PLAN FOR IDENTIFICATION OF NEW DISCHARGES

FOR

CAPE FEAR STEAM ELECTRIC PLANT
500 CP&L ROAD
MONCURE, NORTH CAROLINA 27559
NPDES PERMIT #NC0003433

PREPARED FOR

DUKE ENERGY PROGRESS, INC.
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SUBMITTED: SEPTEMBER 2014

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1.0 INTRODUCTION

The purpose of this document is to address the requirements of North Carolina General Statute (GS)130A-309.210 (d) *Identification and assessment of discharges; correction of unpermitted discharges*, as modified by North Carolina Senate Bill 729, for the Cape Fear Steam Electric Plant (Cape Fear Plant) ash basin operated under National Pollution Discharge Elimination System (NPDES) Permit NC0003433.

The following requirements are contained in General statue 130A-309.210:

d) Identification of New Discharges. – No later than October 1, 2014, the owner of a coal combustion residuals surface impoundment shall submit a proposed Plan for the Identification of New Discharges to the Department for its review and approval as provided in this subsection.

(1) The proposed Plan for the Identification of New Discharges shall include, at a minimum, all of the following:

a. A procedure for routine inspection of the coal combustion residuals surface impoundment to identify indicators of potential new discharges, including toe drain outfalls, seeps, and weeps.

b. A procedure for determining whether a new discharge is actually present.

c. A procedure for notifying the Department when a new discharge is confirmed.

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

(2) The Department shall approve the Plan for the Identification of New Discharges 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 Plan for the Identification of New Discharges, the owner shall begin implementation of the Plan in accordance with the Plan.

The North Carolina Senate Bill 729 establishes the submittal date of this Plan for Identification of New Discharges no later than October 1, 2014.

This bill also modified GS 130A to establish the following submittals that are related to this Plan. GS130A-309.210(a) was modified to require:

(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 inspection procedures presented in this plan, developed to satisfy the requirements of GS130A-309.210(d), will be used as the basis for developing the topographic map required by GS130A-309.210(a)(2).

2.0 SITE DESCRIPTION

2.1 Plant Description

Duke Energy Progress, Inc. (Duke Energy) owns and operates the Cape Fear Steam Electric Plant (Cape Fear Plant) located on approximately 900 acres in central North Carolina near Moncure, North Carolina. The Cape Fear Plant is located in Chatham County along the east bank of the Cape Fear River southeast of Moncure and west of Corinth Road. The site location is shown on **Figure 1**.

The Cape Fear Plant began operations in 1923 and additional units were added in the following years. In the most current configuration, the Cape Fear Plant employed two coal-fired units along with four oil-fueled combustion turbine units. Ash generated from coal combustion was stored on-site in ash basins. Operations were terminated at the Cape Fear Plant in October 2012 and demolition activities are currently underway.

2.2 Ash Basin Description

Coal combustion residuals were managed in on-site ash basins. The ash basins are referred to as "ash ponds" in the Cape Fear Plant's NPDES permit. Five ash basins have historically been used at the Cape Fear Plant and are referenced using the date of construction: 1956, 1963, 1970, 1978, and 1985. The 1956 ash basin is located north of the former Plant, and the remaining ash basins are located south of the Plant area. The 1963 and 1970 ash basins were constructed on the west side of the Plant property adjacent to the Cape Fear River. The 1978 ash basin was constructed east of and abutting the 1963 and 1970 ash basins. The 1985 ash basin was constructed east of the existing ash basins between the discharge canal and Corinth Road. The ash basins are impounded by earthen dams. A 500-foot compliance boundary encircles the ash basins. The ash basin locations are indicated on **Figure 2**.

Currently, the 1956, 1963, and 1970 ash basins are dry and entirely covered with vegetation (both hardwood and pine trees). A small area near the southern end of the 1970 ash basin is seasonally wet. The 1978 ash basin is partially vegetation-covered (both trees and scrub), and a portion of the southern end of the ash basin retains water. The 1985 ash basin has some grass cover and ponded water in the southwest corner of the ash basin.

Discharges from the ash basins are permitted by the NCDENR DWR under NPDES Permit NC0003433.

3.0 SITE GEOLOGY AND HYDROGEOLOGY

3.1 Site Geologic/Soil Framework

The Cape Fear Plant is situated in the Piedmont plateau region of central North Carolina, a few miles northwest of the contact between the Piedmont and the North Carolina Coastal Plain. The Piedmont is characterized by well-rounded hills and rolling ridges. Elevations in the area of the Cape Fear Plant are between 150 and 200 feet above mean sea level.

Geologically, the Plant is located within the Deep River Basin, an irregular, half graben structural feature of Triassic age. In the area of the Plant, the basin is surrounded by and presumably underlain by igneous and metamorphic rocks of the Carolina Terrane rocks. According to the *Geologic Map of North Carolina* (1985), the Cape Fear Plant is situated within the rocks of the Pekin Formation of the Chatham Group; although, the Plant appears to be situated near the gradational contact of the Pekin Formation with the Cumnock Formation (Figure 3). The *Geologic Map of North Carolina* (1985) describes each of these units as being comprised of fluvial sedimentary rocks such as conglomerate, sandstone, and mudstone.

3.2 Site Hydrogeologic Framework

An accepted conceptual model of groundwater flow in the Piedmont has been articulated by LeGrand (1988; 2004). In the Piedmont, the groundwater system is effectively a two-medium system restricted to the local drainage basin and comprised of two interconnected layers: residuum/saprolite and weathered rock overlying fractured crystalline rock separated by the transition zone. Typically, the residuum/saprolite is partly saturated and the water table fluctuates within it. The residuum acts as a reservoir for water supply to the fractures and joints in the underlying bedrock. Relatively shallow fractured crystalline rocks can form extensive aquifers, and the character of such aquifers results from the combined effects of the rock type, fracture system geometry, topography, and weathering. Topography exerts an influence on both weathering and the opening of fractures while the weathering of the crystalline rock modifies both transmissive and storage characteristics.

Shallow groundwater generally flows from local recharge zones in topographically high areas, such as ridges, toward groundwater discharge zones, such as stream valleys. Groundwater flow patterns in recharge areas tend to develop a somewhat radial pattern from the center of the recharge area outward toward the discharge areas and mimic surface topography. Within each of these small, localized drainage basins, the movement of groundwater is generally restricted to the area extending from the drainage divides to a perennial stream or river (slope-aquifer system; LeGrand 1988,

2004). Each basin is similar to adjacent basins and the conditions are generally repetitive from basin to basin. Within a basin, rarely does groundwater move beneath a perennial stream or river to another more distant stream (LeGrand 2004).

Groundwater beneath the Plant area occurs within the residuum at depths ranging from about 10 feet to about 20 feet below the ground surface. Depths to groundwater in wells completed in the shallow bedrock are similar. Groundwater elevations from paired wells typically show slight downward vertical gradients in upland areas and an upward gradient near the Cape Fear River. Analysis of potentiometric data for Plant wells confirms that groundwater flows from upland areas located east of the Plant towards the west-southwest toward the Cape Fear River.

4.0 IDENTIFICATION OF NEW DISCHARGES

4.1 Purpose of Inspection

The purpose of the inspection is to identify new discharges and indicators of potential new discharges, including toe drain outfalls, seeps, and weeps associated with the coal combustion residuals surface impoundments (ash basins).

4.2 Seepage

Seepage is considered to be the movement of wastewater from the ash basin through the ash basin embankment, the embankment foundation, the embankment abutments, or 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, 1985). However, in many instances, indicators of seeps do not necessarily indicate the presence of seeps.

4.3 Areas To Be Inspected for New Discharges

The areas to be inspected are the areas of the site where water contained in the ash basins might infiltrate into the underlying residual material and be expressed as seepage. The extent of the areas to be inspected was determined based on site topography and surface water drainage features around the ash basins. Areas to be inspected are shown on **Figure 2**.

4.4 Inspection Procedure

The inspection procedure for identification of new discharges and indicators of potential new discharges associated with the Cape Fear Plant ash basins is provided in **Appendix A**. In addition to the specific requirements for the inspection, **Appendix A** also provides the general requirements, the frequency of inspections, documentation requirements, and provides a decision flow chart for determining if the potential new discharge is associated with the ash basins.

5.0 REFERENCES

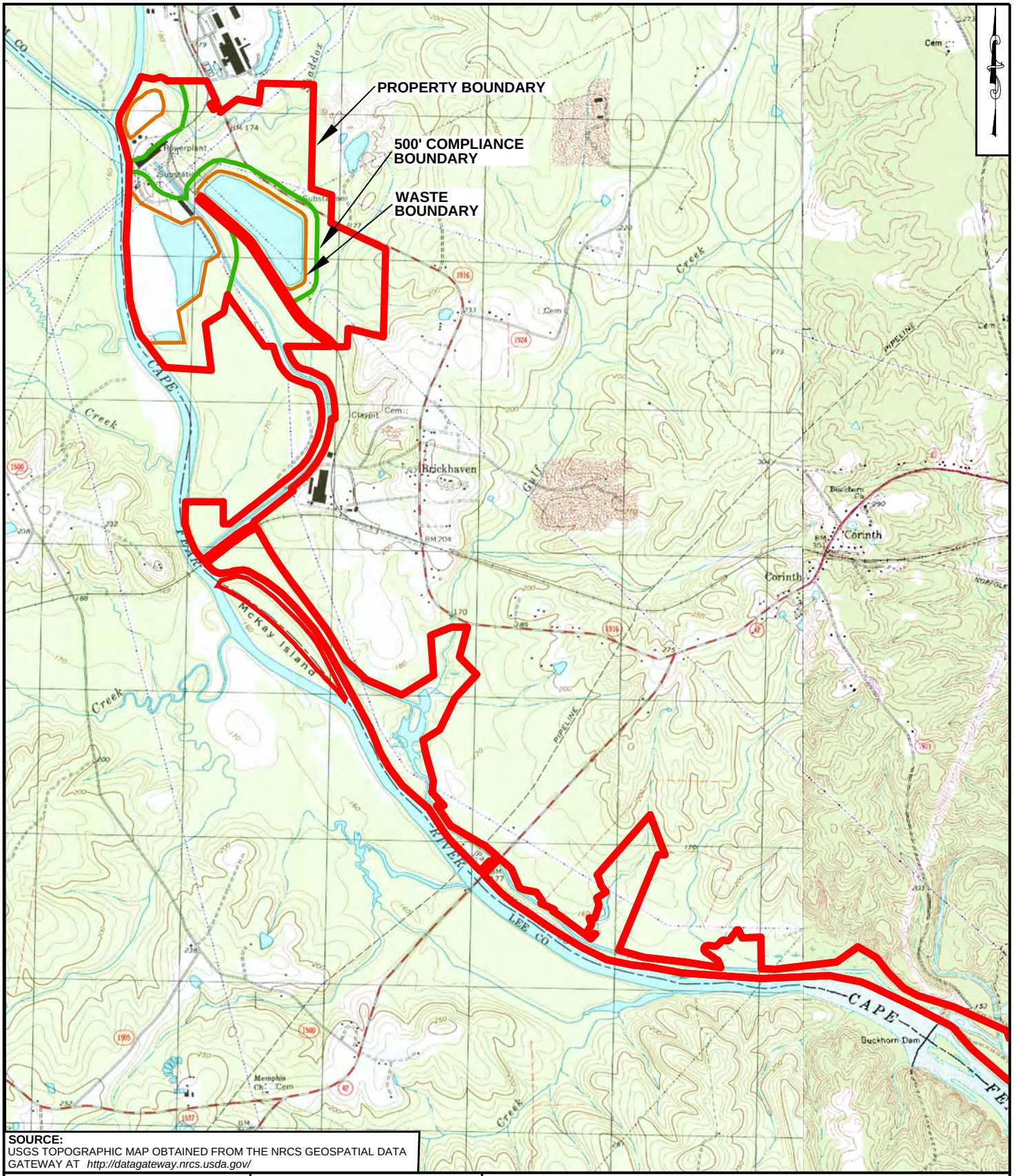
LeGrand, H.E., 1988, *Region 21, Piedmont and Blue Ridge*, p.201-208, in Black, W., Rosenhein, J.S., and Seaber, P.R., eds., Hydrogeology: Geological Society of America, The Geology of North America, v. O-2, Boulder, Colorado, 524 p.

LeGrand, Harry, Sr. 2004. A Master Conceptual Model for Hydrogeological Site Characterization in the Piedmont and Mountain Region of North Carolina, North Carolina Department of Environment and Natural Resources.

NCDENR, "Dam Operation, Maintenance, and Inspection Manual", 1985 (Revised 2007).

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

FIGURES



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

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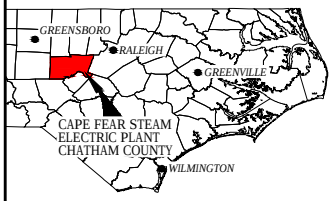
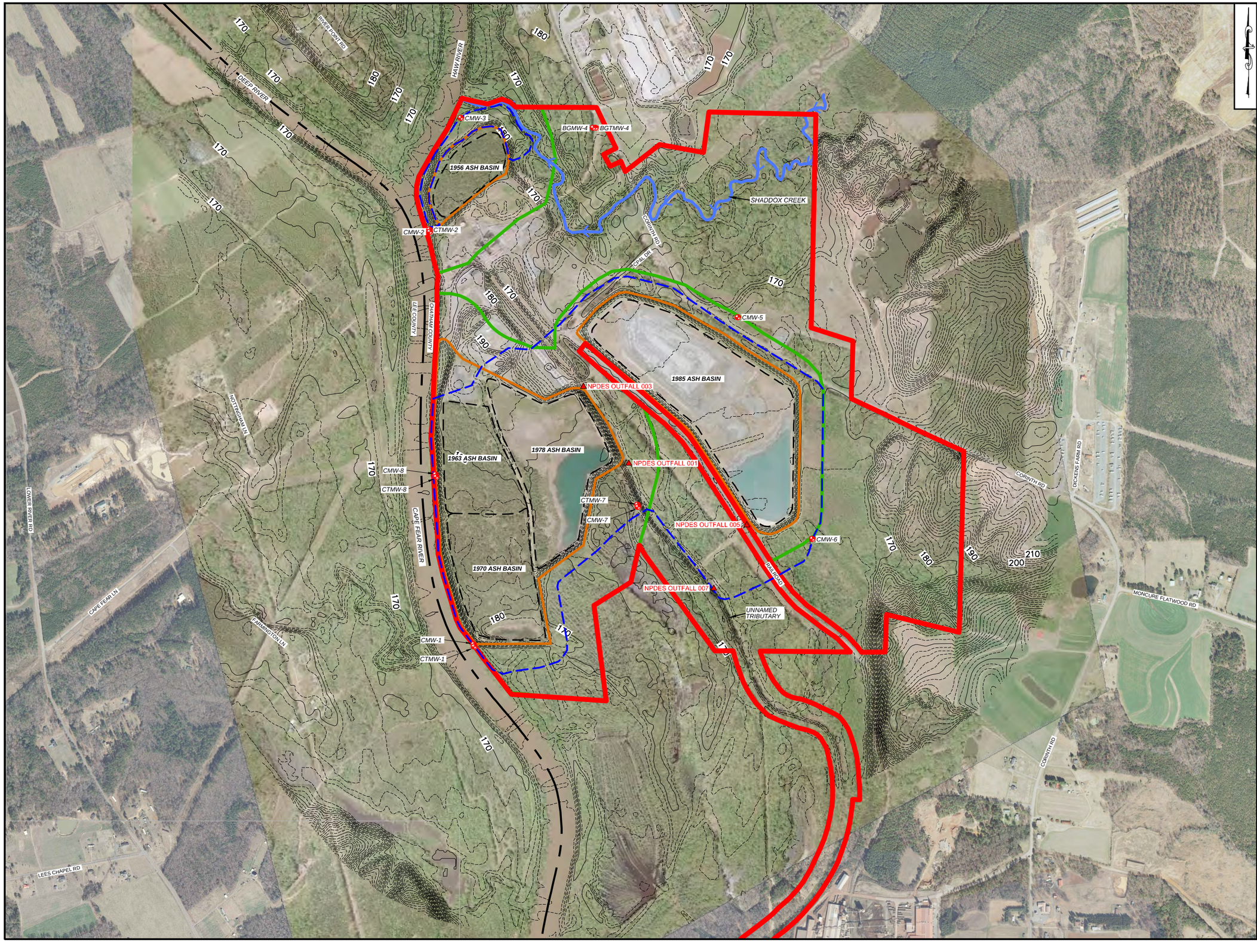


FIGURE 1
SITE LOCATION MAP
CAPE FEAR STEAM ELECTRIC PLANT
500 CP&L ROAD
MONCURE, NORTH CAROLINA
MONCURE, NC QUADRANGLE

DRAWN BY: S. ARLEDGE
PROJECT MANAGER: KATHY WEBB
LAYOUT: FIG 1 (USGS SITE LOCATION)
DATE: 2014-09-26
CONTOUR INTERVAL: 10 FEET
MAP DATE: 1993

GRAPHIC SCALE
1500 0 1500 3000
IN FEET



LEGEND

- DUKE ENERGY PROGRESS CAPE FEAR PLANT
- 500 ft COMPLIANCE BOUNDARY
- WASTE BOUNDARY
- BOUNDARY OF AREA TO BE INSPECTED FOR SEEPS
- FLOW DIRECTION
- 170 — 2007 LiDAR CONTOUR MAJOR
- 2007 LiDAR CONTOUR MINOR
- NPDES OUTFALL 001 — NPDES OUTFALL LOCATION
- CMW-5 — ASH BASIN COMPLIANCE GROUNDWATER MONITORING WELL

SOURCES:

1. 2013 HIGH RESOLUTION AERIAL PHOTOGRAPH OBTAINED FROM CHATHAM COUNTY GIS WEBSITE AT *http://www.chathamgis.com/* AND LEE COUNTY GIS WEBSITE AT *http://leecountync.gov/Departments/GISStrategicServices.aspx*
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).
4. 2ft CONTOUR INTERVALS FROM NCDOT LIDAR DATED 2007 *https://connect.ncdot.gov/resources/gis/pages/cont-elev_v2.aspx*

NOTE:

1. CONTOUR LINES ARE USED FOR REPRESENTATIVE PURPOSES ONLY AND ARE NOT TO BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

GRAPHIC SCALE
500 0 500 1000
IN FEET

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DRAWN BY:	S. ARLEDGE	DATE:	2014-09-26
CHECKED BY:	J. WYLIE	DATE:	2014-09-26
PROJECT MANAGER:	K. WEBB		
LAYOUT NAME:	FIG 2 (SEEP INSPECTION AREA)		

DUKE ENERGY PROGRESS

CAPE FEAR STEAM ELECTRIC PLANT
500 CP & L ROAD
MONCURE, NORTH CAROLINA

FIGURE 2
AREAS TO BE INSPECTED FOR SEEPS

APPENDIX A

INSPECTION FOR IDENTIFICATION OF NEW DISCHARGES

1. Purpose of Inspection

The purpose of the inspection is to identify new discharges and indicators of potential new discharges, including toe drain outfalls, seeps, and weeps that arise after the initial submittal of maps required by North Carolina General Statute 130A-309.210(a)(2)(ii). Seepage is considered to be the movement of wastewater from the ash basin through the ash basin embankment, the embankment foundation, the embankment abutments, or through residual material in areas adjacent to the ash basin. Therefore, a seep is defined in this document as an expression or occurrence of potential wastewater at the ground surface. A weep is understood to have the same meaning as a seep. If new discharges or indicators of potential new discharges are identified, the decision flow chart (see Figure A-1) will be used to determine if the potential new discharge is from the ash basin and if notification to the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Resources (DWR) is required.

2. General Inspection Requirements

2.1. Inspections are to be performed on areas that are below the ash basin full pond elevation and within the area shown on **Figure A-2**. The scope of the inspections includes identification of seeps from residual ground and outfalls from engineered channels.

2.2. If required, a larger scale figure showing the locations of outfalls from engineered channels will be developed. If a separate figure showing outfalls from engineered channels is not developed, **Figure A-2** will be revised to show these features.

2.3. Inspections of areas on or adjacent to the ash basin embankments should be performed within two months after mowing, if possible.

2.4. Inspections should not be performed if the following precipitation amounts have occurred in the respective time period preceding the planned inspection:

2.4.1. Precipitation of 0.1 inches or greater within 72 hours, or

2.4.2. Precipitation of 0.5 inches or greater within 96 hours.

2.5. Record most recent ash basin water surface elevation.

2.6. Review previous inspections for new discharges prior to performing inspection.

2.7. Review the most recent previous dam inspections.

2.8. Conduct an interview with the Site Environmental Coordinator prior to performing inspection to inquire about possible changes to site conditions, such as pond elevations, operations, additions or removal of wastewater discharges to the ash basin, changes to site surface water drainage, etc.

3. Frequency of Inspections

Inspections will be performed on a semi-annual basis during the first quarter of the year (January to March representative of seasonal high precipitation and while vegetation is dormant) and during the third quarter (July to September representative of seasonal low precipitation and vegetative growth).

4. Qualifications

The inspections shall be performed under the direction of a qualified Professional Engineer or Professional Geologist.

5. Documentation of Inspection

The inspection shall be documented by the individual performing the inspection. The report should contain observations and descriptions of the seeps observed, changes in observations compared to previous inspections, estimates of flows quantities, and photographs of seeps and outfalls of engineered channels designed or improved for collecting water from the impoundment. Photographs are to be numbered and captioned.

6. Initial Inspection

An initial inspection should be performed to identify features and document baseline conditions including location, extent (i.e., dimensions of affected area), and flow. Seep locations should be recorded using a Global Positioning System (GPS) device. Photographs should be taken from vantage points that can be replicated during subsequent semi-annual inspections.

7. Inspection For New Seeps at Outfalls From Engineered Outfalls

Inspect the outfalls from engineered channels designed and/or improved (such as through the placement of rip-rap) associated with the ash basin dikes to identify new seeps or indicators of new seeps.

7.1. Inspect all outfalls from engineered channels designed and/or improved (such as through the placement of rip-rap).

7.2. Document the condition of the outfall of the engineered channel with photographs. Photographs are to be taken from a similar direction and scale as the original photographs taken during the initial inspection.

7.3. Observe outfall for seepage and for indicators of seeps.

7.4. Compare current seepage location, extent, and flow to seepage photographs and descriptions from previous inspections.

7.5. Record flow rate if measureable.

8. Inspection For New Seeps Not Captured by Engineered Channels

Inspect areas below the ash basin full pond elevation and within the boundary of the area to be inspected as shown on **Figure A-2** to identify new seeps or indicators of new seeps. Inspect topographic drainage features that potentially could contain new seeps that potentially discharge from the ash basin. Requirements for documentation of the inspection are found in Section 5.

8.1. Previously Identified Seeps

a) Inspect previously identified seep locations. Document the condition of the seeps with a photograph. Photographs are to be taken from similar direction and at a similar scale as the original photograph documenting the seep. Describe the approximate dimensions and flow conditions of the seep.

b) If measureable, record flow.

c) Observe seep to determine if changes to location, extent, of flow are present. Document changes to location, extent, and/or flow amount or pattern.

8.2. New Seep or Indicators of Seep

a) Mark the location of new seep or indicators of seep using a GPS device.

b) Document the condition of the seeps or indicators of seeps with a photograph.

c) Describe the approximate dimensions and flow conditions of the seep.

d) Map the location of new seep or indicator of seep using GPS coordinate points collected during the site visit.

e) If seep or indicator of seep was not caused by changes in surface water drainage and if the location is below the ash basin pond elevation, utilize the decision flow chart to determine if the seep represents a discharge from the ash basin and if notification to DWR is required.

9. Update Maps Identifying Seeps

If new seeps are identified during the inspection, **Figure A-2** shall be updated to show the location of the new seeps.

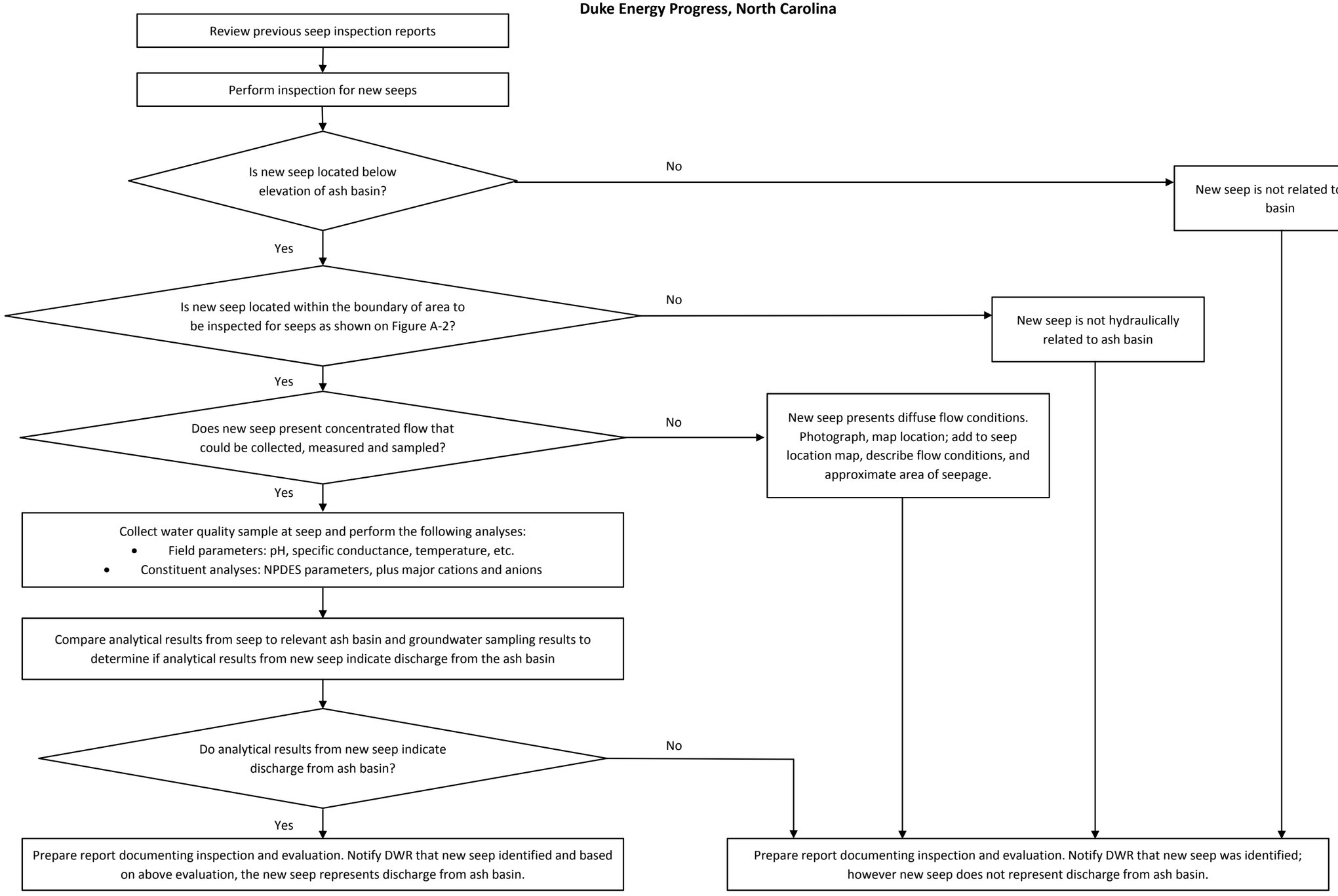
10. Decision Flow Chart

The decision flow chart developed to determine whether a new seep discharges from the ash basin is found in **Figure A-1**.

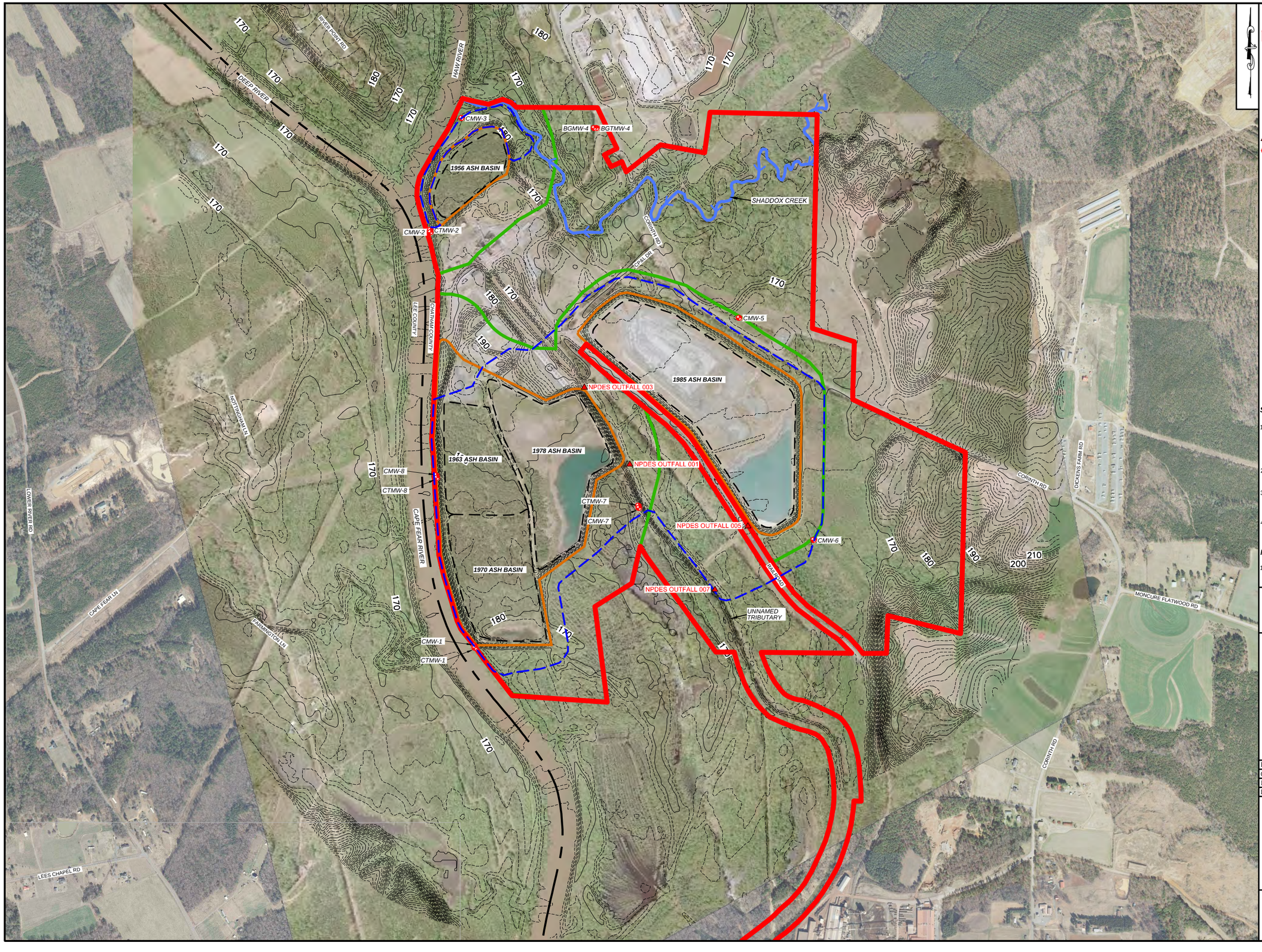
11. Procedure for Notifying NCDENR DWR If New Discharge Is Confirmed

If it is determined that a newly identified seep is present, Duke Energy will notify the DWR regional office by mail within 14 days after the determination.

Figure A-1 Decision Flow Chart for Determining If New Seep Represents Discharge From the Ash Basin Locations
Duke Energy Progress, North Carolina



Notes:
1. If no new seeps are identified, inspection will be documented however no notification to NCDENR DWR is required.
2. If new seeps are identified that do not represent discharge from the ash basin during the same inspection that identifies new seeps that do represent a discharge from the ash basin, a single report will be submitted to NCDENR DWR.



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DRAWN BY:	S. ARLEDGE	DATE:	2014-09-26
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LAYOUT NAME:	FIG A-2 (SEEP INSPECTION AREA)		

DUKE ENERGY PROGRESS

CAPE FEAR STEAM ELECTRIC PLANT
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FIGURE A-2
AREAS TO BE INSPECTED FOR SEEPS