



**PLAN FOR IDENTIFICATION  
OF NEW DISCHARGES**

**FOR**

**L.V. SUTTON ENERGY COMPLEX  
801 SUTTON STEAM PLANT ROAD  
WILMINGTON, NORTH CAROLINA 28401  
NEW HANOVER COUNTY  
NPDES PERMIT #NC0001422**

**PREPARED FOR**

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

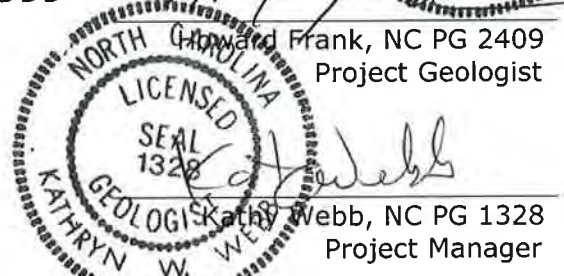


**SUBMITTED: SEPTEMBER 2014**

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



*Howard Frank*  
Howard Frank, NC PG 2409  
Project Geologist



## TABLE OF CONTENTS

SECTION	PAGE
<b>1.0 Introduction .....</b>	<b>1</b>
<b>2.0 Site Description.....</b>	<b>3</b>
2.1 Plant Description.....	3
2.2 Ash Basin Description .....	3
<b>3.0 Site Geology and Hydrogeology.....</b>	<b>4</b>
3.1 Site Geologic/Soil Framework.....	4
3.2 Site Hydrogeologic Framework.....	4
<b>4.0 Identification of New Discharges.....</b>	<b>5</b>
4.1 Purpose of Inspection .....	5
4.2 Seepage .....	5
4.3 Area to be Inspected for New Discharges .....	5
4.4 Inspection Procedure .....	5
<b>5.0 References.....</b>	<b>6</b>

### List of Figures

Figure 1 – Site Location Map

Figure 2 – Areas to be Inspected for Seeps

### List of Appendices

Appendix A – Inspection for Identification of New Discharges

## 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 L.V. Sutton Power Plant (Sutton) ash basin operated under National Pollution Discharge Elimination System (NPDES) Permit NC005363.

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 Sutton Plant, a former coal-fired electricity-generating facility located in New Hanover County, North Carolina, near the City of Wilmington. The location of the plant is shown on **Figure 1**. The Sutton Plant started operations in 1954.

As of November 2013, all of the coal-fired units were retired when a new, natural gas-fired combined-cycle unit began operation. The facility is located northwest of Wilmington on the west side of Highway 421. The topography around the property is relatively gentle, generally sloping downward toward the Cape Fear River.

The Sutton Plant utilizes an approximate 1,100-acre cooling pond located adjacent to the Cape Fear River. The ash management area is located adjacent to the cooling pond, north of the power plant, as shown on **Figure 2**.

### 2.2 Ash Basin Description

The Plant, cooling pond and ash management area are located on the east side of the Cape Fear River. The ash management area is located adjacent to the cooling pond, north of the Plant, as shown on **Figure 2**. The ash management area consists of:

- A former ash disposal area located south of the ash basins, on the south side of the canal;
- An ash basin built in approximately 1971 (old ash basin); and
- A clay-lined ash basin built in approximately 1984 (new ash basin) located toward the northern portion of the ash management area.

The ash basins are impounded by an earthen dike. The ash basin system was an integral part of the Plant's wastewater treatment system which received inflows from the ash removal system, Plant yard drain sump, and stormwater flows. During coal-fired electrical generation, inflows to the ash basins were highly variable due to the cyclical nature of operations. The Sutton Plant NPDES permit authorizes the discharge of cooling pond blowdown, recirculation cooling water, non-contact cooling water and treated wastewater from Internal Outfalls 002, 003 and 004 via Outfall 001 from the cooling pond to the Cape Fear River. The 500 foot compliance boundary circles the ash basins and former ash disposal area (**Figure 2**).

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

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

According to the *Geologic Map of North Carolina* (1985), the Sutton Plant lies within the Coastal Plain Physiographic Province. The North Carolina Coastal Plain is approximately 90 to 150 miles wide from the Atlantic Ocean westward to its boundary with the Piedmont province. Two natural subdivisions of the Coastal Plain were described by Stuckey (1965): the Tidewater region and the Inner Coastal Plain. The Site is located within the Tidewater region, which consists of the coastal area where large streams and many of their tributaries are affected by ocean tides (Winner, Jr. and Coble, 1989). The Sutton Plant is located on the east side of the Cape Fear River within the alluvial plain between the coastal dunes and the interior uplands (NUS Corporation, 1989).

Based on monitoring well logs, the surficial aquifer at the Plant consists generally of brown to tan poorly graded sand; with gray, well to poorly graded sand at depth, with indications of gray clay lenses and fine gravel. The boring logs do not indicate that the Castle Hayne confining unit was encountered during drilling activities, indicating that in the Sutton Plant area, the surficial aquifer is at least 50 feet thick.

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

In the eastern part of the North Carolina Coastal Plain, groundwater is obtained from the surficial, Castle Hayne, and Peedee aquifers. The Coastal Plain groundwater system consists of aquifers comprised of permeable sands, gravels, and limestone separated by confining units of less permeable sediment.

The surface of groundwater at the Sutton Plant is typically located at depths of less than 2 feet below land surface (bls) to greater than 20 feet bls based on topography. Based on the results of work conducted by others (BBL, 2004), the average linear groundwater flow velocity ranges from 109 to 339 feet per year. Water level maps for the site indicate the general direction of groundwater flow appears to be radial from the ash management area with flow toward the north, east, west, and south.

The average precipitation in the Wilmington, NC area is approximately 57 inches per year. Due to the high transmissivity characteristic of the surficial aquifer, recharge rates are expected to be high.

## 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 impoundment (ash basin).

### 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 Area 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 for new discharges was determined based on the site topography and proximity to the cooling pond. At the Sutton Plant, flow of water from the ash basins would be radial. The area to be inspected is 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 Sutton 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

BBL, 2004. Phase I Remedial Investigation Report for the Former Ash Disposal Area, L.V. Sutton Steam Electric Plant, Wilmington, North Carolina.

NCDENR Document, "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.

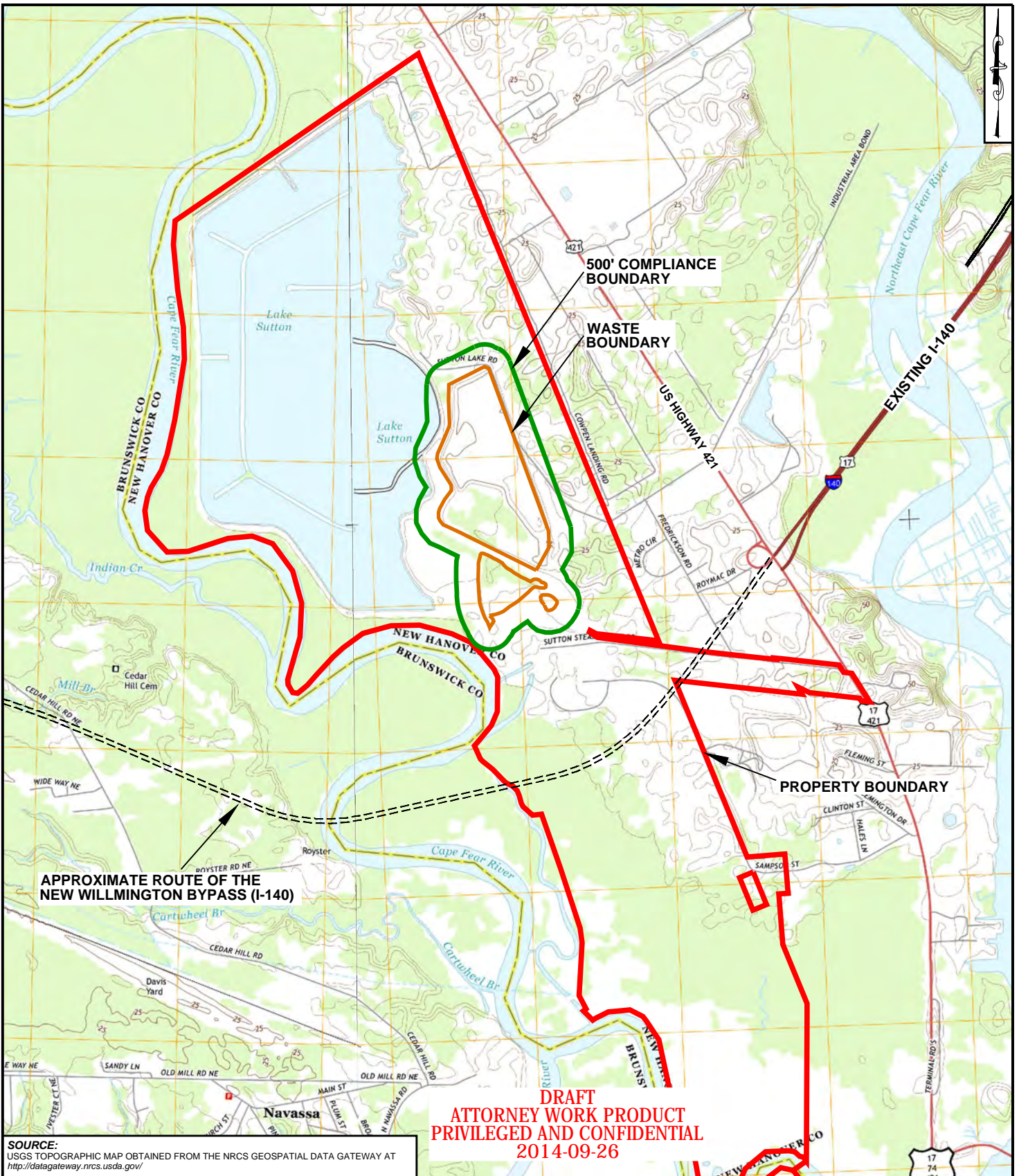
NUS Corporation 1989. Screening Site Inspection Phase I, Carolina Power and Lighting, Sutton Steam Plant, Wilmington, New Hanover County, North Carolina, EPA I.D. NCD000830646.

Stuckey, J.L., 1965, *North Carolina: Its Geology and Mineral Resources*, Raleigh, North Carolina Department of Conservation and Development, 550p.

Winner, M.D., Jr., and Coble, R.W., 1989, *Hydrogeologic Framework of the North Carolina Coastal Plain Aquifer System*: U.S. Geological Survey Open-File Report.



## **FIGURES**

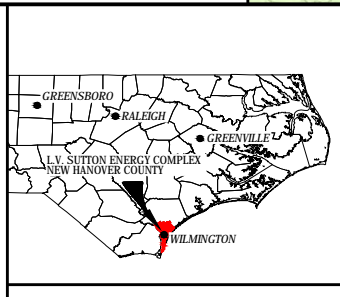


**DRAFT  
ATTORNEY WORK PRODUCT  
PRIVILEGED AND CONFIDENTIAL  
2014-09-26**

**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.synterratorp.com](http://www.synterratorp.com)



**FIGURE 1  
SITE LOCATION MAP  
L.V. SUTTON ENERGY COMPLEX  
801 SUTTON POWER PLANT RD  
WILMINGTON, NORTH CAROLINA  
LELAND AND CASTLE HAYNE  
NC QUADRANGLES**

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

DATE: 2014-09-26  
CONTOUR INTERVAL: 10ft  
MAP DATE: 1999







**LEGEND**

- DUKE ENERGY PROGRESS SUTTON PLANT
- 500 ft COMPLIANCE BOUNDARY
- WASTE BOUNDARY
- BOUNDARY OF AREA TO BE INSPECTED FOR SEEPS
- 120 2007 LIDAR CONTOUR MAJOR
- 2007 LIDAR CONTOUR MINOR
- ▲ NPDES OUTFALL 002
- NPDES OUTFALL LOCATION
- ASH BASIN COMPLIANCE GROUNDWATER MONITORING WELL

- SOURCES:**
1. 2014 AERIAL PHOTOGRAPH WAS OBTAINED FROM WSP FLOWN ON APRIL 17, 2014
  2. 2013 AERIAL PHOTOGRAPH WAS OBTAINED FROM THE NRCS GEOSPATIAL DATA GATEWAY AT <http://datagateway.nrcs.usda.gov/>
  3. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE COORDINATE SYSTEM FIPS 3200 (NAD 83).
  4. PARCEL DATA WAS OBTAINED FROM THE NORTH CAROLINA STATE LIBRARIES AT <http://www.lib.ncsu.edu/gis/counties.html> FOR NEW HANOVER COUNTY.
  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)
  6. WELL LOCATIONS AND MEASURING POINTS WERE BASED ON A SURVEY BY JAMES L. HAINES & ASSOCIATES FOR ISH, INC. DATED DECEMBER 23, 2008. ISH DRAWING IS TITLED "POTENTIAL LOCATIONS FOR PROPOSED GEOPROBE AND WELL INSTALLATIONS", DATED FEBRUARY 25, 2009 WITH A CAD FILE NAME Figure 22.dwg
  7. NEW WELL LOCATIONS AND MEASURING POINTS WERE BASED ON A TABLE BY PARAMUNTE ENGINEERING, WILMINGTON NC DATED 2012-03-05 SUPPLIED BY PROGRESS ENERGY. HORIZONTAL DATUM IS NAD83(NSRS2007) AND THE VERTICAL DATUM IS NGVD29.
  8. THE PROPERTY BOUNDARY FOR THE L.V. SUTTON STEAM ELECTRIC PLANT WAS BASED ON A COMPOSITE MAP PREPARED BY DAVIS-MARTIN-POWELL & ASSOC., INC. THE DRAWINGS ARE DATED JUNE, 1995 WITH REVISION NOTE FOR MARCH 4, 2004. FILE NAME IS L10-90227.DWG. HORIZONTAL DATUM IS NAD83 AND THE VERTICAL DATUM IS NGV 29.
  9. THE LOCATION OF THE FORMER ASH DISPOSAL AREAS WAS BASED ON A FIGURE 2-2 PREPARED BY BLASLAND, BOUCK & LEE, INC. THE FIGURE IS TITLED "HORIZONTAL EXTENT OF THE ASH WITHIN THE FORMER DISPOSAL AREA".
- NOTE:**
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148 River Street, Suite 220  
Greenville, South Carolina 29601  
864-421-9999  
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DRAWN BY:	S. ARLEDGE	DATE:	2014-09-26
CHECKED BY:	H. FRANK	DATE:	2014-09-26
PROJECT MANAGER:	K. WEBB		
LAYOUT NAME:	FIG 2 (SEEP INSPECTION AREA)		

L.V. SUTTON ENERGY COMPLEX  
801 SUTTON POWER PLANT RD  
WILMINGTON, 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

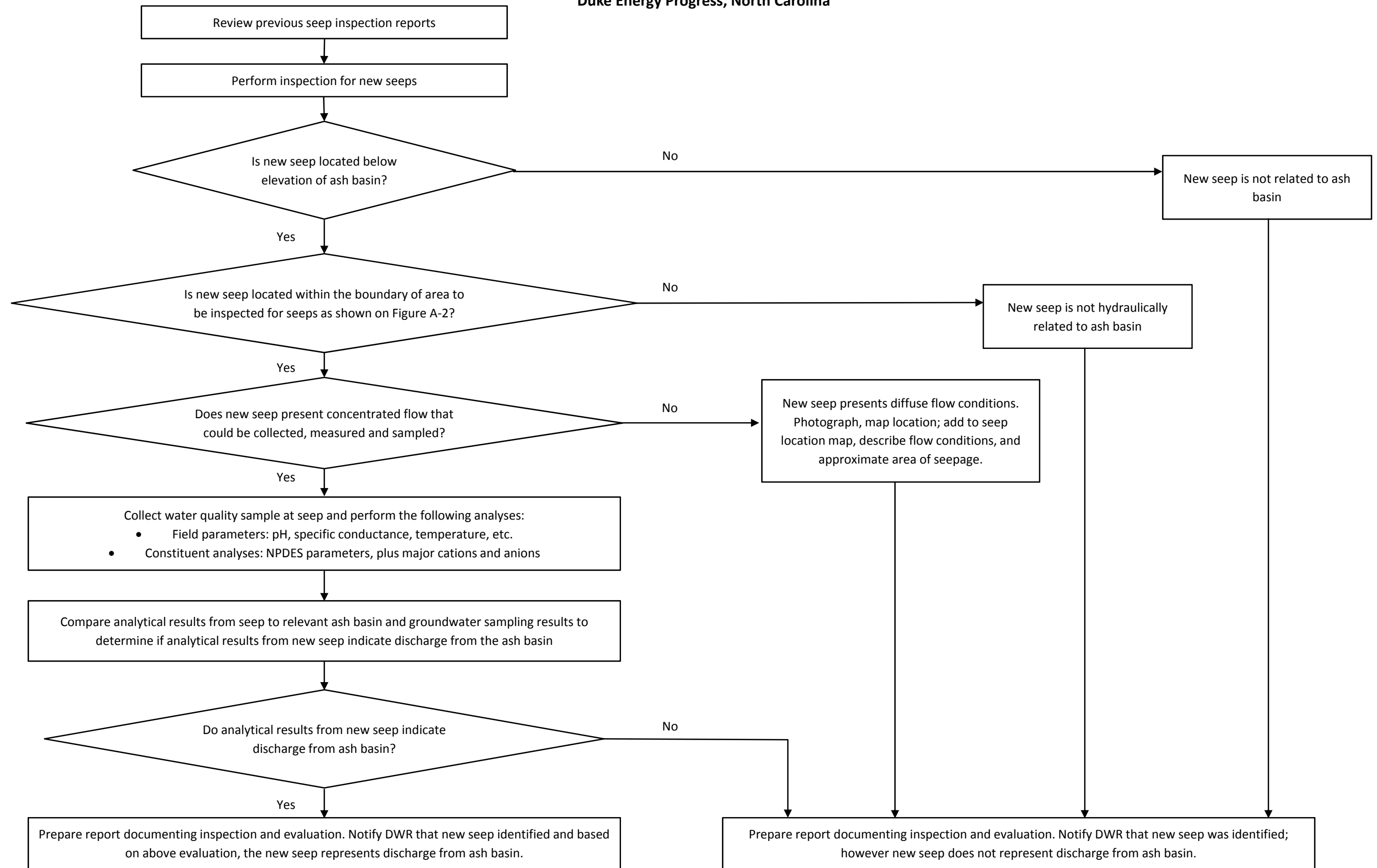
The decision flow chart developed to determine whether a new seep discharges from the ash basin is found in **Figure A-1**.

## 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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Greenville, South Carolina 29601  
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[www.synterracorp.com](http://www.synterracorp.com)

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

L.V. SUTTON ENERGY COMPLEX  
801 SUTTON POWER PLANT RD  
WILMINGTON, NORTH CAROLINA

**FIGURE A-2  
AREAS TO BE  
INSPECTED FOR SEEPS**