

2016 Annual Dam and Dike Inspection Report

Fly Ash Pond

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

November, 2016

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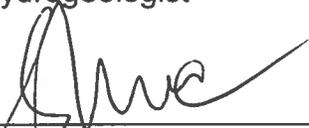
John E. Amos Plant

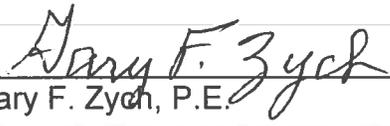
Fly Ash Pond

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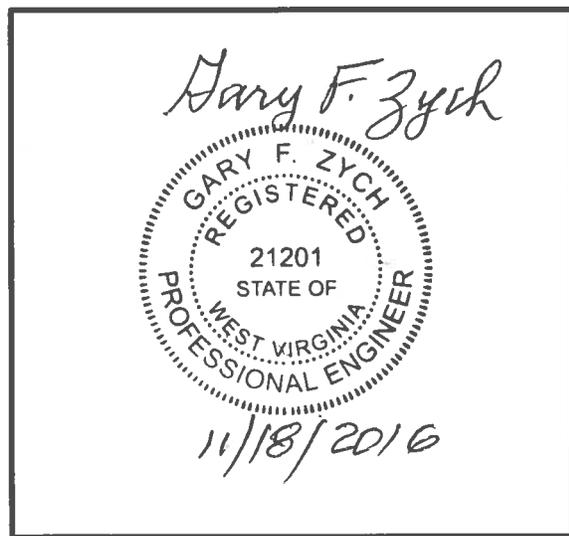


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- Attachment A – Figures
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1.0 INTRODUCTION

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 2016 dam and dike inspection at the JEA fly ash pond was conducted by Mr. J.T. Massey-Norton on October 18th, 2016 with Mr. Rich Fuller who served as the project facility contact. Weather conditions were sunny, with temperatures ranging from a low of 70° F to a high of 75° F. There was intermittent precipitation on the preceding day of inspection and 0.1 inch accumulative rainfall during the seven day period prior to the inspection.

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. These construction activities are in progress and are expected to be completed in 2017. Currently, inflow into the pond occurs as ambient precipitation that falls within the pond's watershed which is then conveyed back to the plant via a pump back system for final discharge through the bottom ash pond outfall #003.

The pool has been drained of free standing water via the pump back system installed in 2010. 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, 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 2015 annual inspection. The decant tower and discharge tunnel have been grouted and closed in accordance with ongoing construction activities. The geometry of the impoundment has been modified to provide a cover cap over the fly ash to provide positive drainage to a new spillway.

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

The location and type of instrumentation are excerpted from the Deformation Report (AEP 2016) and are presented in Attachment A.

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 of CCR since last annual inspection	Not Applicable 160 ft. 160 ft
Storage Capacity of impounding structure at the time of the inspection*	65 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

* STORAGE CAPACITY FOR PHSAE 4 (REFERENCE: STANTEC 2016)

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 that was above the pool level. No animal burrows were noted on the upstream slope. The upstream slope was well vegetated and is controlled by timely mowing. (Photo 1). The guard rail was installed in January/February 2014 and was also observed to be in excellent condition.
2. No erosion was observed along the upstream left and right groin ditches or the abutments above 716 feet bench (Photos 3 and 4). Both of the abutments within 25 ft from the center of any of the groin ditches have been cleared of shrubs and small trees.
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 (Photos 5, 6 and 7). 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.
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 (Photo 7). Another seep at a higher elevation was noted and the seepage water was observed to be clear (i.e. no suspended sediment) (Photo 8) with an estimated discharge of 0.5 gpm.

5. 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 seeps point of emergence.
6. The emergency spillway was clear of any debris and heavy vegetative growth and has been paved (No photo taken). (Note: The top of the asphalt paving within the emergency spillway was maintained at an elevation of 868 ft in accordance with the dam's permit.)
7. The right and left weirs were free flowing and clear. The discharged was estimated to be 3 to 5 gpm for the left weir and 4 to 6 gpm for the right weir (Photos 9 and 10).

4.1.5 SPILLWAY TUNNEL

The primary decant structure and spillway tunnel were grouted and closed in November 2015. No further inspection of these structures are necessary.

4.1.6 EVALUATION OF INSTRUMENTATION DATA

The instrumentation for the fly ash pond consists of piezometers and surface deformation/settlement monuments (See attachment A for locations).

The elevations of piezometer water levels have remained fairly constant with no adverse trends observed that would impair the structural stability of the dam. No adverse trends were observed with respect to the surface deformation/settlement monuments that would impair the structural stability of the dam.

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

The primary decant structure and discharge tunnel have been grouted and closed in accordance with the fly ash dam's permitted modifications to eliminate these structures. Based on interviews with plant personnel 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 30 day 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 seepage along the right groin and located above the repaired slip area should continue to be monitored on a periodic basis to ensure that groin ditch remains free draining.

6.3 MAINTENANCE ITEMS

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

1. Control of the vegetation cover (i.e. mowing) should be continued on its current regularly scheduled basis.
2. The vehicle rutting on the 716 bench should to backfilled as they are observed during routine inspections.

7.0 CONCLUSION

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

8.0 REFERENCES

AEP, May 23rd 2016, Deformation Review Report of Survey Amos Plant Fly Ash Dam, prepared by AEPSC Civil Laboratory, Groveport Ohio

Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule, 40 C.F.R §257 & §261 17 April 2015.

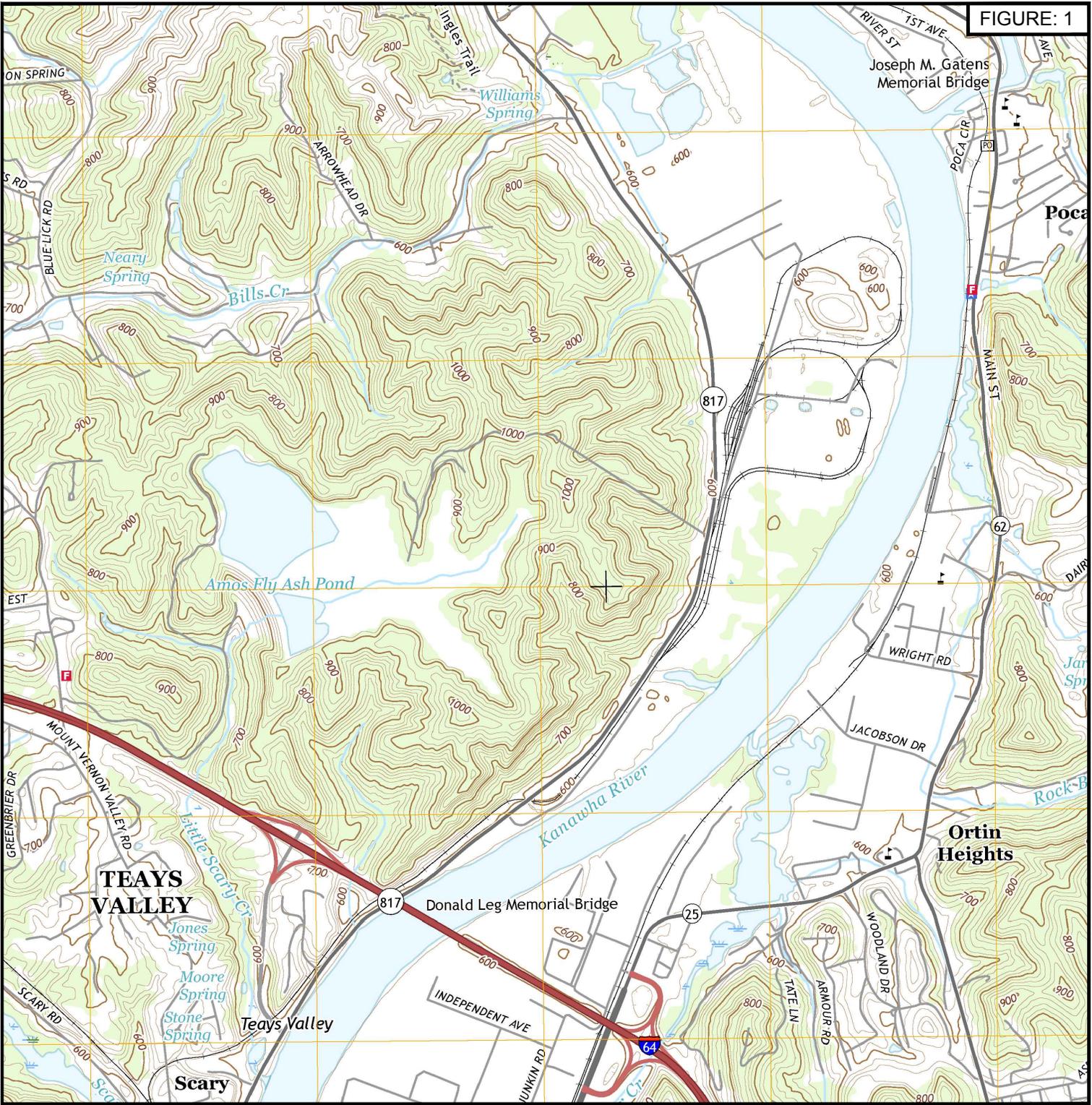
“Qualifications for Impoundment Inspection CI-31”, U.S. Department of Labor, Mine Safety and Health Administration (MSHA), 2004.

Menninger P.E., John, 2012, “Design Basis Report, Fly ash Pond Closure Volume 1 & Volume 2”, Stantec Consulting Services,

ATTACHMENT A

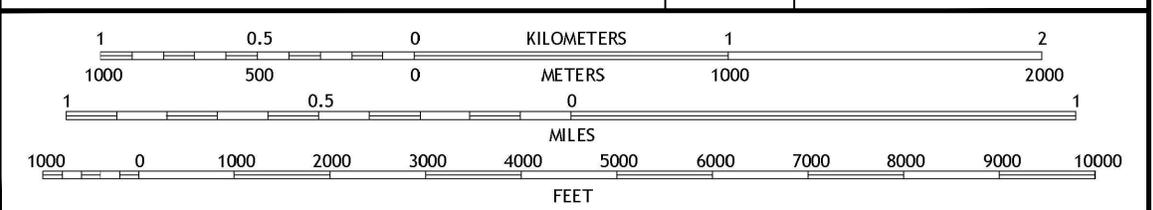
Figures

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: 10/18/2016





1
2
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1
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A

B

C

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E

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H

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AMOS PLANT

SCARY WEST VIRGINIA

FLY ASH POND

UNIT: DRAWING NUMBER: **FIGURE 2** REV:

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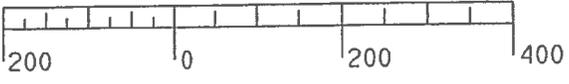
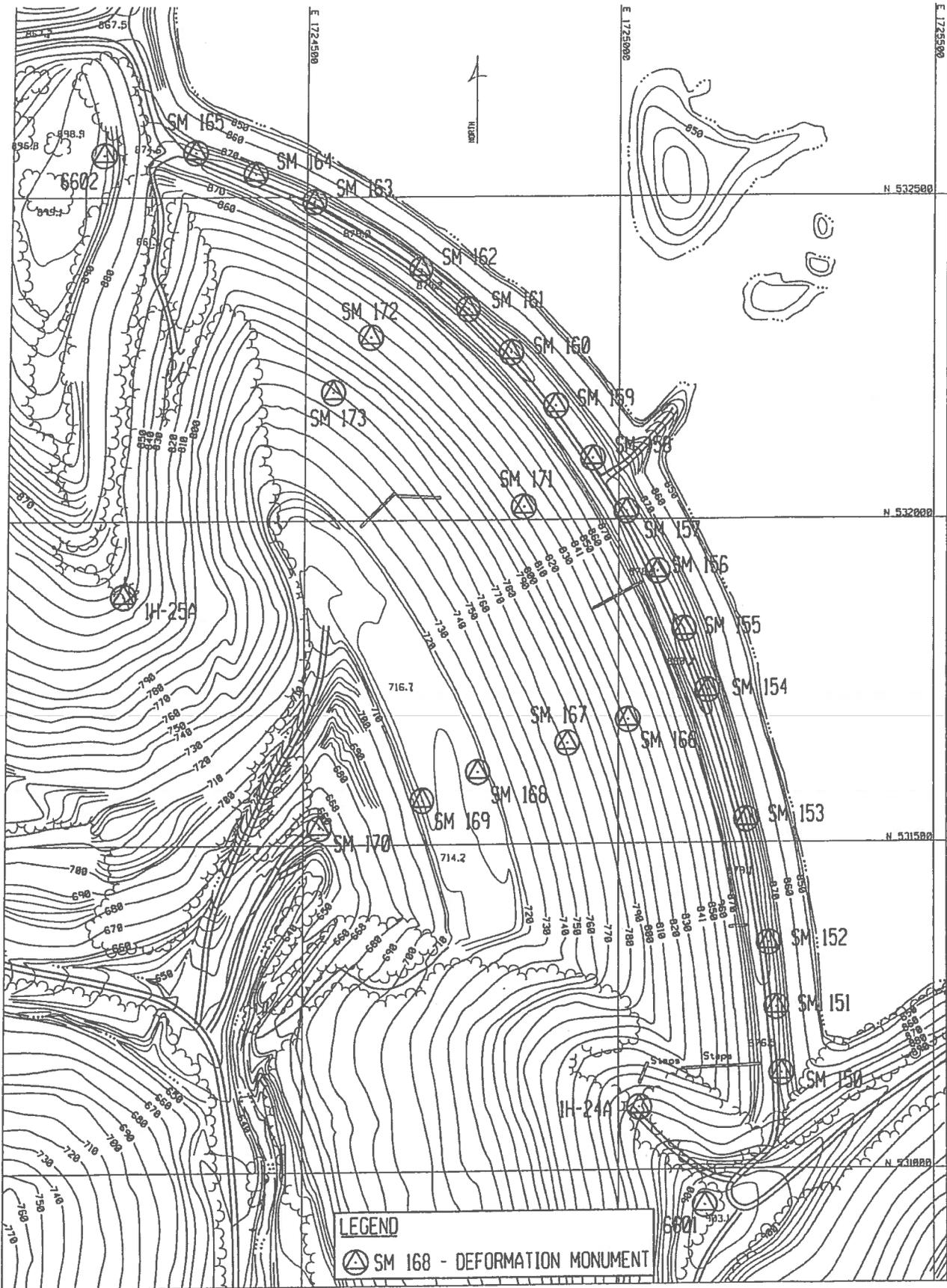
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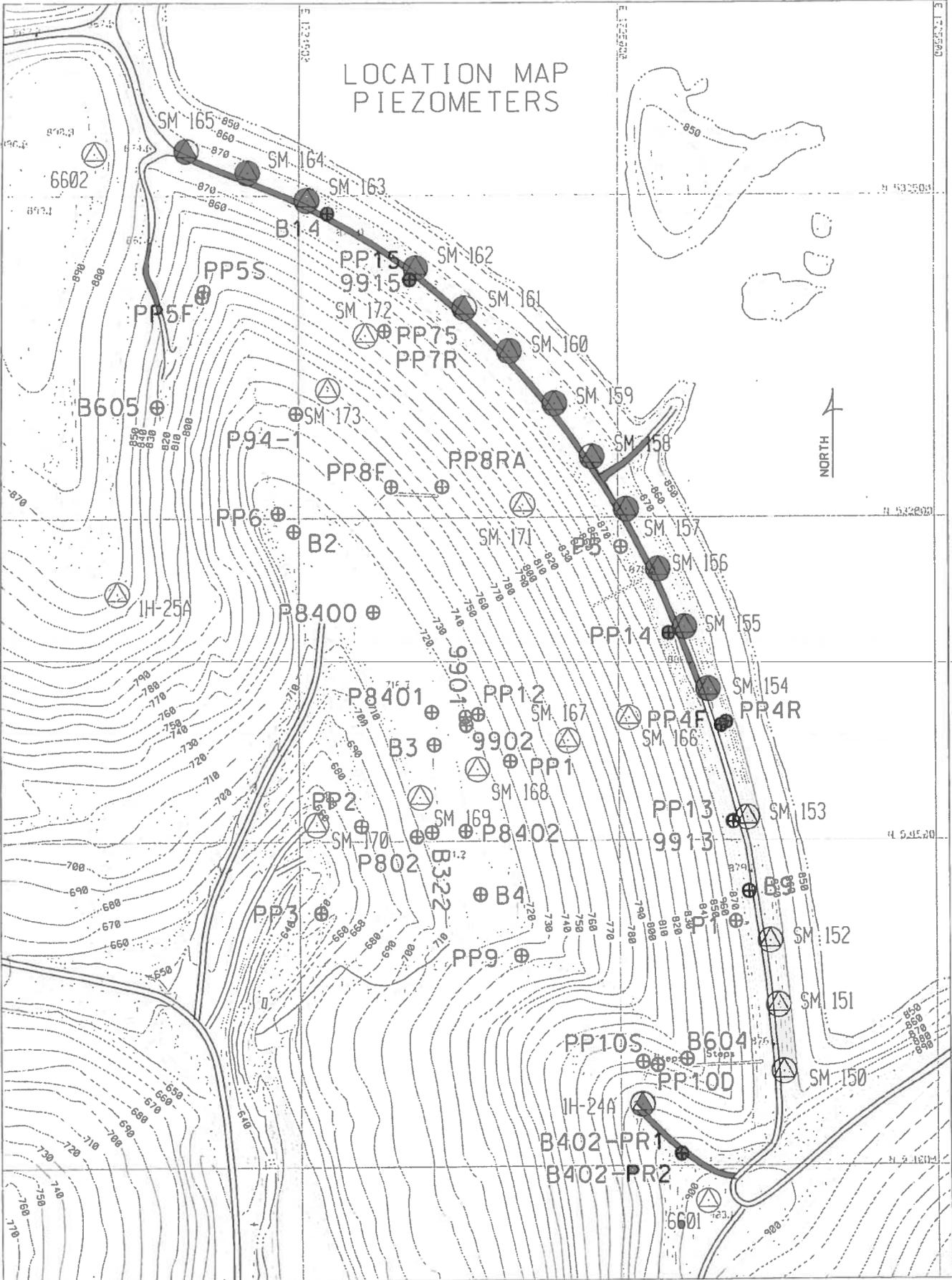
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LOCATION MAP DEFORMATION MONUMENTS

LOCATION MAP PIEZOMETERS



LEGEND

⊕ B402-PR2 - PIEZOMETER

⊙ (with triangle) - PIEZOMETER

ATTACHMENT B

Photos

**2016 Annual Dam and Dike Inspection Report
John E. Amos Plant
Photos**



Photo 1 Typical upstream face showing good vegetative cover. Capping and closure activities are seen in the background.



Photo 2 – Typical view of the left groin showing good conditions.



Photo 3 – Typical view of the right groin showing good conditions.



Photo 4 – Typical view of the downstream slope looking towards the left groin showing good conditions.



Photo 5 – Typical view of the downstream slope looking towards the right groin showing good conditions.

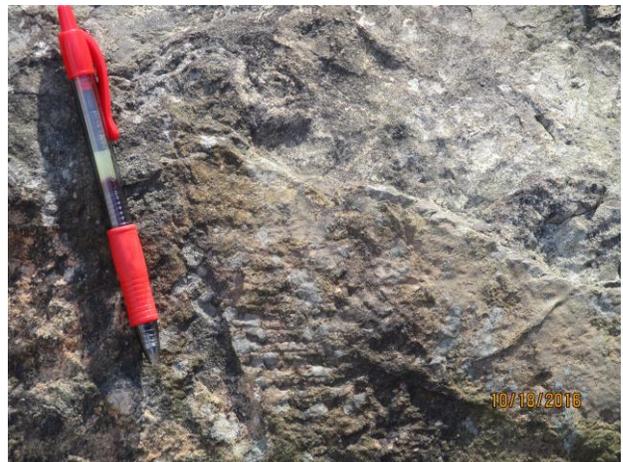


Photo 6 – Typical view of rip rap showing excellent condition (i.e. very little weathering) as noted by the presence of the fern fossil.



Photo 7 – Typical view of the repairs to the seep along the right groin ditch performed this year showing excellent conditions.



Photo 8 – Typical view of spring seepage at Elevation 794 ft with minor slumping along the right groin above the repaired area.



Photo 9- Typical view of the left weir showing a visually clear discharge of 3 to 5 gpm.



Photo 10- Typical view of the right weir showing a visually clear discharge of 4 to 6 gpm.