

2019 Annual Dam and Dike Inspection Report

Fly Ash Pond

**John E. Amos Plant
Appalachian Power Co.
Putnam County, West Virginia**

May 2019

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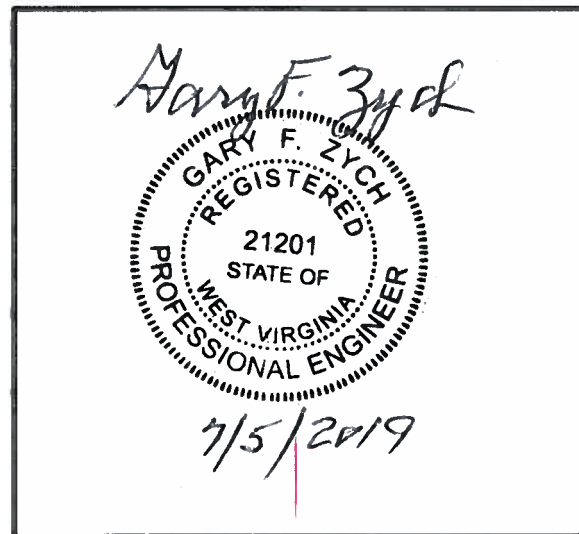
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I certify to the best of my knowledge, information and belief the information contained in this report meets the requirements of 40 CFR § 257.83(b).

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1.0 INTRODUCTION

This report was prepared by AEP- Geotechnical Engineering Services (GES) section, in part, to fulfill the US EPA requirements of 40 CFR 257.83 and the West Virginia Dept. of Environmental Protection, Division of Water Dam Inspection Section and to provide Appalachian Power Co. and John E. Amos (JEA) plant personnel with an evaluation of the facility.

The 2019 dam and dike inspection at the JEA fly ash pond was conducted by Mr. J.T. Massey-Norton on May 30th, 2019 with Mr. Rich Fuller who served as the project facility contact. Weather conditions were overcast with a light intermittent rain (0.19 inches for the day of the inspection), with temperatures ranging from a low of 71° F to a high of 79° F. There was 0.32 inches of precipitation on the day of the inspection and 0.69 inches of rainfall within the preceding seven days.

2.0 DESCRIPTIONS OF COAL COMBUSTION RESIDUALS (CCR) IMPOUNDMENTS

2.1 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** A condition or activity that generally meets what is minimally Satisfactory: 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.

2.2 FLY ASH POND

The fly ash pond is located in Putnam County, West Virginia southwest of the John E. Amos (JEA) Power Plant between State Route 817 and Interstate I-64. The watershed for the fly ash pond drains to the Kanawha River (Figure 1). The JEA fly ash pond was used for sedimentation and storage of fly ash produced as a waste product in burning pulverized coal at the JEA Power Plant.

The John E. Amos fly ash dam is an earthen and rock fill zoned dam constructed in phases with approximately 2.5-3 Horizontal to 1 Vertical (2.5-3 H to 1 V) upstream slopes, 2-2.5 H to 1 V downstream slopes and a design crest elevation of 875 ft. The downstream slope of the dam is protected from erosion by oversize riprap. The

downstream slope of the dam has a berm with a bench at Elevation 713 ft. to 716 ft., commonly referred to as 716 bench.

WV DEP dam safety approved APCo’s permit application on June 10, 2013 to modify the facility to eliminate the free pool within the impoundment by grading the ash and placement of additional soil fill eventually capping it with a synthetic liner overlain with a soil cover allowing non-contact water to be discharged through a new spillway. There is no open pool of water behind the dam and precipitation that falls within the pond’s watershed is conveyed via surface channels to an outlet channel cut in the ridgeline to the west of the dam.

Figures 2 (aerial image – plan view) shows the locations of closure and capping activities for the fly ash pond and dam.

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

A review has been conducted of available information regarding the status and condition of the JEA fly ash pond that includes files available such as the plant’s inspection reports, piezometric measurements, and surface monument surveys for deformation/settlement and previous annual inspections.

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

4.1 FLY ASH POND

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

No modifications have been made to the geometry of the fly ash dam since the 2018 annual inspection.

4.1.2 INSTRUMENTATION (257.83(b)(2)(ii))

Location of instrumentation is included on the figures in Attachment B. With the closing of the Fly Ash Pond only critical piezometers and survey monuments will remain and have been monitored monthly. The maximum recorded readings of each piezometer since the previous annual inspection is shown in Table 3 below. A figure showing the readings since last year’s annual inspection is included in Attachment C. The piezometers not monitored on a monthly basis are planned to be closed in accordance with the requirements of West Virginia Department of Environmental Protection.

Table 3

INSTRUMENTATION DATA Fly Ash Pond			
Instrument	Type	Maximum Reading since last annual inspection	Date of reading
PP1	Piezometer	687.51	Dec. 2018
PP8F	Piezometer	665.75	May 2019
PP8RA	Piezometer	682.04	May 2019
PP5S	Piezometer	778.07	Mar. 2019
PP5F	Piezometer	786.27	Mar. 2019
PP75	Piezometer	685.69	Oct. 2018
PP7R	Piezometer	685.40	Mar. 2019

9915	Piezometer	764.97	Oct. 2018
9913	Piezometer	763.83	Feb. 2019
P1	Piezometer	664.35	Feb. 2019
8400	Piezometer	693.22	Aug. 2018
8401	Piezometer	691.39	Mar. 2019
8402	Piezometer	672.86	Nov. 2018
94-1	Piezometer	720.41	Sep. 2018

Most of piezometers readings continue to show consistent water elevations in the dam. Piezometers 8400, 8401, and 8402 have historically shown wide swings in water elevations and those observed since the last inspection are consistent with those trends. A graph of the piezometer readings is included in Attachment C. A notable departure is also recorded at PP5S and PP5F and may represent erroneous measurements since subsequent measurements appear to have returned to normal conditions.

In addition to the piezometers, the horizontal and vertical deformations of the Amos Fly Ash Dam have historically been monitored using 24 permanent reference points (survey monuments). The deformation surveys were conducted on a semi-annual basis until November 2015 when 30-day monitoring was implemented in accordance with 40CFR257.83 for 12 of the permanent survey monuments. The reports provide graphs of the vertical and horizontal displacements as a function of time for the survey monuments. The deformation of all the monuments have been reviewed as a part of this annual inspection and no unusual or unexpected behavior has been observed.

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

Below 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. At the time of the field inspection, no free pool of water was impounded.

IMPOUNDMENT CHARACTERISTICS	
Fly Ash Pond	
Water Surface Elevation at time of the inspection	Not applicable
Approximate Minimum, Maximum, and Present depth of impounded water since last annual inspection	Not Applicable
Approximate Minimum Maximum and Present depth/elevation of CCR since last annual inspection	<1.0 ft. /elev. 826.70 ft. 160 ft. /elev. 886.36 ft. Depth Varies <1.0 to 160ft Elev. Varies 826.70 ft. to 886.36ft.
Storage Capacity of impounding structure at the time of the inspection*	9,111 AC-Ft
Approximate volume of impounded water at the time of the inspection	Not Applicable
Approximate volume of CCR at the time of the inspection	9,111 AC-Ft

*Facility is closed and cannot store or impound any additional material or water

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

A visual inspection of the fly ash pond was conducted to identify any signs of distress or malfunction of the impoundment and appurtenant structures. The inspection also included hydraulic structures underlying the base of the dike. Specific items inspected included all structural elements of the dam such as inboard and outboard slopes, crest, and toe.

1. There were no visual signs of settlement, misalignment, erosion, or bulging on the crest or the upstream slope. No animal burrows were noted on the upstream slope. The upstream slope was well vegetated and is controlled by timely mowing. The guardrail was also observed to be in excellent condition. (Photos 1, 2 and 3)
2. No erosion was observed along the upstream left and right groin ditches or the abutments above 716 feet bench. Both of the abutments within 25 ft. from the center of any of the groin ditches have been cleared of shrubs and small trees. (Photos 4 and 5)
3. The entire face of the downstream slope was well protected from erosion with large-boulder size sandstone and shale riprap and was generally in fair to good conditions. There were no noticeable signs of movement or slides in the oversize riprap. Most of the vegetation on the downstream slope had been controlled by the application of a herbicide. (Photo 6)
4. The seepage areas near the right groin ditch were still present. The seeps are believed to be originated from the abutment bedrock based on the 2007 geotechnical investigations that revealed a permeable layer of sandstone at about the same elevation. The surficial slip within this seepage area has been repaired and stabilized. Another seep at a higher elevation was noted and the seepage water was observed to be clear (i.e. no suspended sediment). Another surficial slip was observed along the site access road as part of the plant's seven-day inspection and has been repaired and mitigated. (Photos 7 and 8)
5. Another area of seepage near PZ-94-1 remains unchanged from last year's inspection. The concrete pad for the piezometer is undermined and is no longer in contact with the ground. (Photo 9)
6. The right and left groin seepage weirs were free flowing and clear with an estimated discharge of 8 gpm and 10 gpm, respectively.
7. The surface of the 716 bench was generally in excellent condition. There were no visual signs of settlement, misalignment or erosion that would indicate any instability with the earthen fill. Seepage is observed along the 716 bench at the base of the dam's slope and appears to be consistent with respect to

their location and discharge (less than ½ gpm). The discharge was visually clear except for algae and no sediment was observed to be deposited at the seep's point of emergence. (Photos 10 and 11)

8. A minor amount of seepage was observed to discharging from the former (Stage 1 Dam Raising) decant structure. The seepage was estimated to be 0.5 gpm and was visually clear. (Photo 12)
9. The seepage collection basin at the toe was clear and appeared to be functioning as intended. (Photo 13)
10. The new surface water spillway has experienced moderate erosion as it transitions to the natural channel but is stable and clear of debris for the length of its bedrock channel.

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

All areas of the impoundment have a final cover system installed over the CCR Material. The Construction of the new spillway eliminates the possibility to impound water behind the dam. Based on interviews with plant personnel, review of inspection reports, and field observations there were no changes to the fly ash dam itself since the last annual inspection that would affect the stability of the dam structure.

5.0 CORRECTIVE MEASURES TAKEN TO REMEDY DEFICIENCY OR RELEASE SINCE LAST INSPECTION

Based on the plant personnel inspections, the instrumentation readings and interviews with plant personnel there have been no deficiencies or signs of distress observed during any inspection since the last annual inspection.

6.0 SUMMARY OF FINDINGS

6.1 DEFICIENCIES & CHANGES WHICH AFFECT STABILITY OR OPERATIONS (257.83(b)(2)(vi, vii))

There were no significant changes to the fly ash dam since the last annual inspection that would affect the stability of the structure.

There were no deficiencies or signs of structural weakness or disruptive conditions that were observed at the time of the inspection that would require additional investigation or remedial action.

6.2 ITEMS TO MONITOR

The following items need to be monitored.

1. The seepage along the right groin and left groin pipe weirs should continue to be measured on a monthly basis.
2. The piezometers should continue to be measured for static water levels on a monthly basis.
3. The discharge from the original decant concrete discharge pipe should be monitored (flow and visual

clarity) on a monthly basis to determine if this is a seasonal wet weather spring discharge.

6.3 MAINTENANCE ITEMS

The following general maintenance items were identified during the visual inspection:

1. Control of the vegetation (i.e. mowing and spraying) should continue on its current regularly scheduled basis.
2. Piezometer 94-1 requires a new concrete pad and must be installed by a WV licensed driller.
3. Geotechnical Engineering will be developing additional recommendations for implementing engineering controls to assist the plant in mitigating erosion of the bedrock spillway as it transitions to the natural channel.
4. Work with AEP Geotechnical Engineering and AEP Civil Lab to have the piezometers not part of the monitoring of the dam to be properly abandoned.

7.0 CONCLUSION

Overall, the facility is in good condition. Closure of the fly ash pond is complete with no potential structural weakness or other conditions that could potentially disrupt the safety of the fly ash dam structure observed. Continue to perform the maintenance and repairs as they are noted during inspections.

ATTACHMENT A

Photographs

**2019 Annual Dam and Dike Inspection Report
John E. Amos Plant
Photos**



Photo 1 – Typical view showing good conditions of crest.



Photo 2 – Typical view showing good conditions of crest and a partial view of the capped covered pond area showing good vegetative control and maintenance.



Photo 3 – Typical view of the upstream face and closed portion of the impoundment showing good vegetative cover.



Photo 4 – Typical view showing good conditions of the left groin and stairwell access to piezometers PP10s and PP10d.



Photo 5 – Typical view showing good conditions of the right groin.



Photo 6 – Typical view showing good conditions of the downstream face showing the oversized rip rap.



Photo 7 – Typical view showing good conditions of the slip repair in the right groin ditch and a more recent repair along the site access road ramp to the 716 Bench.



Photo 8– Typical view of along the right groin ditch of the minor slip showing no significant change from previous inspections. Discharge from this area was estimated to be 0.25 gpm and was visually clear.



Photo 9-Typical view of piezometer 94-1 showing piezometer-tag number and locked casing protector. The concrete pad is undermined and requires replacement.



Photo 10- Typical view of the wet weather spring along the toe of the downstream face at the 716 bench.



Photo 11- Typical view of the 716 drainage ditch to right groin ditch.



Photo 12- Typical view of the closed primary discharge pipe from the stage one raising. The discharge from the pipe was estimated to be 0.5 gpm and was visually clear.

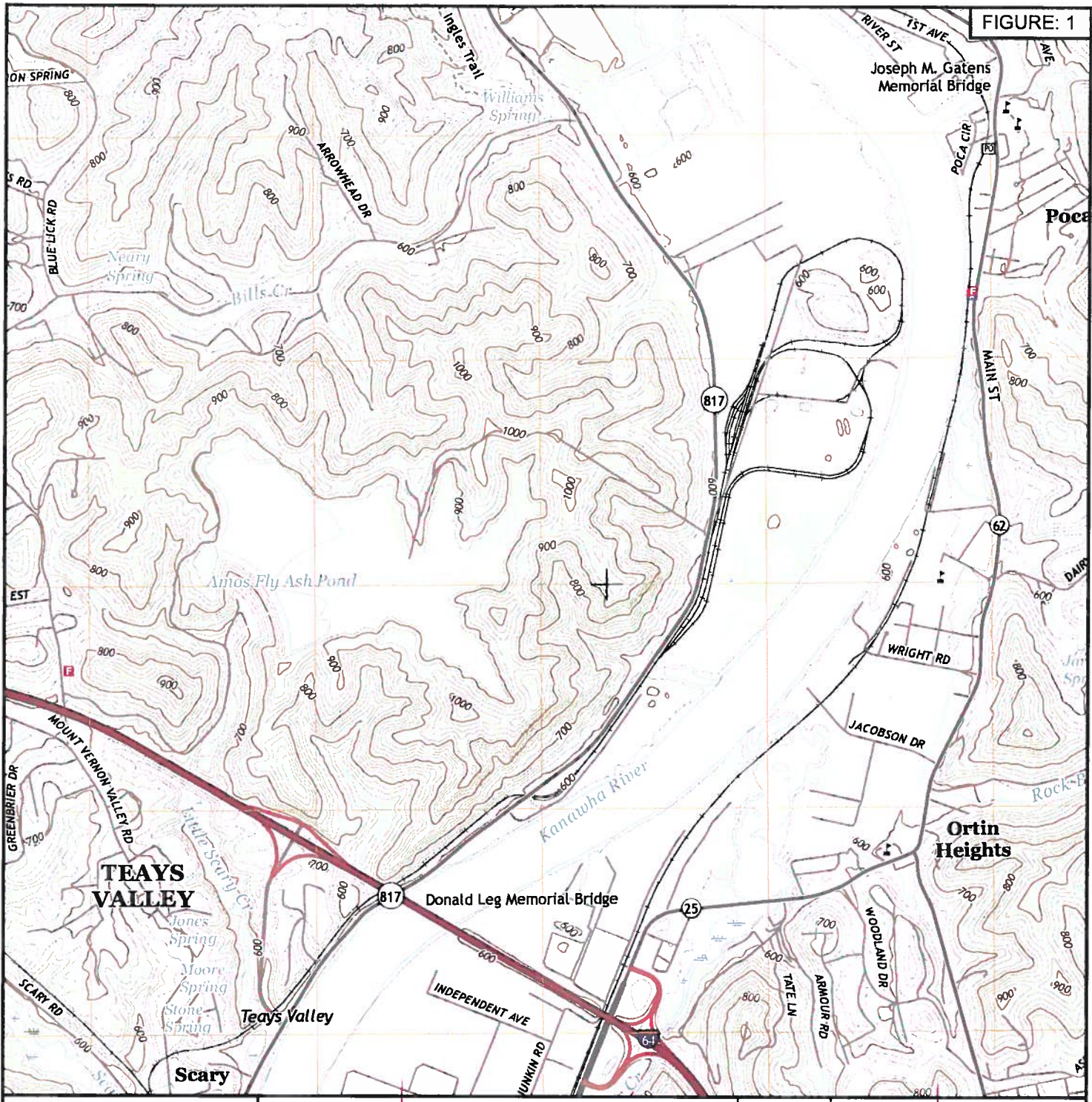


Photo 13- Typical view of the stilling basin that collects seepage from the foundation drainage blanket.

ATTACHMENT B

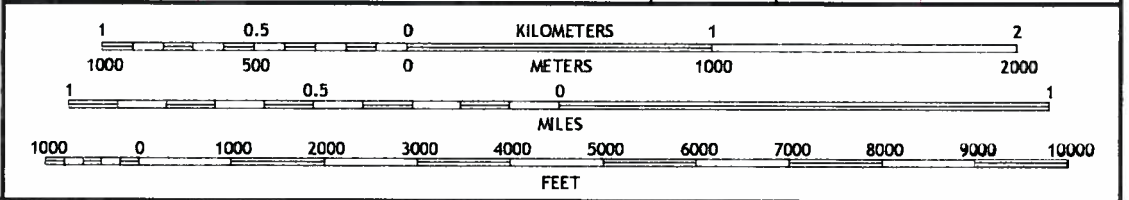
Figures

FIGURE: 1



★
 MN
 GN
 7° 35'
 135 MILS
 0° 30'
 9 MILS
 UTM GRID AND 2016 MAGNETIC NORTH
 DECLINATION AT CENTER OF SHEET

AEP-JOHN AMOS FLY ASH DAM-PUTNAM COUNTY ID#07911 INSPEC. DATE: 3

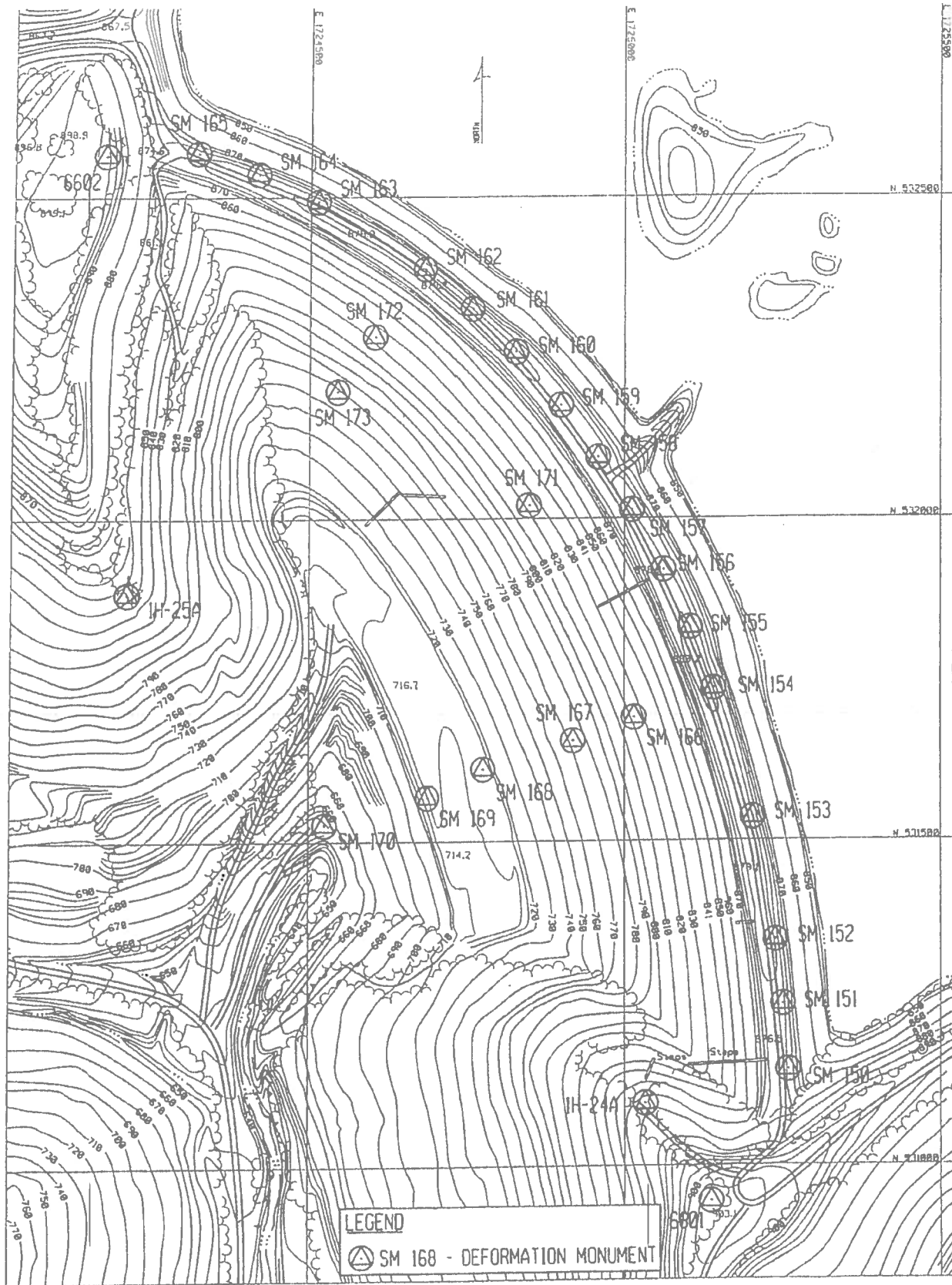


LOCATION MAP PIEZOMETERS



LEGEND

⊕ B402-PR2 - PIEZOMETER



LOCATION MAP
DEFORMATION MONUMENTS

ATTACHMENT C

Instrumentation Data

John E Amos Plant Piezometer Readings Fly Ash Pond

