

2022 Dam and Dike Inspection Report

Bottom Ash Pond

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

September 2022

Prepared for: Public Service Company of Oklahoma – Northeastern Plant

Prepared by: American Electric Power Service Corporation

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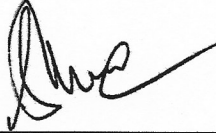
2022 Dam and Dike Inspection Report

Northeastern Plant

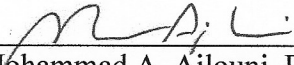
Bottom Ash Pond

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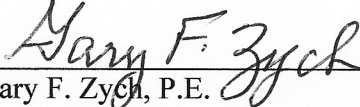
Inspection Date: August 23, 2022

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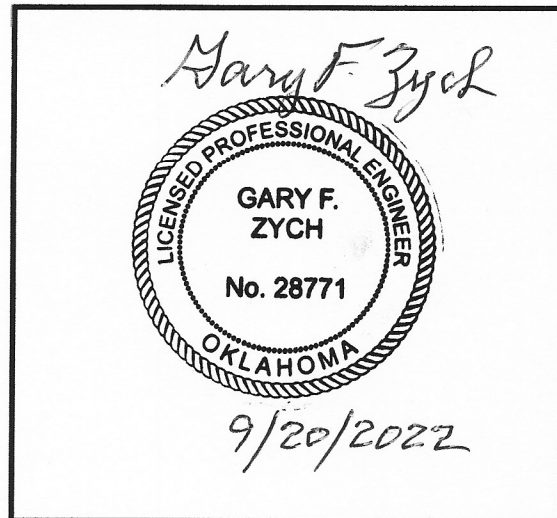
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I certify to the best of my knowledge, information and belief the information contained in this report meets the requirements of OAC § 252:517-13-4.

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2022 Dam and Dike Inspection Report
Northeastern 3&4 Plant Bottom Ash Pond
Oologah, OK

1.0 INTRODUCTION

This report was prepared by AEP-Geotechnical Engineering Services (GES) section, in part, to fulfill requirements of OAC 252:517-13-4 and to provide the Northeastern Plant an evaluation of the facility.

Shah Baig, P.E. performed the 2022 inspection of the bottom ash pond facility at the Northeastern Plant. This report is a summary of the inspection and an assessment of the general condition of the facility. Bryan White, plant staff was present during the inspection. The inspection of the facility was performed on August 23, 2022. Weather conditions were favorable with clear skies, sunny, light breeze, and temperature was about 81 degrees Fahrenheit. There was recorded 0.05 inches of rainfall over the 7-days prior to the inspection.

2.0 DESCRIPTION OF THE IMPOUNDMENT

The Public Service Company of Oklahoma (PSO), Northeastern Power Station is located at the junction of U.S. Highway 169 and Oklahoma highway 88, approximately 1 mile south of Oologah, Rogers County, Oklahoma. The bottom ash pond is located southwest side of the power plant, adjacent to the coalyard. Figure 1 (Site Location Map) illustrates the location of the bottom ash pond with respect to the power plant, landfill, and coalyard.

Figure 2 provides a plan view of the bottom ash pond, the embankment (dikes) structure of dam, pertinent dam features, and the dam's appurtenances. The dam is a 4,200-foot long cross-valley fill on an unnamed tributary to Fourmile Creek. The dam is roughly U-shaped and has been divided into north, west, and south embankments for reference in this inspection report.

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 crest elevation of 625 feet. Overflow from the spillway discharges to a low area and then flows through culverts under a railroad and off site. Figure 2 shows the spillway and discharge culverts locations.

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 subgrade from the downstream toe toward the centerline of the embankment. 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 foot layer of riprap. The toe drain was designed to drain seepage from the dam at any point along its length and there are no seepage collection pipes to discharge seepage at specific locations. Therefore, 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, where a pipe was installed under the access road. A railroad track used for coal deliveries to the power plant stretches through the crest of the west and south dikes.

3.0 REVIEW OF AVAILABLE INFORMATION (252:517-13-4(b)(1)(A))

A review of available information regarding the status and condition of the bottom ash pond has been conducted. This information includes files available in the operating record, such as design and construction information, previous periodic structural stability assessments, previous 7-day inspection reports, 30-day data collection reports, and previous annual inspection. Based on the review of the data there were no signs of actual or potential structural weakness or adverse conditions.

4.0 INSPECTION (252:517-13-4(b)(1)(B))

4.1 CHANGES IN GEOMETRY SINCE LAST INSPECTION (252:517-13-4(b)(2)(A))

No modifications have been made to the geometry of the bottom ash pond since the last annual inspection. The geometry of the impoundment has essentially remained unchanged.

4.2 INSTRUMENTATION (252:517-13-4(b)(2)(A))

There are two piezometers and a seepage collection pipe as part of the instrumentation for this facility. The locations of the instrumentations are shown on Figure 2. The maximum and minimum recorded readings of each piezometer 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. MW-01 is located on the crest of the dam and MW-02 is located at the toe of the dam. The water level in the pond ranged from elevation 623.25 – 622.08. Figure 3 illustrates the historical piezometer data.

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 – Piezometer Water Elevation Data

INSTRUMENTATION DATA			
Bottom Ash Pond			
Instrument	Type	Max/Min Reading since last annual inspection	Date of readings
MW-01	Piezometer	609.2/608.2	12-21-2021 /3-15-2022
MW-02	Piezometer	599.67/598.32	6-8-2022/9-29-2021

4.3 IMPOUNDMENT CHARACTERISTICS (252:517-13-4(b)(2)(C))

Table 2 is a summary of the minimum, maximum, and present depth and elevation of the impounded water and Coal Combustion Residuals (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. Most of the bottom ash settles out is a very small area that is periodically excavated and either beneficially used or placed in the on-site landfill. Therefore, the depth range of ash does not vary.

Table 2 – Impoundment Data

IMPOUNDMENT CHARACTERISTICS	
Bottom Ash Pond (crest elevation: 630.0 ft; lowest 604.0 ft)	
Approximate Minimum depth of impounded water since last annual inspection	18.08 ft (622.08 ft)
Approximate Maximum depth of impounded water since last annual inspection	19.25 ft (623.25 ft)
Approximate Present depth of impounded water at the time of the inspection	19.16 ft (622.16 ft)
Approximate Minimum depth of CCR since last annual	5 ft.

inspection	
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 (Elev. 625 -630 ft)

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 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 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 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 problem has developed that could impact the structural integrity of the structure. 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, scarps, 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 (252:517-13-4(b)(1)(B))

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. Figure 4 illustrate the visual inspection photograph location.

Auxiliary Spillway

1. Photograph No. 1 illustrates the auxiliary spillway located at the northwest corner of the pond. Overall, the spillway appeared to be in good and functional condition as designed without any obstruction to flow. There were no signs of movement, settlement, or misalignment of the spillway. There were no signs of seepage along the contacts between the concrete training walls and downstream slope or at the end of the concrete chute.
2. The energy dissipater baffles (Photograph No. 2) at the toe of the spillway were clear of sediment and were in good condition. The drainage pipe culverts downstream of the spillway appeared clear of obstruction, dry, and in good functional condition.

North Embankment (dike)

1. Typical condition of the downstream slope of the dike was well vegetated. The grass along the exterior slope was recently mowed. There were no signs of sloughing or other slope movement observed (Photograph No. 3).
2. Photograph No. 4 illustrate the crest and upstream of the north dike. The crest appeared in good and stable condition with no significant settlement, misalignment, or noticeable sign of distress. The interior slopes show no signs of sloughing or bulges. The riprap protection along the slope was in good condition and no significant grassy vegetation was noticed within the riprap.
3. The intake structure was in good functional 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 (Photograph No. 5).
4. Photograph No. 6 illustrate the natural ground and ash built-up along the northeast area of the pond. Minor vegetation was noticed in this area, but the ash deposits were well maintained and in stable condition.
5. Ash and waste water sluice pipes are illustrated in Photograph Nos. 7 and 8. The sluice pipes are located in the mid-section of the north dike. Overall, the sluice pipes are working as intended. The outlet end support (Photograph No. 7) of the pipe appeared to be supported on a pile of bottom ash. All the pipe support should be inspected for undermining of pipe support footings.

South, East, and West Embankment (dike)

1. A dredge cell is located to the east within the bottom ash pond footprint. Photograph No. 9 illustrates an overall view of the dredge cell. Dredge cell is located at a higher elevation compared to the pond. Dredge cell consists of bottom ash fill and appeared to be contained and in stable condition. Bottom ash is stored in the geotubes located in the southeast area of the pond (Photograph No. 10).
2. The upstream slope of the southeast corner of the south dike is illustrated in Photograph No. 11. A runoff ditch is located at the toe of the upstream slope. The upstream slope with the riprap appeared in good condition. Excessive vegetation was present in the ditch.

3. The seepage collection blanket (Photograph Nos. 12 and 13) at the toe of the downstream slope of the south and west dike appeared in good and functional condition. No water was noticed in the seepage blanket at the time of inspection.
4. The downstream slope (Photograph No. 14) was well vegetated and maintained in a controlled manner. There was no observed seepage, wet, or damp areas along the slope. The area about 30-feet beyond the toe of the dike is well maintained and free from overgrown trees.
5. Typical view of the downstream slope, access road, seepage blanket, toe ditch, and pipe culvert are illustrated in Photograph Nos. 15 and 16. There was no signs of sloughing, settlement, animal holes, or other deficiencies.
6. The upstream slope and crest of the south dike is illustrated in Photograph Nos. 17 and 18. The crest including the railroad appeared in good condition. The upstream slope was good without any signs of sloughing or settlement. The riprap in the lower section of the slope appeared in good and stable condition.

4.6 CHANGES THAT EFFECT STABILITY OR OPERATION (252:517-13-4(b)(2)(G))

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 exhibit any signs of structural weakness or instability.
3. The seepage collection blanket located at the downstream slope of the south and west sections of the dike appeared in good functional condition.

5.2 MAINTENANCE ITEMS

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

1. Maintain the vegetation in the ditch to the southeast corner to a minimum possible in order to use it effectively.
2. In general, clear any overgrown vegetation during mowing activities.

5.3 ITEMS TO MONITOR

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

- 1) Sluice pipe support footing and subgrade should be monitored for any undermining or potential unstable condition.

5.4 DEFICIENCIES (252:517-13-4(b)(5))

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 during this inspection or during any of the periodic 7-day inspections or 30-day data collection since the last annual inspection. 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 regarding this report, please contact Gary Zych at 614-716-2917 (email: gfzych@aep.com) or Shah Baig at 614-716-2241 (email: sbaig@aep.com).

LIST OF FIGURES

- Figure 1 - Site Location Map
- Figure 2 – Facility Location Map
- Figure 3 – Historical Piezometer Data
- Figure 4 – Inspection Photograph Location Map

Figure 1 – Site Location Map
Bottom Ash Pond
Northeastern Plant, Oologah, OK

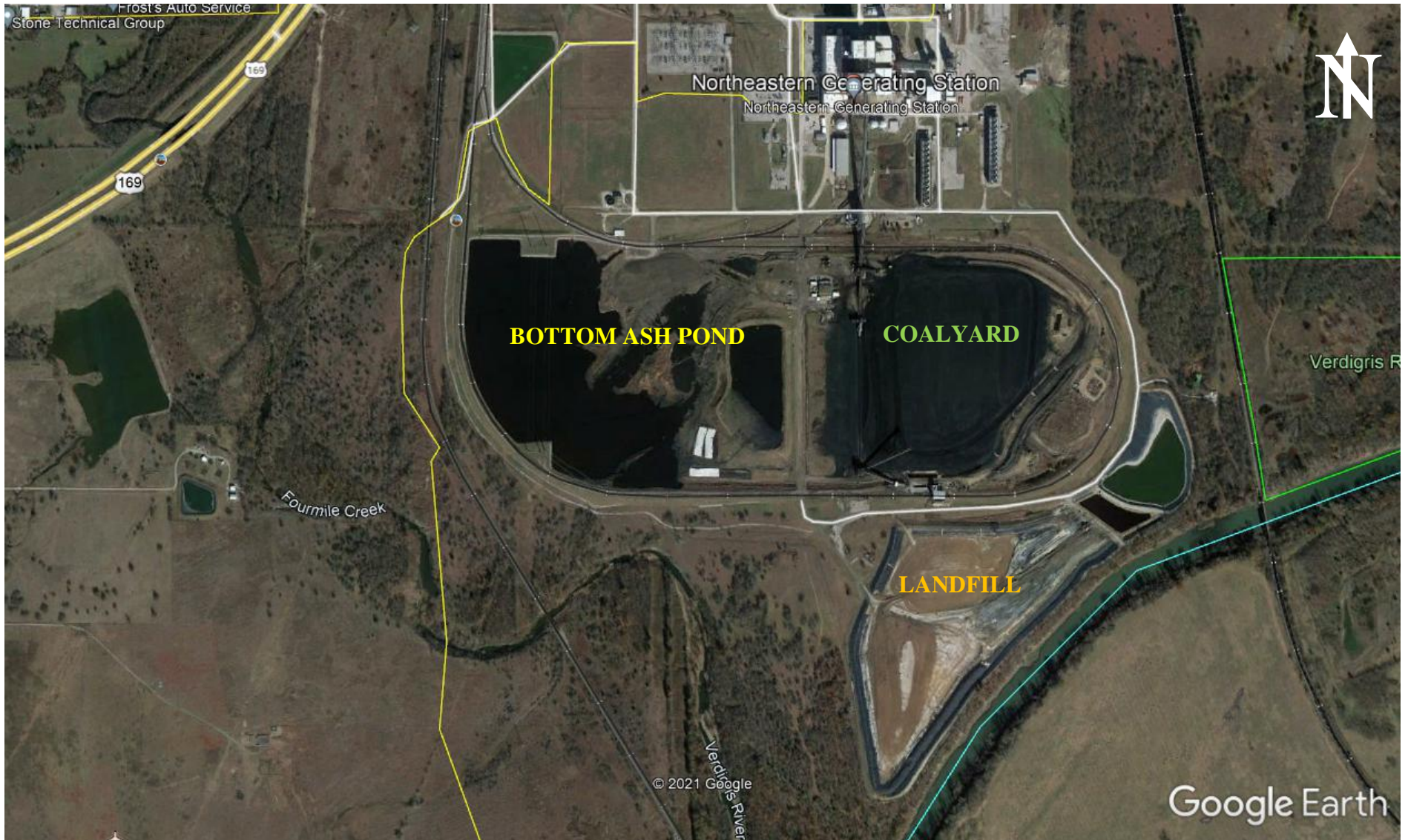
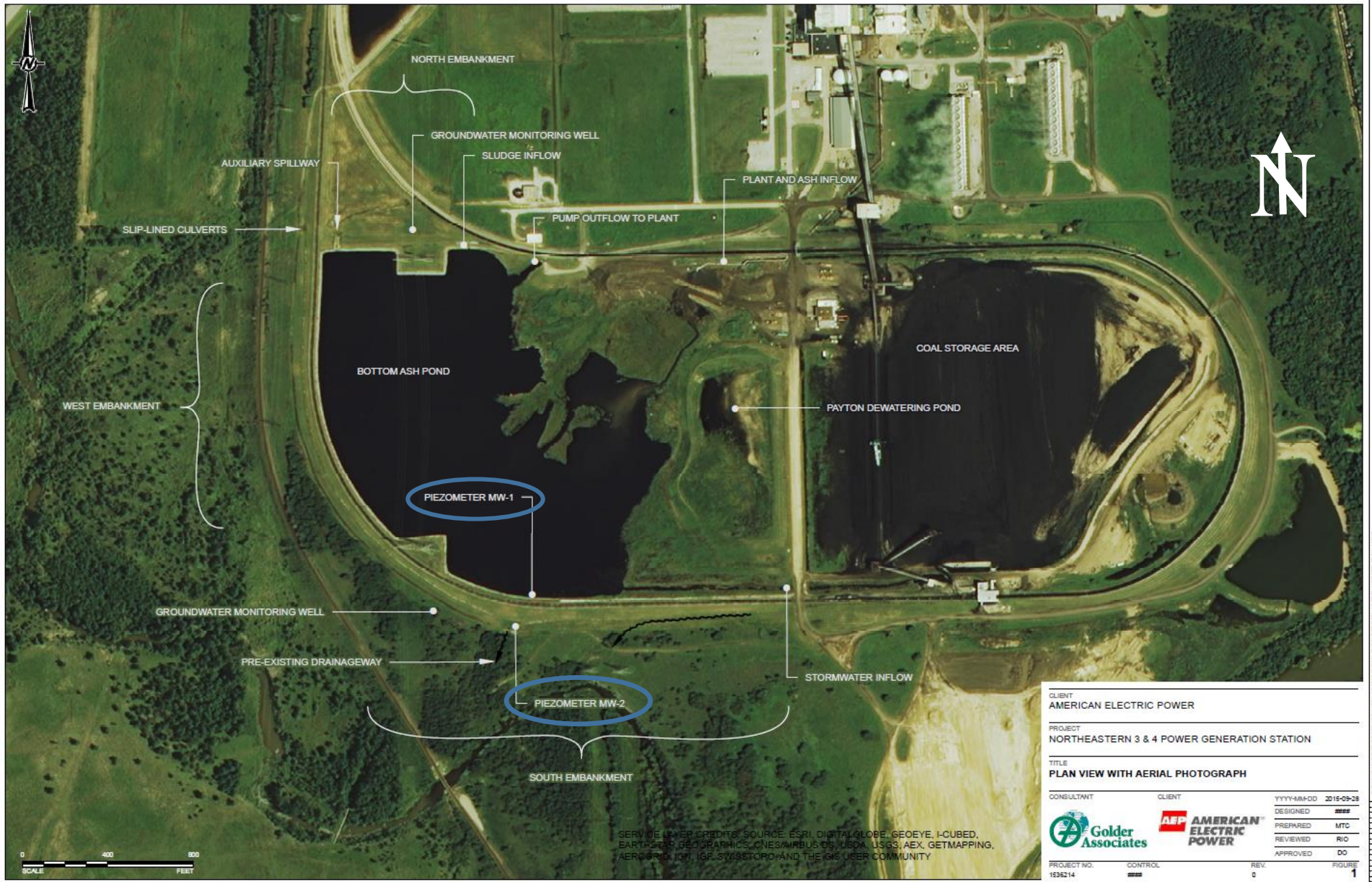


Figure 2 – Facility Map
Bottom Ash Pond
Northeastern Plant, Oologah, OK



CLIENT		AMERICAN ELECTRIC POWER	
PROJECT		NORTHEASTERN 3 & 4 POWER GENERATION STATION	
TITLE		PLAN VIEW WITH AERIAL PHOTOGRAPH	
CONSULTANT	CLIENT	YYYY-MM-DD	2016-09-28
		DESIGNED	###
		PREPARED	MTC
		REVIEWED	PIO
		APPROVED	DO
PROJECT NO.	CONTROL	REV	FIGURE
1636214	###	0	1

IF THESE DIMENSIONS DO NOT MATCH WHAT IS SHOWN, THE SHEET DESIGN BEING MODIFIED BECOMES THE BASIS.

Figure 3 – Historical Piezometer Data

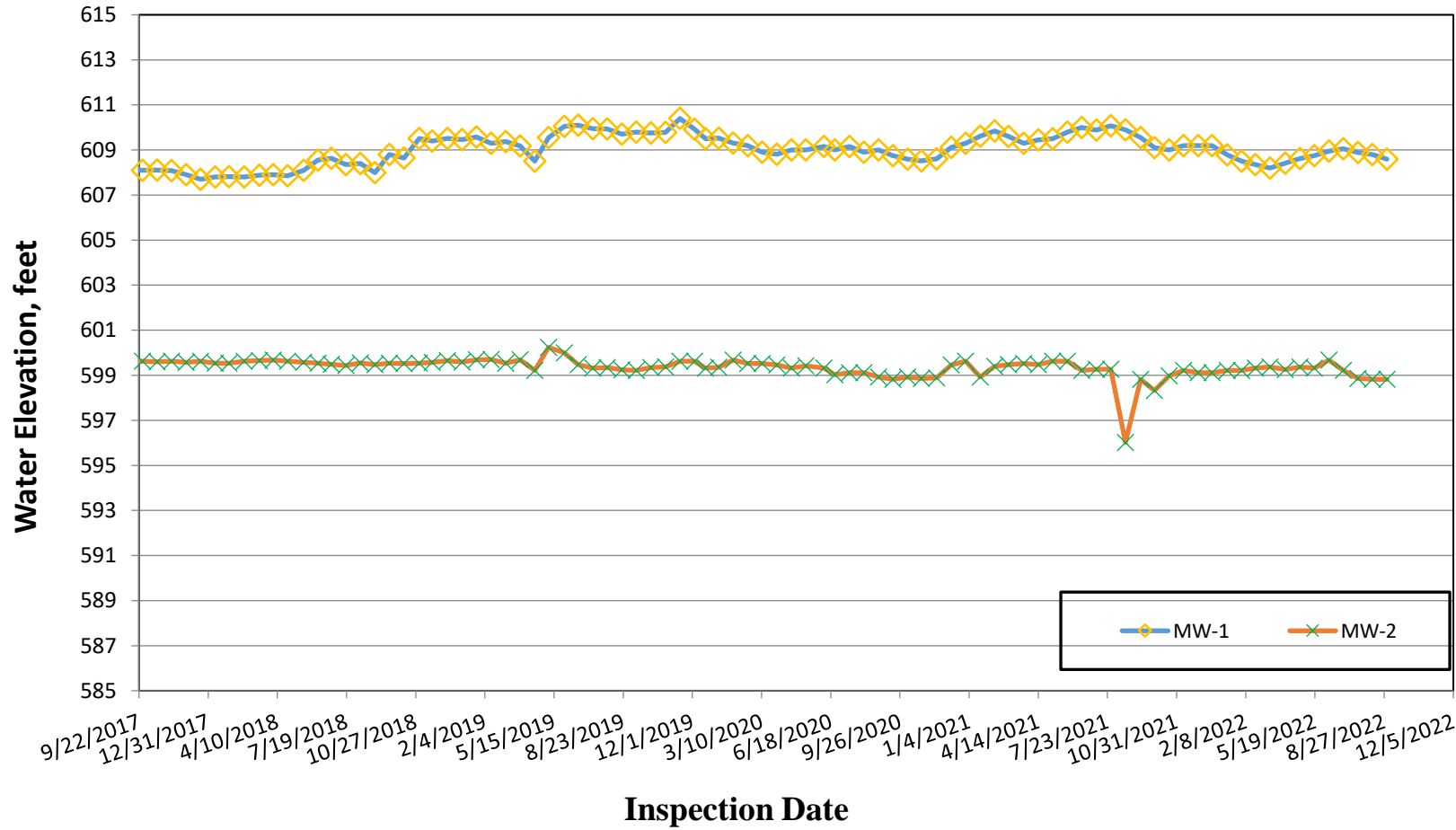








Figure 4 – Inspection Photograph Location Map
Bottom Ash Pond
Northeastern Plant, Oologah, OK





ATTACHMENT




▪ Inspection Photographs




<p>Photograph No. 1 Auxiliary spillway of the ash pond.</p>	 A photograph showing the auxiliary spillway of the ash pond. The spillway is a concrete structure with a rocky toe on the left side, leading to a body of water. A metal fence is visible on the right side of the spillway. In the background, there is a large electrical transmission tower under a blue sky with scattered white clouds.
<p>Photograph No. 2 Auxiliary Spillway chute, energy dissipater, and pipe culverts.</p>	 A photograph showing the auxiliary spillway chute, energy dissipater, and pipe culverts. The spillway is a concrete structure with a rocky toe on the left side, leading to a body of water. A metal fence is visible on the right side of the spillway. In the background, there is a large electrical transmission tower under a blue sky with scattered white clouds.
<p>Photograph No. 3 Typical condition of the downstream slope of the northwest dike section (looking east).</p>	 A photograph showing the typical condition of the downstream slope of the northwest dike section (looking east). The dike is a grassy embankment with a gravel path on the right side. In the background, there is a large industrial facility with a tall chimney and several buildings, under a blue sky with scattered white clouds.

<p>Photograph No. 4 Typical condition of the crest of the northwest dike.</p>	 A wide-angle photograph showing a gravel path along the crest of a dike. The dike is covered in tall, dry grass. In the background, there is a body of water, a utility pole, and a blue sky with scattered white clouds.
<p>Photograph No. 5 Ash water intake structure.</p>	 A photograph of an ash water intake structure. It features a metal walkway with railings and a concrete base. The structure is situated on a grassy bank next to a body of water. A car is visible in the background on the opposite side of the water.
<p>Photograph No. 6 Ash built up and natural ground at the northeast area of the pond.</p>	 A photograph showing a large area of ash built up on the ground. The ash is a light brown color and is surrounded by sparse, dry vegetation. In the background, there is a body of water and a clear blue sky with a few utility poles.

<p>Photograph No. 7 Ash sluice pipe at the north dike.</p>	 A photograph showing a large, reddish-brown metal pipe (ash sluice pipe) running along a concrete and stone-lined channel. The channel is filled with water and surrounded by grassy areas. In the background, there is a body of water and some utility poles under a clear blue sky.
<p>Photograph No. 8 Ash and wastewater pipes.</p>	 A photograph showing two parallel pipes, one reddish-brown and one white, running along a concrete and stone-lined channel. The channel is filled with water and surrounded by grassy areas. In the background, there is a large concrete structure, possibly a dam or dike, and some utility poles under a clear blue sky.
<p>Photograph No. 9 Dredge cell.</p>	 A wide-angle photograph of a large, flat, open area, likely a dredge cell. The ground is dark and appears to be covered in ash or sediment. There are some green bushes in the foreground and a large industrial structure in the background under a clear blue sky.

<p>Photograph No. 10 Bottom ash collected in geotubes.</p>	 A wide-angle photograph showing a large, flat area covered with white, granular bottom ash. The ash is contained within a series of parallel, slightly raised geotubes. In the background, there is a body of water, likely the Bottom Ash Pond, and several high-voltage power lines with towers stretching across the horizon under a clear blue sky with a few clouds.
<p>Photograph No. 11 Southeast ditch.</p>	 A photograph of a ditch or drainage channel. The left side of the ditch is a steep, rocky embankment. The right side is a grassy slope. The ditch itself is filled with water. In the background, there are power lines and a clear blue sky with scattered white clouds.
<p>Photograph No. 12 Seepage collection toe drain (looking east).</p>	 A photograph showing a rocky, gravelly path or drain leading up a grassy slope. In the distance, there is a structure that appears to be a seepage collection toe drain. The sky is blue with some clouds.

<p>Photograph No. 13 Seepage collection toe drain (looking west).</p>	 A photograph showing a rocky, gravelly toe drain on a grassy slope. The drain runs diagonally across the frame from the bottom left towards the top right. The surrounding area is covered in green grass and some small shrubs. In the background, a power line tower is visible against a blue sky with scattered white clouds.
<p>Photograph No. 14 Downstream slope (looking east).</p>	 A wide-angle photograph of a downstream slope covered in green grass. In the distance, a large industrial structure, possibly a conveyor system, is visible on the left side. The sky is bright blue with many white clouds. A line of trees is visible on the right side of the slope.
<p>Photograph No. 15 Toe ditch and pipe culvert.</p>	 A close-up photograph of a gravelly toe ditch and a pipe culvert. The ditch is filled with grey gravel and runs along the edge of a grassy slope. A large, dark pipe is visible, partially buried in the gravel. In the background, a power line tower and a fence are visible under a blue sky with white clouds.

Photograph No. 16	 A gravel access road runs parallel to a grassy downstream slope. In the background, several high-voltage power line towers are visible against a blue sky with scattered white clouds. A person is standing on the crest of the slope on the right side.
Photograph No. 17	 A view of the upstream slope looking east. The water of the Bottom Ash Pond is on the left, bordered by a rocky toe drain. The slope is covered in grass and some weeds. Power line towers are visible in the distance under a cloudy sky.
Photograph No. 18	 Another view of the upstream slope, showing the rocky toe drain and the water of the pond. The slope is grassy, and power line towers are visible in the background under a blue sky with clouds.