

2017 Annual Dam and Dike Inspection Report

Bottom Ash Pond

**Northeastern 3&4 Plant
Public Service Company of Oklahoma
Oologah, Oklahoma**

November 2017

Prepared for: Public Service Company of Oklahoma – Northeastern 3&4 Plant

Prepared by: American Electric Power Service Corporation

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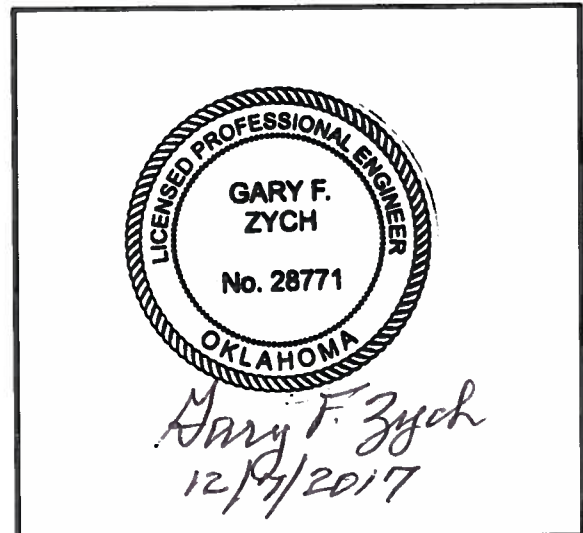
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I certify to the best of my knowledge, information and belief the information contained in this report meets the requirements of 40 CFR § 257.83(b).

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1.0 INTRODUCTION

This report was prepared by AEP- Geotechnical Engineering Services (GES) section, in part, to fulfill requirements of 40 CFR 257.83 and to provide the Northeastern 3&4 Plant an evaluation of the facility.

Mr. Gary F. Zych, P.E. performed the 2017 inspection of the Bottom Ash Pond at the Northeastern 3&4 Power Station. This report is a summary of the inspection and an assessment of the general condition of the facility.

Mr. Bryan White and Mr. Sam Miller, personnel at the Plant, accompanied the AEPSC staff during the inspection. The inspection was performed on November 7, 2017. Weather conditions were cloudy and the temperature was in the lower 40's (°F). There was 0.10-inch of rainfall over the seven days prior to the inspection. The embankments were also recently mowed. The water level in the pond was at an operational pool elevation of 624.0.

2.0 DESCRIPTIONS OF IMPOUNDMENT

Figure 1 provides a plan view, in the form of a satellite image, of the Bottom Ash Pond, the embankment structure or dam, pertinent dam features, and the dam's appurtenances. The dam is a 4,200-foot long cross-valley impoundment on an unnamed tributary to Fourmile Creek. The dam is roughly U-shaped and has been divided into north, west, and south embankments for this inspection.

There is no principal spillway at the bottom ash pond; water is typically recirculated back to the power plant for reuse. The auxiliary spillway at the bottom ash pond is a concrete overflow structure with a design invert elevation of 625.0 ft. Overflow from the spillway discharges to a low area and then flows through a culvert under a railroad and off site. Figure 1 shows the spillway and discharge culvert locations.

The downstream toe of the dam was designed with a toe drain along the west and south embankments. This drainage system consists of a 1.5-foot-thick sand and gravel drainage blanket layer that extends along the dam subgrade from the toe toward the centerline of the embankment as shown on the design drawings. The drainage blanket is connected to a gravel and sand bedding layer, 9-inches in thickness, at the toe that runs 12 feet up the slope from the toe and is overlain by a 1-foot layer of riprap. The toe drain was designed to drain seepage from the dam at any point along its length; i.e., there are no seepage collection pipes to discharge seepage at specific locations. As a consequence, seepage will tend to collect and discharge at the lowest elevation along the toe. This area is near the western end of the south embankment at the location of the pre-existing natural streambed, at the pipe under the access road.

A railroad track used for coal deliveries to the plant runs along the crest of the west and south dikes.

3.0 REVIEW OF AVAILABLE INFORMATION (257.83(b)(1)(i))

A review of available information regarding the status and condition of the Bottom Ash Pond which include files available in the operating record, such as design and construction information, previous periodic structural stability assessments, previous 7 day inspection reports, and previous annual inspections has been conducted. Based on the review of the data there were no signs of actual or potential structural weakness or adverse conditions.

As noted in the previous Inspection Report, the joint caulking material was replaced at the auxiliary spillway. That material was intact and good condition at the time of this inspection.

4.0 INSPECTION (257.83(b)(1)(ii))

4.1 CHANGES IN GEOMETRY SINCE LAST INSPECTION (257.83(b)(2)(i))

No modifications have been made to the geometry of the Bottom Ash Pond since the previous annual inspection. The geometry of the impoundment has remained essential unchanged.

4.2 INSTRUMENTATION (257.83(b)(2)(ii))

The location and type of instrumentation is shown on Figure 2. The maximum recorded readings of each instrument since the previous annual inspection is shown in Table 1 below. The readings collected since the last inspection were all within their normal safe operating ranges.

Additionally, the seepage collected at the toe of the south embankment is measured at the culvert. Since the installation of the new culvert in 2016, there has been no measurable flow from the culvert.

Table 1

INSTRUMENTATION DATA			
Bottom Ash Pond			
Instrument	Type	Maximum Reading since last annual inspection	Date of reading
MW-01	Piezometer	609.1	7/27/2017
MW-02	Piezometer	600.24	5/3/2017

4.3 IMPOUNDMENT CHARACTERISTICS (257.83(b)(2)(iii, iv, v))

Table 2 is a summary of the minimum, maximum, and present depth and elevation of the impounded water & CCR since the previous annual inspection; the storage capacity of the impounding structure at the time of the inspection; and the approximate volume of the impounded water and CCR at the time of the inspection. [Note: the volume calculations have been revised in this report based on the elevation-storage data from an 2011 Engineering report and the 1970 quad map. The total capacity at elevation 630 is 396 ac-ft. CCR deposition has mainly been from elevation 626 and higher.]

Table 2

IMPOUNDMENT CHARACTERISTICS	
Bottom Ash Pond (crest elev: 630.0; lowest 604.0)	
Approximate Minimum depth of impounded water since last annual inspection	18.8 ft. (622.8)
Approximate Maximum depth of impounded water since last annual inspection	21.0 ft. (625.0)
Approximate Present depth of impounded water at the time of the inspection	20.0 ft. (624.0)
Approximate Minimum depth of CCR since last annual inspection	5 ft.
Approximate Maximum depth of CCR since last annual inspection	5 ft.

Approximate Present depth of CCR at the time of the inspection	5 ft.
Storage Capacity of impounding structure at the time of the inspection	183 ac-ft.
Approximate volume of impounded water at the time of the inspection	183 ac-ft.
Approximate volume of CCR at the time of the inspection	145 ac-ft (el 625 -630)

4.4 DEFINITIONS OF VISUAL OBSERVATIONS AND DEFICIENCIES

This summary of the visual observations uses terms to describe the general appearance or condition of an observed item, activity or structure. The meaning of these terms is as follows:

- Good:** A condition or activity that is generally better or slightly better than what is minimally expected or anticipated from a design or maintenance point of view.
- Fair/Satisfactory:** A condition or activity that generally meets what is minimally expected or anticipated from a design or maintenance point of view.
- Poor:** A condition or activity that is generally below what is minimally expected or anticipated from a design or maintenance point of view.
- Minor:** A reference to an observed item (e.g., erosion, seepage, vegetation, etc.) where the current maintenance condition is below what is normal or desired, but which is not currently causing concern from a structure safety or stability point of view.
- Significant:** A reference to an observed item (e.g. erosion, seepage, vegetation, etc.) where the current maintenance program has neglected to improve the condition. Usually conditions that have been identified in the previous inspections, but have not been corrected.
- Excessive:** A reference to an observed item (e.g., erosion, seepage, vegetation, etc.) where the current maintenance condition is above or worse than what is normal or desired, and which may have affected the ability of the observer to properly evaluate the structure or particular area being observed or which may be a concern from a structure safety or stability point of view.

This document also uses the definition of a “deficiency” as referenced in the CCR rule section §257.83(b)(5) Inspection Requirements for CCR Surface Impoundments. This definition has been assembled using the CCR rule preamble as well as guidance from MSHA, “Qualifications for Impoundment Inspection” CI-31, 2004. These guidance documents further elaborate on the definition of deficiency. Items not defined by deficiency are considered maintenance or items to be monitored.

A “deficiency” is some evidence that a dam has developed a problem that could impact the structural integrity of the dam. There are four general categories of deficiencies. These four categories are described below:

1. Uncontrolled Seepage

Uncontrolled seepage is seepage that is not behaving as the design engineer has intended. An example of uncontrolled seepage is seepage that comes through or around the embankment and is not picked up and safely carried off by a drain. Seepage that is collected by a drain can still be uncontrolled if it is not safely collected and transported. Seepage that is not clear and is turbid would also be considered as uncontrolled. Seepage that is unable to be measured and/or observe it is considered uncontrolled seepage.

Note: Wet or soft areas are not considered as uncontrolled seepage, but can lead to this type of deficiency. These areas should be monitored more frequently.

2. Displacement of the Embankment

Displacement of the embankment is large scale movement of part of the dam. Common signs of displacement are cracks, scraps, bulges, depressions, sinkholes and slides.

3. Blockage of Control Features

Blockage of Control Features is the restriction of flow at spillways, decant or pipe spillways, or drains.

4. Erosion

Erosion is the gradual movement of surface material by water, wind or ice. Erosion is considered a deficiency when it is more than a minor routine maintenance item.

4.5 VISUAL INSPECTION (257.83(b)(2)(i))

A visual inspection of the Bottom Ash Pond was conducted to identify any signs of distress or malfunction of the impoundment and appurtenant structures. Specific items inspected included all structural elements of the dam such as inboard and outboard slopes, crest, and toe; as well as appurtenances.

Selected inspection photos are included in Attachment A. Additional pictures taken during the inspection can be made available upon request.

North Embankment

1. The intake structure was in good structural condition. The metal platform and concrete structure show no signs of deterioration. The intake screen was clear of debris. The staff gauge was in good condition.
2. The interior slopes show no signs of sloughing or bulges. The riprap protection along the slope within the operating pool range is in good condition and has not deteriorated. There was no grassy vegetation growing within the riprap since the plant performs periodic maintenance and spraying to control weedy/woody vegetation. [Observation 3]
3. The exterior slope of the embankment was well vegetated. The grass along the exterior slope was recently mowed. There were no signs of sloughing or other slope movement. [Observation 1]
4. The crest appeared in good and stable condition with no significant settlement, misalignment, or noticeable sign of distress.

Auxiliary Spillway

1. The concrete control section and discharge chute were in good condition and clear of any heavy vegetation or debris that would restrict flow. [Observations 1 & 3]

2. There were no signs of movement or misalignment along any of the construction joints except for the joint at the top of the chute. However, this has been observed in all past inspections and probably occurred some time ago. The joint material at this location was replaced as noted in last year's report. There was no seepage along the contacts between the concrete training walls and exterior slope of the embankment, nor at the end of the concrete chute. The auxiliary spillway was not activated since the last annual inspection.
3. The energy dissipater baffles at the toe of the spillway were clear of sediment and were in good condition.

West Embankment

1. The interior slope of this embankment was in good condition. The rip rap was free of any vegetation.
2. The area beyond the toe of the embankment has been well maintained to prevent heavy and/or woody vegetation within the regulatory 30-foot setback. The exterior slope is well vegetated and maintained. There was no seepage noted along the toe of the West embankment. [Observations 4 & 8]
3. The crest and railroad tracks do not show any signs of settlement or misalignment. The tracks are inspected monthly by an outside company to ensure no misalignment or settlement.
4. There were 2 rodent holes located in the West Embankment exterior slope. The holes were flagged for repair. The holes were older and appeared to be abandoned.

South Embankment

5. The interior slope of the South Dike embankment was in good condition. There were no signs of bulges, cracks, sloughing or other deficiencies. The rip rap was free of vegetation and the grass cover was recently mowed. The crest and railroad tracks do not show any signs of settlement or misalignment. As noted above, the tracks are inspected regularly by an outside company to ensure no misalignment or settlement. [Observation 5]
6. The exterior slope is well vegetated and maintained. There was no observed seepage, wet or damp areas along the slope. [Observations 6 & 9]
7. The seepage collection blanket appears to be functioning as designed. Seepage is directed to the low area below the embankment and is typically discharged through a pipe below an access drive. The access drive pipe was replaced in early 2016 along with the gravel roadway above it. There was no apparent seepage flowing from the system although the downstream areas had some ponded water in the discharge swale. The ponded water was clear.
8. The area beyond the toe of the embankment has been well maintained to prevent heavy and/or woody vegetation within the regulatory 30 foot setback.

4.6 CHANGES THAT EFFECT STABILITY OR OPERATION (257.83(b)(2)(vii))

Based on interviews with plant personnel and field observations there were no changes to the Bottom Ash Pond since the last annual inspection that would affect the stability or operation of the impounding structure.

5.0 SUMMARY OF FINDINGS

5.1 GENERAL OBSERVATIONS

The following general observations were identified during the visual inspection:

- 1) Overall the facility is in good condition. The impoundment is functioning as intended with no signs of potential structural weakness or conditions which are disrupting to the safe operation of the impoundment.
- 2) The outboard slopes, crest and inboard slopes of the embankment were generally in good condition. The embankments did not show any signs of structural weakness or instability.

5.2 MAINTENANCE ITEMS

The following maintenance items were identified during the visual inspection, see inspection map for locations:

- 1) Several animal holes were found. These holes should be backfilled and re-vegetated.

5.3 ITEMS TO MONITOR

The following items were identified during the visual inspection as items to be monitored.

- 1) Seepage collected in the downstream access road pipe at the south dike should continue to be monitored. It is suggested that the lower pools of water be pumped dry to observe if seepage is passing through the pipe bedding material.

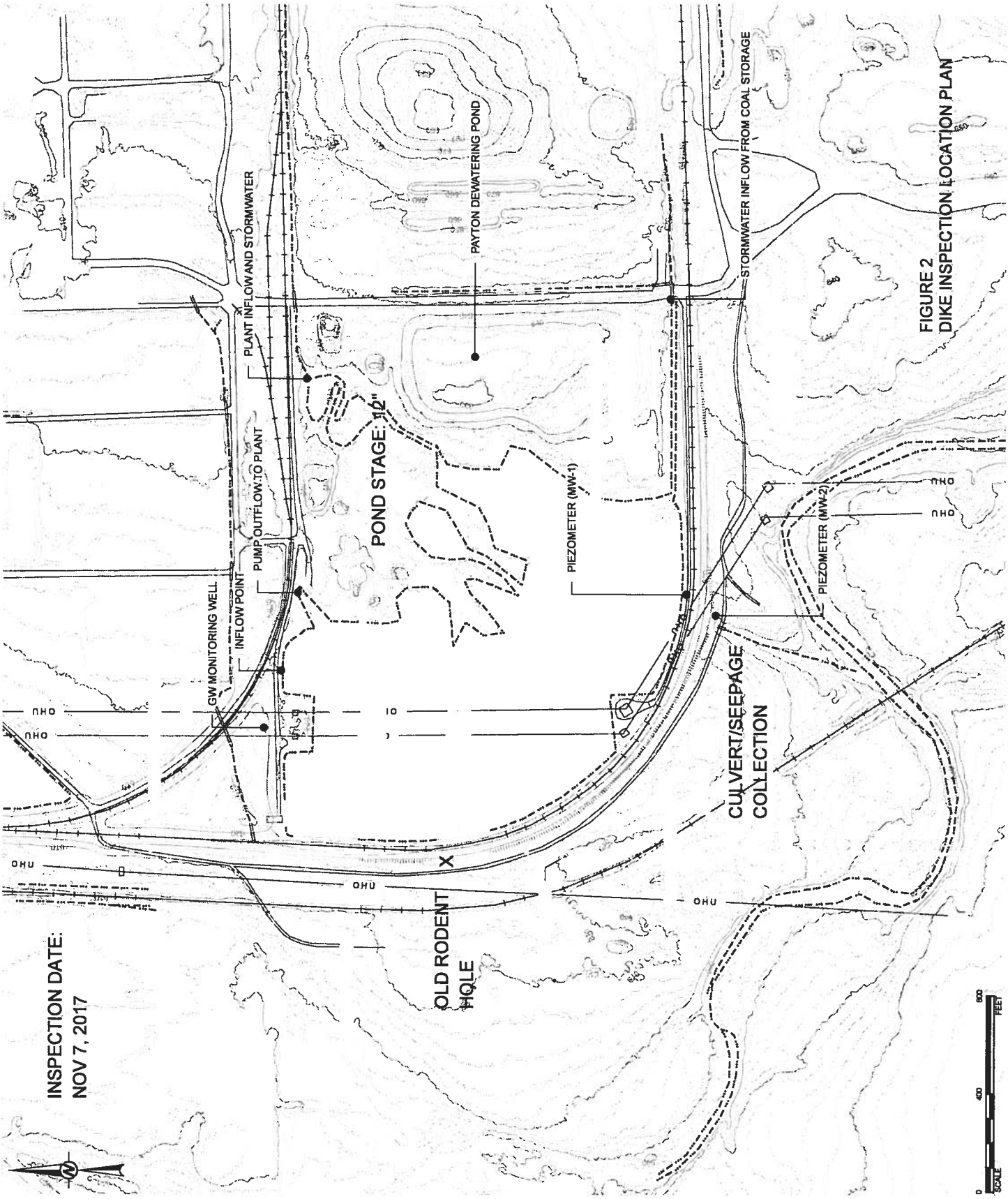
5.4 DEFICIENCIES (257.83(b)(2)(vi))

There were no signs of structural weakness or disruptive conditions that were observed at the time of the inspection that would require additional investigation or remedial action. There were no deficiencies noted this inspection or during any of the periodic 7-day inspections or 30-day data collection. A deficiency is defined as either 1) uncontrolled seepage, 2) displacement of the embankment, 3) blockage of control features, or 4) erosion, more than minor maintenance. If any of these conditions occur before the next annual inspection contact AEP Geotechnical Engineering immediately

If you have any questions with regard to this report, please contact Gary Zych at 614-716-2917 (Audinet: 200-2917).



Figure 1. Satellite Image Of Bottom Ash Pond Dam, Features, And Appurtenances At Northeastern 3&4 Power Station.



INSPECTION DATE:
NOV 7, 2017



FIGURE 2
DIKE INSPECTION LOCATION PLAN

ATTACHMENT A

Photos

[There are no Observations #2 and 7]

Plant Name:

Observation #:

Unit:

Date:

Observation:

Photo #1



Photo #2



Recommendations:

Plant Name:

Observation #:

Unit:

Date:

Observation:

Photo #1

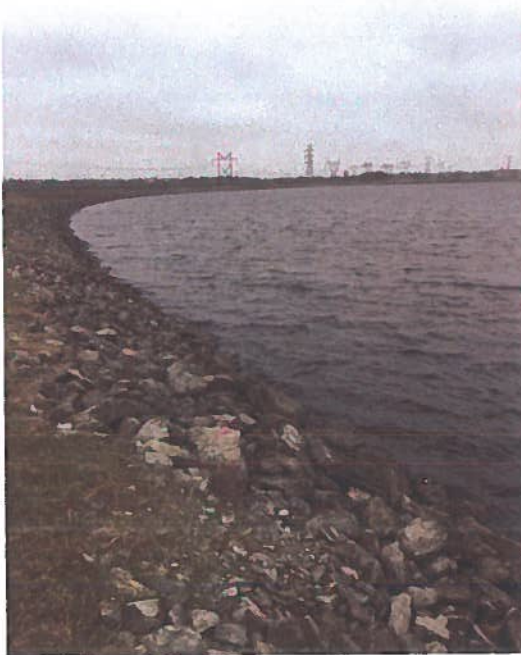


Photo #2



Recommendations:

Plant Name:

Observation #:

Unit:

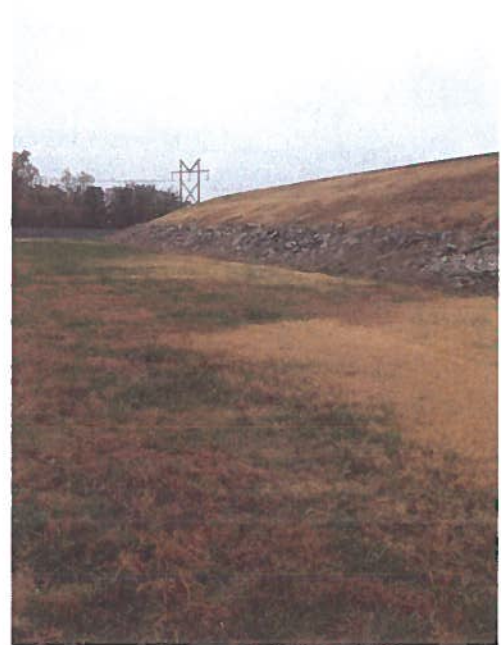
Date:

Observation:

Photo #1



Photo #2



Recommendations:

Plant Name:

Observation #:

Unit:

Date:

Observation:

Photo #1



Photo #2



Recommendations:

Plant Name:

Observation #:

Unit:

Date:

Observation:

Photo #1



Photo #2



Recommendations:

Plant Name:

Observation #:

Unit:

Date:

Observation:

Photo #1



Photo #2



Recommendations:

Plant Name:

Observation #:

Unit:

Date:

Observation:

Photo #1

Photo #2



Recommendations: