



**PLAN FOR IDENTIFICATION  
OF NEW DISCHARGES**

**FOR**

**H.F. LEE ENERGY COMPLEX  
1199 BLACK JACK CHURCH ROAD  
GOLDSBORO, NORTH CAROLINA 27530  
NPDES PERMIT #NC0003417**

**PREPARED FOR**

**DUKE ENERGY PROGRESS, INC.  
410 S. WILMINGTON STREET/NC14  
RALEIGH, NORTH CAROLINA 27601**

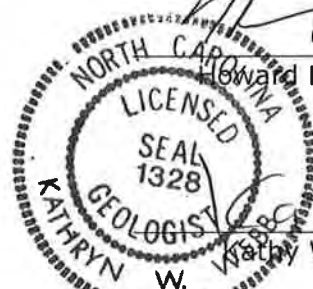


**SUBMITTED: SEPTEMBER 2014**

**PREPARED BY:  
SYNTERRA  
148 RIVER STREET  
GREENVILLE, SOUTH CAROLINA  
(864) 421-9999**



Howard Frank, NC PG 2409  
Project Geologist



Kathy Webb, NC PG 1328  
Project Manager



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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 H. F. Lee Energy Complex (Lee) ash basin operated under National Pollution Discharge Elimination System (NPDES) Permit #NC0003417.

The following requirements are contained in General statute 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 Lee Plant, a coal-fired electricity-generating facility located west of Goldsboro in Wayne County, North Carolina, as shown on **Figure 1**. The property encompasses approximately 2,100 acres, including the approximately 314-acre ash basins (171-acre inactive ash basins and 143-acre active ash basin). The property includes the cooling pond (Quaker Neck Lake), located to the east of the plant operations area. The Neuse River flows through the property as shown on **Figure 1**.

The Lee Plant 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. 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. Ash is no longer produced as part of electricity generation at the site.

Surface topography slopes downward toward the Neuse River, which bisects the Lee Plant property, entering along the southern property line at a point approximately 500 feet west of the plant. The river then flows north through the plant property before gradually bending eastward around the north side of the plant. A diversion canal with flow control structures connects the northern and southern sections of the river.

### 2.2 Ash Basin Description

Coal combustion residuals have been managed in the Plant's on-site ash basins, which includes three inactive ash basins located to the west of the plant operations area and an active ash basin northeast of the operations area (**Figure 1**). 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 due to the plant no longer generating coal combustion residuals. The individual ash management areas are shown on **Figures 2 and 3**.

Discharges from the ash basins are permitted by the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Resources (DWR) under the National Pollution Discharge Elimination System (NPDES) Permit NC0003417.

### **3.0 SITE GEOLOGY AND HYDROGEOLOGY**

#### **3.1 Site Geologic/Soil Framework**

Geographically, the Lee Plant lies within the Coastal Plain Physiographic Province (North Carolina Department of Natural Resources and Community Development, 1985). Two natural subdivisions of the Coastal Plain were described by Stuckey (1965): the Tidewater region and the Inner Coastal Plain. The Lee Plant is located within the Inner Coastal Plain, which consists of the gently rolling land surface between the Tidewater region and the Fall Line (Winner, Jr. and Coble, 1989), which is located approximately 20 miles west of the Plant.

The geology at the site consists of surficial sand. Underlying the surficial sand is the Yorktown and Duplin Formation (undifferentiated). Below the Yorktown/Duplin Formations is the Cape Fear Formation.

The Coastal Plain groundwater flow system consists of aquifers made of relatively permeable sand, gravel and limestone separated by confining units of relatively low hydraulic conductivity. The flow of groundwater is controlled by boundary conditions such as streams and rivers that have cut into the aquifer, lakes, extraction wells, etc., but generally moves to the southeast following the flow direction of the Neuse River. The average estimated hydraulic conductivity is 29 feet per day (Winner, Jr. and Coble, 1989).

#### **3.2 Site Hydrogeologic Framework**

The Plant property is bisected by the Neuse River, which flows along the southern property line to approximately 500 feet west of the plant and then flows north through the property before gradually bending eastward and then south. A diversion canal, with flow control structures, connects the northern and southern sections of the river. Other surface water features include Halfmile Branch and Beaverdam Creek. Each of these features feeds the Neuse River.

Surface topography at the Plant slopes downward toward the Neuse River. The Neuse River near the Lee Plant is not tidally influenced, but the river stage does respond to overland flow and groundwater flow to the river. Measurements taken at the nearby USGS gauging Station 02089000 (Neuse River near Goldsboro, NC), show that the Neuse River water level elevation has ranged between approximately 45 feet and 63 feet NAVD88.

Field activities at the Plant site indicate that the lithology generally consists of a layer of silty to clayey surficial deposits underlain by interbedded clay and sand of the

Yorktown Formation. The data suggest that the base of the surficial aquifer is a clay aquitard present at approximately 30 ft. msl elevation.

Groundwater flow is toward the Neuse River, which is likely the primary downgradient hydraulic boundary for the site. 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 msl.



## 4.0 IDENTIFICATION OF NEW DISCHARGES

### 4.1 Purpose of Inspection

The purpose of the inspection is to identify indicators of potential new discharges, including toe drain outfalls, seeps, and weeps associated with the coal combustion residuals 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 lush 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. The areas to be inspected are shown on **Figure 2 and 3**.

### 4.4 Inspection Procedure

The inspection procedure for identification of new discharges and indicators of potential new discharges associated with the Lee 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 basin(s).

## 5.0 REFERENCES

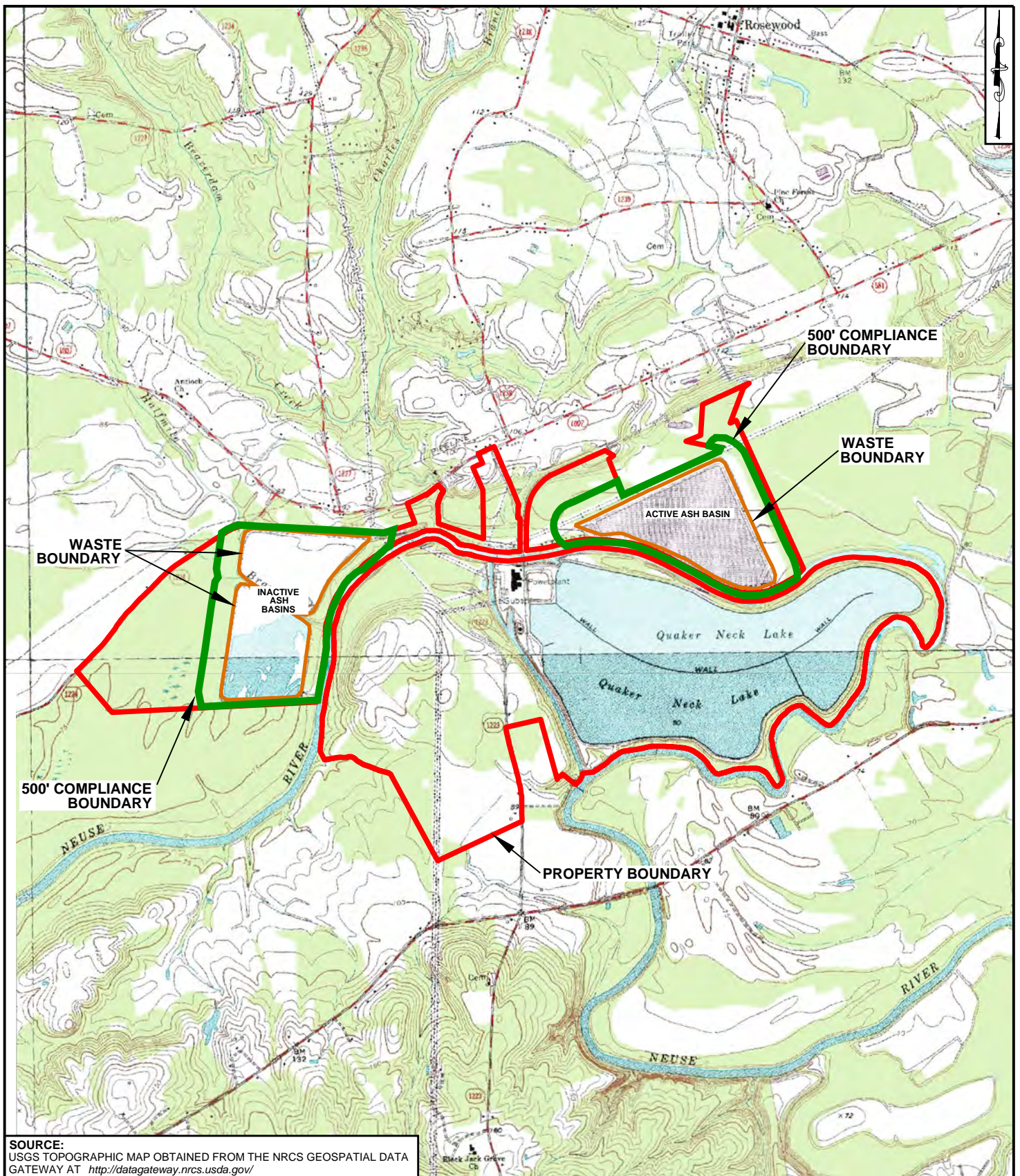
NCDENR, "Dam Operation, Maintenance, and Inspection Manual", 1985 (Revised 2007).

North Carolina Geological Survey, 1985, *Geologic map of North Carolina*: North Carolina Geological Survey, General Geologic Map, scale 1:500,000.

Stuckey, Jasper Leonidas, *North Carolina: Its Geology and Mineral Resources*, Raleigh, North Carolina Department of Conservation and Development, 1965.

Winner, M.D., Jr., and Coble, R.W., 1989, *Hydrogeologic framework of the North Carolina Coastal Plain aquifer system*: U.S. Geological Survey Professional Paper 1404-I, 106 p.

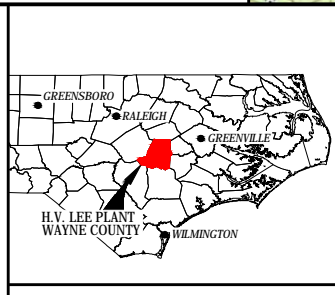
## **FIGURES**



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**  
**H.F. LEE ENERGY COMPLEX**  
**1199 BLACK JACK CHURCH ROAD**  
**GOLDSBORO, NORTH CAROLINA**  
**SOUTH AND NORTH**  
**GOLDSBORO, NC QUADRANGLES**

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

DATE: 2014-09-26  
 CONTOUR INTERVAL: 10 FEET  
 MAP DATE: 1974

GRAPHIC SCALE  
 1500 0 3000  
 IN FEET



**LEGEND**

- DUKE ENERGY PROGRESS LEE PLANT
- 500 ft COMPLIANCE BOUNDARY
- WASTE BOUNDARY
- BOUNDARY OF AREA TO BE INSPECTED FOR SEEPS
- ← FLOW DIRECTION
- 70 2007 LIDAR CONTOUR MAJOR
- 2007 LIDAR CONTOUR MINOR
- CW-4 ASH BASIN COMPLIANCE GROUNDWATER MONITORING WELL

- 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 TIPS 3200 (NAD 83).
  5. 2ft CONTOUR INTERVALS FROM NCDOT LIDAR DATED 2007 [https://connect.ncdot.gov/resources/gis/pages/cont-elev\\_v2.aspx](https://connect.ncdot.gov/resources/gis/pages/cont-elev_v2.aspx)

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PROJECT MANAGER:	K. WEBB		
LAYOUT NAME:	FIG 2 (SEEP IDENTIFICATION AREA)		



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**FIGURE 2**  
**AREAS TO BE INSPECTED FOR SEEPS - INACTIVE ASH BASINS**



**LEGEND**

- ▭ DUKE ENERGY PROGRESS LEE PLANT
- ▭ 500 ft COMPLIANCE BOUNDARY
- ▭ WASTE BOUNDARY
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- ▲ NPDES OUTFALL 001 NPDES OUTFALL LOCATION
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PROJECT MANAGER: K. WEBB	
LAYOUT NAME: FIG 3 (SEEP INSPECTION AREA)	

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**FIGURE 3**  
**AREAS TO BE INSPECTED FOR SEEPS - ACTIVE ASH BASIN**

**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.

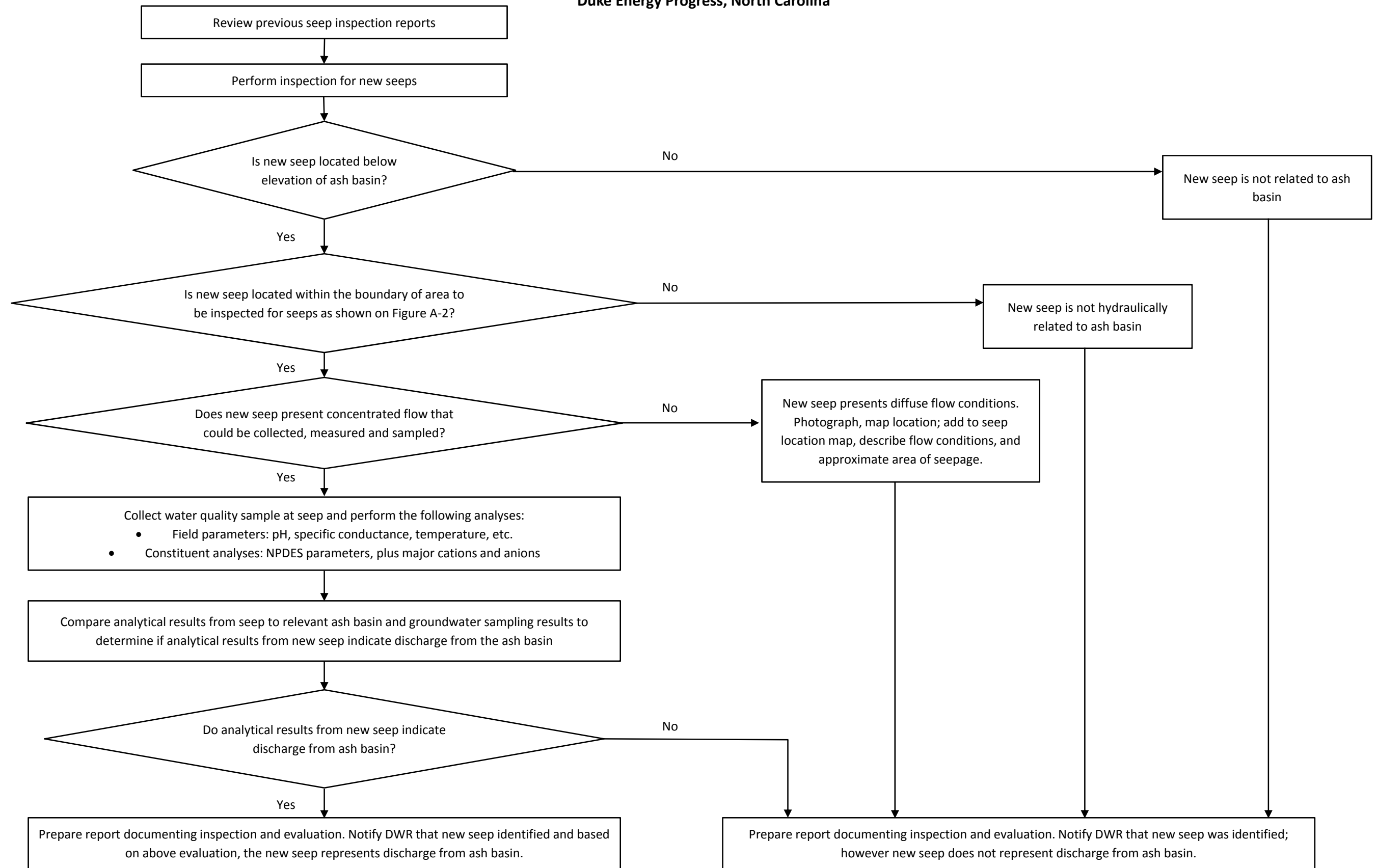
## **10. Decision Flow Chart**

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.



**LEGEND**

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- BOUNDARY OF AREA TO BE INSPECTED FOR SEEPS
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PROJECT MANAGER:	K. WEBB		
LAYOUT NAME:	FIG A-2 (SEEP IDENTIFICATION AREA)		



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**FIGURE A-2**  
**AREAS TO BE INSPECTED FOR SEEPS - INACTIVE ASH BASINS**



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PROJECT MANAGER:	K. WEBB		
LAYOUT NAME:	FIG A-3 (SEEP INSPECTION AREA)		

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**FIGURE A-3**  
**AREAS TO BE INSPECTED FOR SEEPS - ACTIVE ASH BASIN**