DAM & DIKE INSPECTION REPORT
Mountaineer Bottom Ash Complex

GERS-15-032 – Revision 0

MOUNTAINEER PLANT
NEW HAVEN, WV

INSPECTION DATE November 5, 2015

PREPARED BY _____ **DATE** 12/18/2015
Brett A. Dreger, P.E.

REVIEWED BY _____ **DATE** 12-22-15
Shah Baig, P.E.

APPROVED BY _____ **DATE** 1/6/2016
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PROFESSIONAL ENGINEER
SEAL & SIGNATURE

2015 INSPECTION REPORT
BOTTOM ASH COMPLEX

GERS-15-032
REVISION 0

MOUNTAINEER PLANT
NEW HAVEN, WEST VIRGINIA

PREPARED BY
AEP SERVICE CORPORATION
CIVIL ENGINEERING DIVISION
GEOTECHNICAL ENGINEERING SECTION
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

APPENDIX A: MOUNTAINEER BOTTOM ASH COMPLEX INSPECTION PHOTOGRAPHS

APPENDIX B: MOUNTAINEER BOTTOM ASH COMPLEX INSPECTION LOCATION PLAN

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INTRODUCTION

AEPSC Civil Engineering administers the company's Dam Inspection and Maintenance Program (DIMP). As part of DIMP, staff from the Geotechnical Engineering Section conducts dike and dam inspections annually. Mr. Brett A. Dreger conducted the 2015 inspection of the Mountaineer Bottom Ash Complex. This report has been prepared under the direction of Gary F. Zych P.E. and is a summary of the inspection and assessment of the condition of the facilities.

Mr. Chris Purdum of the Mountaineer Plant was the facility contact for the inspection and assisted with the inspection. The inspection was performed on November 5, 2015. The weather condition was partly sunny with temperatures ranging from 55° F in the morning to 66° F in the afternoon. No precipitation was observed prior to the inspection.

Bottom Ash Complex

At the Mountaineer Plant, the Bottom Ash Complex consists of East and West Bottom Ash Ponds, East and West Wastewater Ponds, a Leachate Collection Surge Pond, a FGD Waste Containment Pond, a Reclaim Water Pond, a Clearwater Pond and a small Metal Cleaning Waste Tank Secondary Containment Basin. The pond embankments are generally small in height (i.e., < 50 ft.) and have design slopes of 3 Horizontal to 1 Vertical (3H to 1V) for both the interior and exterior slopes. The east and west ponds operate in alternate sequences where the inactive pond group is undergoing routine maintenance, repair, ash removal or another operating activity. During this inspection the east ponds were inactive. The figure in Appendix B depicts the pond arrangement at the Bottom Ash Complex.

SUMMARY OF VISUAL OBSERVATIONS

The 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, cracks, concrete surface etc.) where the current maintenance program has neglected to improve the condition. Usually, conditions that have been identified in previous inspections, but have not been corrected.

Excessive: A reference to an observed item (e.g., erosion, seepage, vegetation, cracks, concrete surface 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.

Results of the visual inspection performed on November 5, 2015 are summarized below. Operating pool elevations for the ponds are summarized in the instrumentation data section of this report.

East Bottom Ash Pond (EBAP), West Bottom Ash Pond (WBAP) and Facility Exterior Slopes

Conditions along the exterior slopes of the Bottom Ash Complex were generally good and well maintained. The conditions with respect to vegetation and brush control were satisfactory with no excessive growth. The condition with respect to the extent of animal burrows remains consistent with last inspection, particularly with ground hog activity. Details of the visual inspection are presented in the items below. Photographs referenced in the following report can be found in Appendix A.

1. The condition of the east exterior slope was satisfactory to good. Locations of observed animal burrows and wet areas are shown in Appendix B. Typical conditions of the slope's vegetative cover after recent mowing are shown in Photograph No. 1, 3, and No. 4. Photograph No. 2 is a close up view of a

typical active animal burrow that are present throughout the length of the east exterior slope and were generally isolated to the lower half of the dike. An extended area of excessive wetness approximately 900 feet long was still observed adjacent to the toe of the dike toward the northern end. The wet area was varying in width along its length with visible water standing primarily in ruts made by the mowing equipment over the years. No visible signs of distress were observed along the toe of the dike adjacent to the wet area. Photograph No. 5 illustrates the general extent of the wet area.

2. The overall condition of the north exterior slope is good and is shown in Photograph No. 5. Minor ponding of water due to poor drainage has been documented in the past. The area north of the EBAP beyond the facility perimeter fencing has also previously been reported with standing water. During this inspection, these areas were noted to be wet with some standing water in the old tire ruts. The upper slope area along the conveyor appeared in good condition as seen in Photograph No. 7.

3. The west exterior slope and toe of the facility was well vegetated and recently mowed as shown in Photograph No. 6, 8 & 9. As with the east side exterior slope, there were active animal burrows observed along the west side exterior slope.

4. The condition of the south exterior slope was good. Photograph No. 10 shows the west half of the exterior slope looking east.

5. The EBAP interior slopes were observed to be in generally good condition. Mowing and brush control is considered good. During the inspection, the EBAP was out of service. Photograph No. 11, 12 and 13 shows the overall condition of the interior slopes of the EBAP. Some erosion is present around the inside edges and other concerns are that some of the boards on the EBAP skimmer structure are missing and the EBAP Fill Pipe Turbine Room Sump Discharge structure is in poor condition.

6. The WBAP interior slopes were observed to be in generally good condition. Erosion was minor. Mowing and brush control is considered good. During the inspection, the WBAP was active. Photograph No. 14 through Photograph No. 16 show the general condition of the interior slopes of the WBAP.

7. The general condition of the interior and exterior dike crest areas are considered good and the roadway surfaces are in good condition with no visual evidence of dike settlement, misalignment, cracking or stability problems. Photographs No. 31, 32, 33, and 34 are representative of the exterior dike crest areas and interior roadway conditions throughout the Complex.

East Wastewater Pond (EWP) and West Wastewater Pond (WWP)

1. The condition of the EWP and the WWP interior slopes with respect to slope mowing, brush control and soil erosion was good. Typical slope conditions along the inside slope area of the WWP and EWP are shown in Photograph No. 17, 18, 19, 20, 21 and No. 22.

2. The effluent flume concrete and the steel weir components at the south end of the WWP appeared to be in satisfactory and working condition. Photograph No. 18 is an overview of the effluent flume and weir.

3. The effluent flume concrete and the steel weir components at the south end of the EWP appeared to be in fair condition. Minor deterioration of the concrete is occurring with age and should continue to be monitored for any future deterioration. Photograph No. 21 shows the overflow weir.

4. The Leachate Surge Pond located within EWP appears to be in good condition. The condition of the HDPE liner system and interior slopes is shown in Photograph No. 23. The liner is intact and in good condition.

5. The main junction box between the Wastewater Ponds and the Reclaim/Clearwater Ponds was in good condition and operating properly. See Photograph No. 24.

Metal Cleaning Tank Secondary Containment Basin/ FGD Scrubber Sludge Pond

1. The FGD Scrubber Sludge Pond was in good condition and is shown in Photograph No. 25. The MCTSCB interior slopes and vegetation control was in satisfactory condition. No Photograph was taken during this inspection.

Clearwater Pond (CWP) and Reclaim Water Pond (RWP) Interior Slopes

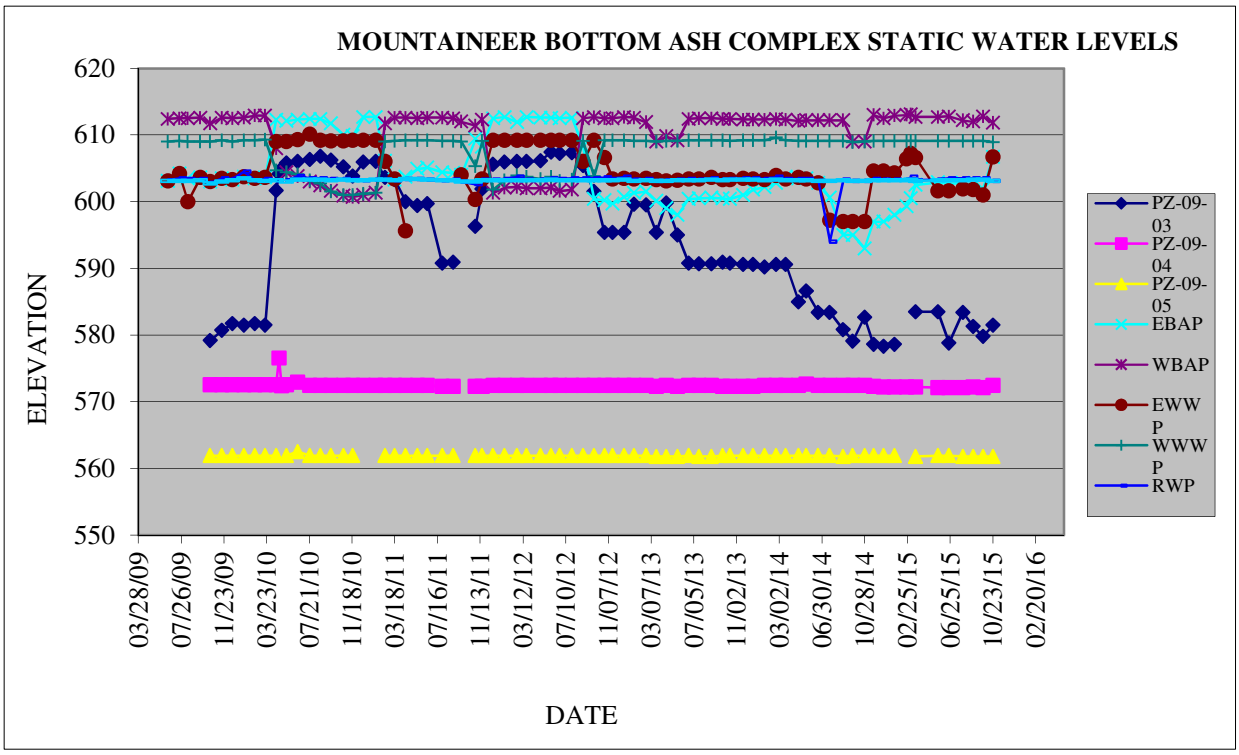
1. The condition of the CWP and RWP interior slopes with respect to slope mowing and brush control was satisfactory. In the RWP there were some signs of minor beaching erosion activity on one of the slopes near the water line (Photograph No. 26). Typical vegetation conditions on the other interior slopes of the RWP and CWP are shown in Photographs No. 27 through 30.

2. The overflow structures also appeared in fair condition. The typical condition of the CWP effluent flumes is shown in Photograph No. 28.

3. The crest areas and pipe cribbing along the edge of the clear water pond appeared to be in satisfactory condition with no signs of rutting misalignment or cracking. However, there is some minor erosion occurring between the cribbing under the supported pipe in the northwest corner as shown in Photograph No. 30.

ASSESSMENT OF RECENT INSTRUMENTATION DATA

Three piezometers were installed in February 2009. PZ-09-03 was installed at the crest of the EBAP. PZ-09-04 was installed directly down the slope from PZ-09-03. PZ-09-05 was installed at the crest of the CWP. The following chart shows the static water levels in those piezometers measured during the monthly plant inspections, along with the measured pond levels:



A summary of the pond levels measured during the inspection and the levels at the time of recent previous annual inspections are provided below. The EBAP and EWP were inactive at the time of the 2015 annual inspection, which is the reason their water levels are significantly below normal operating conditions. It is noted that the static water level in PZ-09-03 trends relative to the operating pool level of the EBAP.

Pond Name	Normal Pool Elevation (ft)	Pond Elevation (Ft.) 10-15-13	Pond Elevation (Ft.) 9-25-14	Pond Elevation (Ft.) 10-24-15
EBAP	612.0	600.4	< 595.0	606.7
WBAP	612.0	612.4	609.0	611.8
EWP	609.0	603.3	< 597.0	606.7
WWP	609.0	609.1	608.9	608.9
RWP	603.0	603.4	603.1	603.1
CWP	603.0	603.3	603.1	603.1

Note: Shading indicates inactive cell at time of inspection.

CONCLUSIONS

Based on the visual inspection, the overall condition of the Bottom Ash Complex is good. Inspection and monitoring activities being performed by the Plant and AEPSC Civil Engineering & Geotechnical Services should continue. Specific conclusions related to this inspection include:

- The Bottom Ash Complex appears to be operating as designed and shows no signs of distress, slope instability, dike misalignment or settlement;
- Drainage along the toe of the east exterior dike is considered poor and requires corrective action. A survey of the area was completed this year and grading plans are being developed.
- Vegetation management for the facility is considered good. However, there are some areas that are slightly overgrown and should be remedied.
- The animal activity along the east embankment outside slopes continues to be present. The current program to control animal activity using the catch and release method appears to have had limited success.
- The EBAP letdown pipe at the turbine room sump discharge structure is in poor condition.
- There are loose or broken bolts on the WWP effluent flume steel weir plate.

RECOMMENDATIONS

Following are remedial actions, general maintenance items and monitoring requirements that are recommended as a result of the inspection. Assistance or guidance with the implementation of these items can be provided by AEPSC Civil Engineering & Geotechnical Services:

REMEDIAL ACTIONS

- Need to repair/replace letdown pipe at turbine room sump discharge box in EBAP.
- Repair or replace the loose or broken bolts on the WWP effluent flume steel weir plate.
- As stated in last year's 2014 inspection report, since the catch and release method does not seem to have completely eliminated the animal problem, consideration should be given to the use of fumigants during the period(s) allowed by most current edition of the West Virginia Division of Natural Resources' Hunting and Trapping Regulations.
- Complete grading work along the toe of the exterior slope of the east dike and north dike areas to promote drainage and to relieve ponding;

GENERAL MAINTENANCE AND MONITORING

- If there are areas that need seeding and mulching activities and cannot be completed before the end of this year, then place temporary erosion control matting at all eroded and bare areas in order to minimize further degradation and make repair plans for early next spring with the application of soil (as necessary to sustain vegetation), fertilizer, seed and mulch to follow immediately.

- As a minimum, vegetation control activities should continue on a semiannual basis on the interior and exterior slopes of all the Ponds (EBAP, WBAP, EWP, WWP, RWP, & CWP);
- The interior and exterior slopes of the bottom ash pond and clear water pond should be repaired on an ongoing basis as erosion occurs.
- Ongoing monitoring procedures and communication between Plant Personnel and the AEPSC Civil Engineering Division should continue.
- Continue Plant inspections of the facility in accordance with the recently revised Circular Letter.
- Follow the prescribed maintenance activities outlined in the approved plan.

Based on the inspection and review of relevant documents, AEPSC – Civil Engineering believes that the Bottom Ash Complex has a generally good appearance and is in good condition. Inspections and monitoring by plant personnel should continue. If you have any questions with regard to this report, please do not hesitate to contact Brett A. Dreger at 614-716-2258 (audinet 200-2258) or Gary Zych at 614-716-2917 (audinet 200-2917).

APPENDIX A

MOUNTAINEER BOTTOM ASH COMPLEX INSPECTION PHOTOGRAPHS

APPENDIX A
MOUNTAINEER BOTTOM ASH COMPLEX
DIKE INSPECTION PHOTOGRAPHS

	**Photo No. 1** Bottom Ash Complex Overview of East Exterior Slope From South End Generally Looking North
	**Photo No. 2** Bottom Ash Complex Typical View of Animal Burrows on East Exterior Slope.
	**Photo No. 3** Bottom Ash Complex Overview of East Exterior Slope from Midpoint Generally Looking North

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DIKE INSPECTION PHOTOGRAPHS

	**Photo No. 4** Bottom Ash Complex Overview of East Exterior Slope Generally Looking South.
	**Photo No. 5** Bottom Ash Complex North Exterior Slope Generally Looking West.
	**Photo No. 6** Bottom Ash Complex West Exterior Slope From North End Looking south.

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	**Photo No. 7** Bottom Ash Complex North Exterior Slope From West End Looking East.
	**Photo No. 8** Bottom Ash Complex Typical Condition of West Exterior Slope Looking North.
	**Photo No. 9** Bottom Ash Complex Typical Condition of West Exterior Slope Looking South.

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	**Photo No. 10** Bottom Ash Complex Typical Condition of South Exterior Slope Looking East.
	**Photo No. 11** Bottom Ash Complex Typical Condition of East Bottom Ash Pond Interior Overflow and Low Water Outlet Structure. East Bottom Ash Pond is Currently Out of Service.
	**Photo No. 12** Bottom Ash Complex Typical Condition of East Bottom Ash Pond Discharge Header Pipe.

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	**Photo No. 13** Bottom Ash Complex Typical Condition of East Bottom Ash Pond Interior Slope conditions.
	**Photo No. 14** Bottom Ash Complex West Bottom Ash Pond Typical Interior Condition.
	**Photo No. 15** Bottom Ash Complex Typical Interior of West Bottom Ash Pond Overflow and Low Water Outlet Structure. West Bottom Ash Pond Was In Service at Time of Inspection.

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	**Photo No. 16** Bottom Ash Complex Typical Condition of West Bottom Ash Pond Discharge Header Pipe.
	**Photo No. 17** Bottom Ash Complex West Wastewater Pond Interior Condition.
	**Photo No. 18** Bottom Ash Complex West Wastewater Pond Effluent Flume and Weir.

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	**Photo No. 19** Bottom Ash Complex West Wastewater Pond Interior Slope Condition and Discharge Header Pipe.
	**Photo No. 20** Bottom Ash Complex East Wastewater Pond Typical Interior Condition and Low Water Outlet Structure.
	**Photo No. 21** East Wastewater Pond Interior Effluent Flume and Weir.

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DIKE INSPECTION PHOTOGRAPHS

	**Photo No. 22** Bottom Ash Complex East Wastewater Pond Interior Slope Condition and Discharge Header Pipe.
	**Photo No. 23** Bottom Ash Complex East Wastewater Pond Interior Leachate Collection Surge Pond Typical Condition.
	**Photo No. 24** Main Junction Box Between Wastewater Ponds and Reclaim/Clear Water Ponds.

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	**Photo No. 25** Bottom Ash Complex FGD Scrubber Sludge Pond Interior Condition.
	**Photo No. 26** Bottom Ash Complex Reclaim Pond Interior Slope Condition. Notice Beaching Erosion At Waterline.
	**Photo No. 27** Bottom Ash Complex Clear Water Pond Typical Interior Condition.

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	**Photo No. 28** Bottom Ash Complex Clear Water Pond Effluent Flume and Weir Structure.
	**Photo No. 29** Bottom Ash Complex Clear Water Pond Typical Interior Slope Condition.
	**Photo No. 30** Bottom Ash Complex Clear Water Pond Typical Interior Slope Condition and Inlet Structure.

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	**Photo No. 31** Bottom Ash Complex Typical Crest Condition Along Interior Dike of Bottom Ash Ponds.
	**Photo No. 32** Bottom Ash Complex Typical Crest Condition of Exterior Dike of East Bottom Ash Pond.
	**Photo No. 33** Bottom Ash Complex Typical Crest Condition of Exterior Dike of West Bottom Ash Pond.

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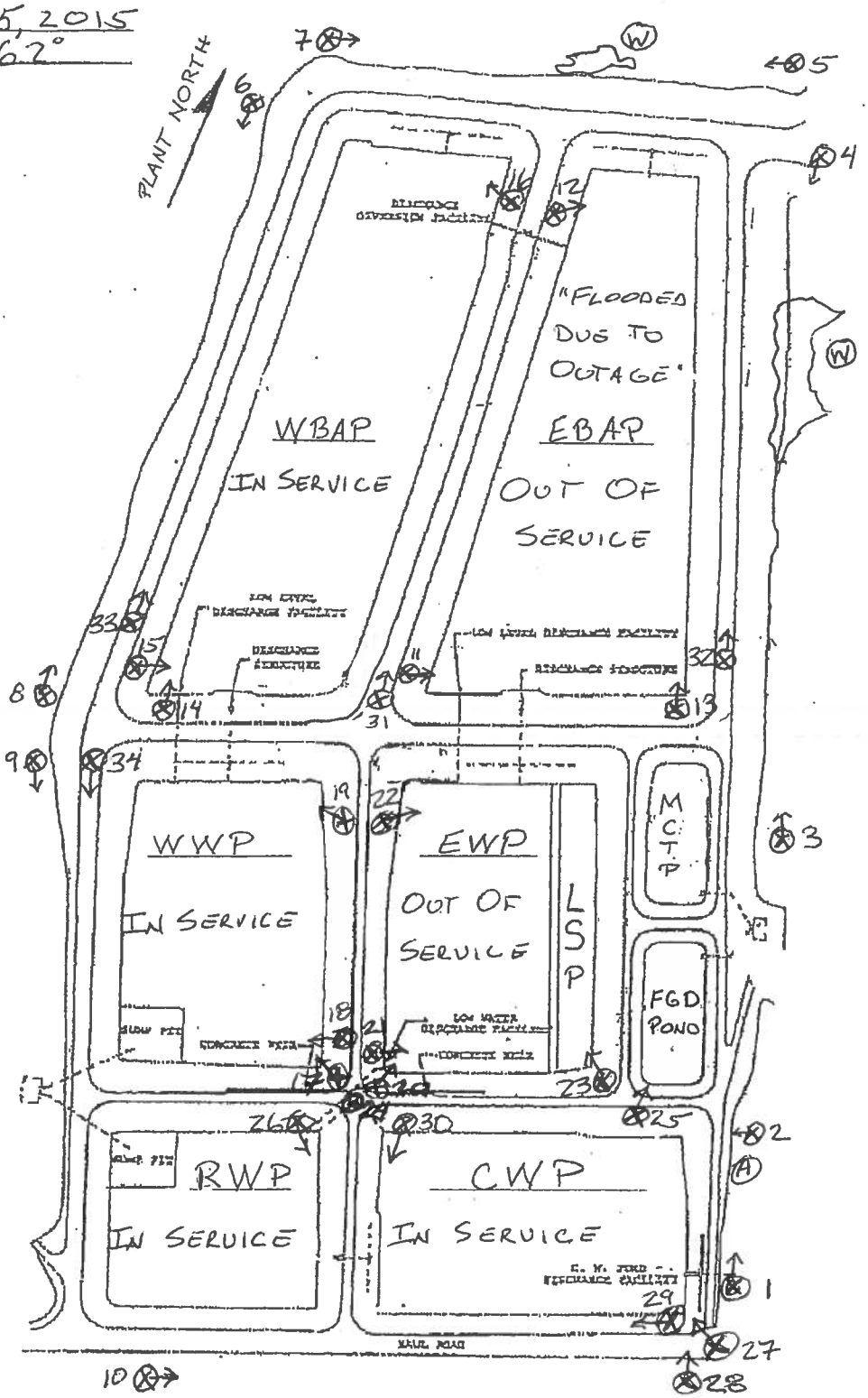
	**Photo No. 34** Bottom Ash Complex Typical Crest Condition of Exterior Dike of West Wastewater Pond.

APPENDIX B

MOUNTAINEER BOTTOM ASH COMPLEX
INSPECTION LOCATION PLAN

Date: NOVEMBER 5, 2015
Weather: SUNNY, 62°



Legend

A	Animal Hole
G	Erosion Gully
W	Area of Wetness or Seepage
S	Slide Area
Tr/Br	Trees & Brush
⊗	PHOTO

MOUNTAINEER PLANT
INSPECTION LOCATION PLAN

APPENDIX C

ENGINEER'S INSPECTION VERIFICATION STATEMENT
MOUNTAINEER BOTTOM ASH COMPLEX ID # 05307

ENGINEER'S INSPECTION VERIFICATION STATEMENT

For Compliance with Dam Safety Rules §47-34-15.4.c

I hereby verify that I supervised the visual inspection of the Mountaineer Bottom Ash Complex (ID# 05307) and its appurtenances on November 5, 2015. The attached signed and sealed inspection report documents:

1) the current conditions as observed;

2) any maintenance items necessary to prolong safe functioning of the dam;

3) any conditions observed during the inspection which indicate that the dam has a serious problem[1];

4) any conditions that will not allow proper functioning of the dam during normal or maximum reservoir water level conditions.

Gary F. Zych

Signature
Gary F. Zych, P.E.
Manager
Geotechnical Engineering Services
American Electric Power Service Corporation

Jan 6, 2016

Date

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SEAL

[1] As defined in Section 2.47 of the Dam Safety Rules