Organic Carbon	P, FP, G	Cool to ≤6 °C[18], HCl, H_2SO_4, or H_3PO_4 to pH <2	28 days.
44. Orthophosphate	P, FP, G	Cool, to ≤6 °C[18] [24]	Filter within 15 minutes; Analyze within 48 hours.
46. Oxygen, Dissolved Probe	G, Bottle and top	None required	Analyze within 15 minutes.
47. Winkler	G, Bottle and top	Fix on site and store in dark	8 hours.
48. Phenols	G	Cool, ≤6 °C[18], H_2SO_4 to pH <2	28 days.
49. Phosphorous (elemental)	G	Cool, ≤6 °C[18]	48 hours.
50. Phosphorous, total	P, FP, G	Cool, ≤6 °C[18], H_2SO_4 to pH <2	28 days.
53. Residue, total	P, FP, G	Cool, ≤6 °C[18]	7 days.
54. Residue, Filterable	P, FP, G	Cool, ≤6 °C[18]	7 days.
55. Residue, Nonfilterable (TSS)	P, FP, G	Cool, ≤6 °C[18]	7 days.
56. Residue, Settleable	P, FP, G	Cool, ≤6 °C[18]	48 hours.
57. Residue, Volatile	P, FP, G	Cool, ≤6 °C[18]	7 days.
61. Silica	P or Quartz	Cool, ≤6 °C[18]	28 days.
64. Specific conductance	P, FP, G	Cool, ≤6 °C[18]	28 days.
65. Sulfate	P, FP, G	Cool, ≤6 °C[18]	28 days.
66. Sulfide	P, FP, G	Cool, ≤6 °C[18], add zinc acetate plus sodium hydroxide to pH >9	7 days.
67. Sulfite	P, FP, G	None required	Analyze within 15 minutes.
68. Surfactants	P, FP, G	Cool, ≤6 °C[18]	48 hours.
69. Temperature	P, FP, G	None required	Analyze.
73. Turbidity	P, FP, G	Cool, ≤6 °C[18]	48 hours.

[1] “P” is for polyethylene; “FP” is fluoropolymer (polytetrafluoroethylene (PTFE); Teflon®), or other fluoropolymer, unless stated otherwise in this Table II; “G” is glass; “PA” is any plastic that is made of a sterilizable material (polypropylene or other autoclavable plastic); “LDPE” is low density polyethylene.

[2] Except where noted in this Table II and the method for the parameter, preserve each grab sample within 15 minutes of collection. For a composite sample collected with an automated sample (e.g., using a 24-hour composite sample; see 40 CFR 122.21(g)(7)(i) or 40 CFR Part 403, Appendix E), refrigerate the sample at ≤6 °C during collection unless specified otherwise in this Table II or in the method(s). For a composite sample to be split into separate aliquots for preservation and/or analysis, maintain the sample at ≤6 °C, unless specified otherwise in this Table II or in the method(s), until collection, splitting, and preservation is completed. Add the preservative to the sample container prior to sample collection when the preservative will not compromise the integrity of a grab sample, a composite sample, or aliquot split from a

composite sample within 15 minutes of collection. If a composite measurement is required but a composite sample would compromise sample integrity, individual grab samples must be collected at prescribed time intervals (e.g., 4 samples over the course of a day, at 6-hour intervals). Grab samples must be analyzed separately and the concentrations averaged. Alternatively, grab samples may be collected in the field and composited in the laboratory if the compositing procedure produces results equivalent to results produced by arithmetic averaging of results of analysis of individual grab samples. For examples of laboratory compositing procedures, see EPA Method 1664 Rev. A (oil and grease) and the procedures at 40 CFR 141.34(f)(14)(iv) and (v) (volatile organics).

[3] When any sample is to be shipped by common carrier or sent via the U.S. Postal Service, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirement of Table II, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater; Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

[4] Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before the start of analysis and still be considered valid. Samples may be held for longer periods only if the permittee or monitoring laboratory has data on file to show that, for the specific types of samples under study, the analytes are stable for the longer time, and has received a variance from the Regional Administrator under Sec. 136.3(e). For a grab sample, the holding time begins at the time of collection. For a composite sample collected with an automated sampler (e.g., using a 24-hour composite sampler; see 40 CFR 122.21(g)(7)(i) or 40 CFR part 403, Appendix E), the holding time begins at the time of the end of collection of the composite sample. For a set of grab samples composited in the field or laboratory, the holding time begins at the time of collection of the last grab sample in the set. Some samples may not be stable for the maximum time period given in the table. A permittee or monitoring laboratory is obligated to hold the sample for a shorter time if it knows that a shorter time is necessary to maintain sample stability. See 136.3(e) for details. The date and time of collection of an individual grab sample is the date and time at which the sample is collected. For a set of grab samples to be composited, and that are all collected on the same calendar date, the date of collection is the date on which the samples are collected. For a set of grab samples to be composited, and that are collected across two calendar dates, the date of collection is the dates of the two days; e.g., November 14-15. For a composite sample collected automatically on a given date, the date of collection is the date on which the sample is collected. For a composite sample collected automatically, and that is collected across two calendar dates, the date of collection is the dates of the two days; e.g., November 14-15. For static-renewal toxicity tests, each grab or composite sample may also be used to prepare test solutions for renewal at 24 h, 48 h, and/or 72 h after first use, if stored at 0-6 °C, with minimum head space.

[5] ASTM D7365-09a specifies treatment options for samples containing oxidants (e.g., chlorine). Also, Section 9060A of Standard Methods for the Examination of Water and Wastewater (20th and 21st editions) addresses dechlorination procedures.

[6] Sampling, preservation and mitigating interferences in water samples for analysis of cyanide are described in ASTM D7365-09a. There may be interferences that are not mitigated by the analytical test methods or D7365-09a. Any technique for removal or suppression of interference may be employed, provided the laboratory demonstrates that it more accurately measures cyanide through quality control measures described in the analytical test method. Any removal or suppression technique not described in D7365-09a or the analytical test method must be documented along with supporting data.

[7] For dissolved metals, filter grab samples within 15 minutes of collection and before adding preservatives. For a composite sample collected with an automated sampler (e.g., using a 24-hour composite sampler; see 40 CFR 122.21(g)(7)(i) or 40 CFR Part 403, Appendix E), filter the sample within 15 minutes after completion of collection and before adding preservatives. If it is known or suspected that dissolved sample integrity will be compromised during collection of a composite sample collected automatically over time (e.g., by interchange of a metal between dissolved and suspended forms), collect and filter grab samples to be composited (footnote 2) in place of a composite sample collected automatically.

[8] Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

[9] If the sample is not adjusted to pH 2, then the sample must be analyzed within seven days of sampling.

[10] The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.

[11] When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity (*i.e.,* use all necessary preservatives and hold for the shortest time listed). When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to ≤6 °C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9; samples preserved in this manner may be held for seven days before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (regarding the requirement for thiosulfate reduction), and footnotes 12, 13 (regarding the analysis of benzidine).

[12] If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0 ±0.2 to prevent rearrangement to benzidine.

[13] Extracts may be stored up to 30 days at <0 °C.

[14] For the analysis of diphenylnitrosamine, add 0.008% $Na_2S_2O_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.

[15] The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O_3$.

[16] Place sufficient ice with the samples in the shipping container to ensure that ice is still present when the samples arrive at the laboratory. However, even if ice is present when the samples arrive, immediately measure the temperature of the samples and confirm that the preservation temperature maximum has not been exceeded. In the isolated cases where it can be documented that this holding temperature cannot be met, the permittee can be given the option of on-site testing or can request a variance. The request for a variance should include supportive data which show that the toxicity of the effluent samples is not reduced because of the increased holding temperature. Aqueous samples must not be frozen. Hand-delivered samples used on the day of collection do not need to be cooled to 0 to 6 °C prior to test initiation.

[17] Samples collected for the determination of trace level mercury (<100 ng/L) using EPA Method 1631 must be collected in tightly-capped fluoropolymer or glass bottles and preserved with BrCl or HCl solution within 48 hours of sample collection. The time to preservation may be extended to 28 days if a sample is oxidized in the sample bottle. A sample collected for dissolved trace level mercury should be filtered in the laboratory within 24 hours of the time of collection. However, if circumstances preclude overnight shipment, the sample should be filtered in a designated clean area in the field in accordance with procedures given in Method 1669. If sample integrity will not be maintained by shipment to and filtration in the laboratory, the sample must be filtered in a designated clean area in the field within the time

period necessary to maintain sample integrity. A sample that has been collected for determination of total or dissolved trace level mercury must be analyzed within 90 days of sample collection.

[18] Aqueous samples must be preserved at ≤6 °C, and should not be frozen unless data demonstrating that sample freezing does not adversely impact sample integrity is maintained on file and accepted as valid by the regulatory authority. Also, for purposes of NPDES monitoring, the specification of "≤°C" is used in place of the "4 °C" and "<4 °C" sample temperature requirements listed in some methods. It is not necessary to measure the sample temperature to three significant figures (1/100th of 1 degree); rather, three significant figures are specified so that rounding down to 6 °C may not be used to meet the ≤6 °C requirement. The preservation temperature does not apply to samples that are analyzed immediately (less than 15 minutes).

[19] An aqueous sample may be collected and shipped without acid preservation. However, acid must be added at least 24 hours before analysis to dissolve any metals that adsorb to the container walls. If the sample must be analyzed within 24 hours of collection, add the acid immediately (see footnote 2). Soil and sediment samples do not need to be preserved with acid. The allowances in this footnote supersede the preservation and holding time requirements in the approved metals methods.

[20] To achieve the 28-day holding time, use the ammonium sulfate buffer solution specified in EPA Method 218.6. The allowance in this footnote supersedes preservation and holding time requirements in the approved hexavalent chromium methods, unless this supersession would compromise the measurement, in which case requirements in the method must be followed.

[21] Holding time is calculated from time of sample collection to elution for samples shipped to the laboratory in bulk and calculated from the time of sample filtration to elution for samples filtered in the field.

[22] Sample analysis should begin as soon as possible after receipt; sample incubation must be started no later than 8 hours from time of collection.

[23] For fecal coliform samples for sewage sludge (biosolids) only, the holding time is extended to 24 hours for the following sample types using either EPA Method 1680 (LTB-EC) or 1681 (A-1): Class A composted, Class B aerobically digested, and Class B anaerobically digested.

[24] The immediate filtration requirement in orthophosphate measurement is to assess the dissolved or bio-available form of orthophosphorus (*i.e.,* that which passes through a 0.45-micron filter), hence the requirement to filter the sample immediately upon collection (*i.e.,* within 15 minutes of collection).

[38 FR 28758, Oct. 16, 1973