

**2016 DAM & DIKE INSPECTION  
REPORT  
RECLAIM POND  
ASH POND 1A & 1B  
POND 2**

**CLINCH RIVER PLANT  
CARBO, VA**

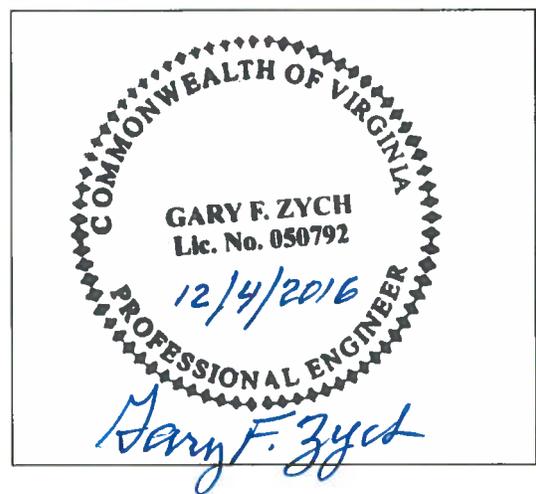
**INSPECTION DATE** October 19 & 20, 2016

**PREPARED BY** *Daniel W. Pizzino* **DATE** 12/1/2016  
Daniel W. Pizzino, P.E.

**REVIEWED BY** *Daniel Murphy* **DATE** 12/1/2016  
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**PROFESSIONAL ENGINEER  
SEAL & SIGNATURE**

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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. Daniel Pizzino, P.E. conducted this annual inspection. This report has been prepared under the direction of Mr. Gary Zych, P.E. and presents a summary of the inspection and assessment of the condition of the facilities.

Mr. Jimmie Saunders, an employee at the Clinch River Plant, was the facility contact. The inspection was performed on October 19 and 20, 2016. Weather conditions were partly sunny and mild. Temperatures were in the mid 60's. The 7 days prior to the inspection there was no precipitation at the plant.

At the Clinch River Plant, the Ash Pond Complex consists of Ash Pond 1A, Ash Pond 1B and the Reclaim Pond as shown in Figure 1. The two ash ponds are formed by earthen embankments approximately 60-ft. high on the west, south and east sides; a splitter embankment in the center; and natural high ground along the north side. The embankments have interior slopes of approximately 3 Horizontal to 1 Vertical (3H to 1V) and exterior slopes of approximately 2H to 1V. The exterior dike on the south side has an underdrain and finger drain system installed downstream of the toe road to control and collect seepage. The Reclaim Pond is an excavated pond which collects seepage and effluent from Pond 1 and Pond 2.

In 2015 construction was finalized on a diversion channel which routes runoff around the impoundment. The project started in 2014 and consists of constructing a grouted riprap channel upstream of the pond to capture offsite drainage. This channel discharges into a concrete channel located on the face of the dike and outlets to a culvert to the Clinch River.

In spring of 2016 the principal outlet pipe located in Pond 1B was grouted closed as a result of a routine camera inspection which discovered increased infiltration into the pipe at the several joints. Concrete grout was pumped into the portion of the pipe that runs through the dike and up the drainage shaft. As a result, a temporary pump has been placed in the pond to convey any storm water the pond may collect. In order to pass a large storm event a temporary spillway was cut into the crest of the dam. The pump system and spillway will be removed when the pond is closed which is scheduled to begin in 2017.

Ash Pond 2 closure was completed in January 2014. The project consisted of placing an impermeable cap over the pond as a formal closure. Pond 2 is still considered a regulated dam at this time and was inspected as such.

## **SUMMARY OF VISUAL OBSERVATIONS**

### **General**

The summary of the visual observations uses terms to describe the general appearance or condition of an observed item, activity or structure. Their 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 or 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.
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.

Appendices A and B and contain selected photographs taken during the inspection of the Reclaim Pond, Pond 1A and Pond 1B, respectively. Appendix C contains photographs of Pond 2.

**Reclaim Pond** (Refer to Figure 1)

1. The north slope of the pond is in good condition. The riprap and gravel surface appeared stable. (Photo 1)
2. An erosion gully which has been observed during the past several annual inspections has been repaired. (Photo 1)
3. The V-notch weir boxes referenced as Nos. 3, 5 and 5A were in good condition. Flow was discharging from all three weirs, see table on page 6 for flow rates. Since the plant has stopped sluicing to the pond and the pool level has dropped the flow rates at each weir box have declined from normal levels. All flows were clear. The vegetation around the weir boxes was mowed and did not restrict flow. (Photos 2-4)

**Pond 1A** (Refer to Figure 1)

1. The exterior slope of the west 1A dike was well vegetated and the cover was recently mowed. In general the slope is in good condition. (Photo 5) The groin ditch at the west abutment was in good condition and recently mowed. The area around the concrete channel, culvert and energy dissipater has good vegetation. The vegetation on the abutment section was clear of woody vegetation within 25 feet of the groin (as per the VA Dam Safety requirements). The abutment was stable and no seepage was observed. An underdrain that collects water under the surface of the diversion channel and outlets into the concrete channel was discharging. (Photo 6)
2. The exterior slope of the south 1A dike below the access road is covered with riprap which is part of the seepage control project implemented in 2006. The surface of the riprap did not show any signs of instability or other slope movement. The overall slope surface is in good condition. (Photo 7-8)
3. The exterior slope of the south 1A dike above the access road was also well vegetated and recently mowed. There were no signs of sloughing, bulging or settlement on the upper section of the slope. The general condition of the upper section was satisfactory. The access road was in good condition. The pavement has minor surface cracking but did not show signs of movement. (Photo 9)

4. The crest of the south 1A dike showed no signs of settlement or movement. There were no ruts observed. (Photo 10)
5. The 18” stormwater diversion pipe located on the face of the dike was in good condition. There did not appear to be any leaking or soil erosion around the pipe. The pipe appeared to be functioning properly. (Photo 11)
6. The sump pit at the toe of the dike that collects the seepage from the dikes was operating properly. Both drain lines entering the pit were discharging as intended.
7. There were no animal holes observed during the inspection along the 1A dike.
8. Pond 1A is dry and has not been used for sluicing plant process water since 2015. Runoff collected in Pond 1A is conveyed to Pond 1B by a 24” HDPE pipe through the splitter dike. The pipe from Pond 1A to Pond 1B was in good condition. Low areas in the pond surface are pumped using a small trash pump.
9. The 18” stormwater diversion pipe inlet #2 was clear of debris. There was no water flowing into the inlet and the hollow that drains into the pipe was dry.
10. Weir #6, located on the South 1A dike, was completely dry and has appeared to not be flowing for some time. (Photo 12)

**Pond 1B** (Refer to Figure 1)

1. The outlet structure and outlet pipe were completely grouted closed and abandoned. The existing outlet structure is in fair condition however it is no longer being used. The grouted discharge pipe was inspected and no signs of leakage were observed. There was no evidence of structural weakness or seepage along the length the pipe. (Photo 13)
2. A temporary spillway was recently constructed by using riprap and concrete in the northeast portion of Pond 1B. The spillway was in good condition. (Photo 14-15)
3. The south dike crest was in good condition with no evidence of settlement or misalignment. The dike road was in good condition and did not contain any ruts or standing water. (Photo 16)
4. A temporary staff gauge was present at the time of the inspection. The pool level was read to be approximately 553. (Photo 17)
5. The exterior grassed slopes of Pond 1B dike are well vegetated and were recently mowed. Overall the outboard slope of the dike was in good condition with no signs of misalignment.
6. A protective casing of one of the monitoring wells along the crest of Pond 1B was rusty and very corroded. This was noted on the 2015 inspection; however this well is scheduled to be removed when closure work begins on the pond. (Photo 18)
7. The gravel access road near the left abutment appears in good condition. Previous inspections have noted a history of erosion gullies along this portion of road, but presently do not have any signs of erosion. (Photo 19)

8. The inboard slopes of Pond 1B dikes were well vegetated and recently mowed. The slopes appeared stable and are in good condition. A rodent hole was observed on the inboard slope of Pond 1B approximately half way up the embankment. (Photo 20 & 21)
9. The left abutment (east side) groin /diversion/seepage ditch was flowing and measured with Weir #4. (Photo 22) There were no signs of erosion. The ditch is in good condition. The abutment area within 25 feet of the groin has been cleared of woody vegetation and was recently mowed.
10. The access road and toe drain along the south dike appeared in stable condition. There were no signs of instability, rutting, or erosion. (Photo 23)
11. The exterior of the concrete manholes located at the toe of the slope were in good condition. A low volume of seepage from Pond 2 discharge pipe is being collected in the adjacent pump station. The water is periodically pumped out to the Reclaim Pond. The pumping system appears to be functioning properly.
12. The runoff diversion inlet pipe #1 at the bottom of hollow was free of debris. The inlet area was damp and no water was entering the structure.

**Pond 2** (Refer to Figure 2)

1. As noted in the Introduction Section, Pond 2 was capped and closed with work being completed in January 2014. A certification report was submitted to VDCR following the completion of this work. Overall the cap was well vegetated and has been recently mowed. There were no signs of settlement or erosion. (Photo 24 & 25)
2. The exterior slopes of the lower dike system showed no signs of instability. The exterior slopes are well vegetated and were recently mowed. There was no woody vegetation noted as in previous inspections. (Photo 26)
3. There were two rodent holes observed near the lower end of the second staircase. They appear abandoned and no longer active. (Photo 27)
4. The stairs leading to Dumps Creek which were constructed in 2013 are showing signs of weather deterioration. Several nails had popped up along the treads.
5. The crest of the lower dike was in good condition. There were no signs of misalignment, cracking or settlement. There was no standing water or ruts observed.
6. Seepage at the toe of the lower dike emanates at the interface with the bank of Dumps Creek. The area of seepage appeared to be only damp. The flow rate was very low and clear. (Photo 28)
7. The slope and crest of the middle dike are in good condition. The exterior slope was well vegetated but recently mowed. There were no signs of misalignment, cracking or settlement. (Photo 29)
8. The Fabriform ditch constructed as part of the closure was working as designed. Minor debris was observed in channel from nearby trees. No erosion was observed on the sides of the ditch or at the outlet. (Photo 30)
9. The east gabion discharge channel constructed as part of the closure project was working properly. The channel has some minor debris but was overall in good condition. (Photo 31)

10. The outlet downstream of the east gabion discharge channel appears stable. There was no observed erosion of the riprap as observed in previous inspections. There was minor debris at the outlet of the culvert. (Photo 32)

**ASSESSMENT OF RECENT INSTRUMENTATION DATA**

**Pond Water Levels**

Pond water levels, as measured on the date of the inspection, are summarized below. Also presented are water levels measured during previous annual inspections. The pond levels are considered normal.

<b>Pond Name</b>	<b>Oct 19, 2016</b>	<b>Oct 15, 2015</b>	<b>Oct 28, 2014</b>	<b>Oct 2 2013</b>	<b>Oct 3 2012</b>	<b>Sep 13 2011</b>	<b>Nov 17 2010</b>
Reclaim Pond	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not Measured	Not measured
1A Pond	Dry	Dry	1566.0	1566.4	1566.4	1566.65	1566.6
1B Pond	1553	Not Measured	1556.0	1557.9	1557.6	1557.25	1558.16
Pond 2	Closed	Closed	Closed	Closed	Dewatered – No free water present		

**Piezometer and Observation Wells**

Twenty (20) piezometers are located on or near the Pond 1A/1B Ash Pond and are being monitored by AEP. Locations of the piezometers are shown on Figure 1. Measurements recorded by the Plant since 1999 appear similar and within their normal historic range. Piezometers A-1, B-1, and P-1 have been removed due to construction of the diversion channel in 2014. These piezometers may be reinstalled after the cap and closure of the pond is completed.

In addition, several ground water monitoring wells have been installed along the perimeter of the diking system. These wells are located in the bedrock strata below the foundation of the dikes.

Plots of the data along the cross sections used in the 2010 stability evaluation of the Pond 1A and 1B dike are included in Appendix E.

Prior to the cap and closure of Pond 2, nine (9) piezometers were installed and monitored using a vibrating wire sensor and data logger. These reading are currently taken once week and collected every month. Four (4) existing traditional piezometers are also monitored within the Pond 2 on a monthly basis. All readings have been within their normal ranges or have been decreasing since the installation of the cap system. The location of these piezometers is shown on Figure 2.

**Flow Measurement Weirs**

Flow through five V-Notched Weirs collecting seepage and surface runoff from the Ash Pond 1A and 1B Complex were measured during the inspection. Results of these measurements and previous measurements are summarized below. Note that previously listed Weir #2 has been abandoned and its flow is directed through Weir #5A. Weir #5A is located near Weir #5.

Weir No. & Size	Flow Rate GPM							
	Oct 18, 2016	Oct 15, 2015	Oct 28, 2014	Oct 2, 2013	Oct 3, 2012	Sep 12, 2011	Nov 17, 2010	Jan. 7, 2009
5A-90°	<1	4	4	4	6	4	1.1	8
3-90°	<1	< 2	< 2	4	4	2	No flow	1.5
4-90°	12	37	37	24	20	24	24	88
5-90°	1	6	6	12	6	6	6	37
6-22 1/2°	Dry	2.6	2.6	1	1.4	3.0	1	6.6

## OTHER ASSESSMENTS

There were no other formal assessments by any agencies for Pond 1A/1B or Pond 2 since the last annual inspection. On May 9th there was a video inspection of the discharge pipe from Pond 1B to the downstream structure beyond the toe of the dam. All piping was in good condition however leaks observed at pipe joints in previous inspections appeared to be increasing in flowrate. Subsequently the pipe was grouted shut and abandoned in June 2016. A temporary pump system was installed to decant any runoff entering the pond. A temporary spillway was also constructed to pass inflow during extreme rain events.

## RECOMMENDATIONS (other than normal maintenance items)

### Reclaim Pond

1. No Recommendations

### Pond 1A

2. No Recommendations

### Pond 1B

3. Repair rodent hole along the inboard slope.
4. Inspect all monitoring well casings and replace any casings that are rusted through or are not properly protecting the well.

### Pond 2

5. Repair the rodent holes located near the toe of the lower dike.
6. The stairs leading to dumps creek should be inspected and any loose or deteriorated boards should be repaired.
7. Remove sticks and debris that has fallen in the Fabriform channel and the gabion channel.

In general, routine inspections, monitoring and maintenance by plant personnel should continue. The vegetation on both the exterior and interior slopes should be mowed at least twice a year.

If you have any questions with regard to this report, please contact Daniel Pizzino at (614) 716-1472 (audinet 200-1472).

**APPENDIX A: RECLAIM POND PHOTOGRAPHS**

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Picture 1 – Reclaim Pond, gravel surface at crest



Picture 2 – Reclaim Pond, Weir box #3



Picture 3 – Reclaim Pond, Weir Box #5



Picture 4 – Reclaim Pond, Weir Box #5A

**APPENDIX B: ASH POND 1A and 1B PHOTOGRAPHS**

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Picture 5 – Pond 1A, outboard slope of west dike



Picture 6 – Pond 1A, abutment and concrete discharge channel



Picture 7 – Pond 1A, outboard slope of south dike



Picture 8 – Pond 1A and 1B, outboard slope of south dike



Picture 9 – Pond 1A, access road and outboard slope of south dike above access road



Picture 10 – Pond 1A, crest of dike

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Picture 11 – Pond 1A, 18” stormwater diversion pipe along outboard slope of south dike



Picture 12 – Pond 1A, Weir Box #6



Picture 13 – Pond 1B, abandoned principal outlet structure



Picture 14 – Pond 1B, temporary emergency spillway



Picture 15 – Pond 1B, temporary emergency spillway



Picture 16 – Pond 1B, crest of dike

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Picture 17 – Pond 1B, staff gauge



Picture 18 – Pond 1B, Corroded protective casing of monitoring well



Picture 19 – Pond 1B, Gravel Access road



Picture 20 – Pond 1B, Rodent hole located on inboard slope



Picture 21 – Pond 1B, Rodent hole located on inboard slope



Picture 22 – Pond 1B, Weir Box #4

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Picture 23– Pond 1B, access road along toe

**APPENDIX C: ASH POND 2 PHOTOGRAPHS**

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Picture 24– Pond 2, typical view of pond cap



Picture 25– Pond 2, typical view of pond cap



Picture 26-Pond 2, typical view of lower dike



Picture 27 – Pond 2, Rodent hole located near lower end of middle staircase



Picture 28-Pond 2, view of seepage area



Picture 29-Pond 2, typical view of middle dike

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Photos**



Picture 30-Pond 2, Fabriform ditch

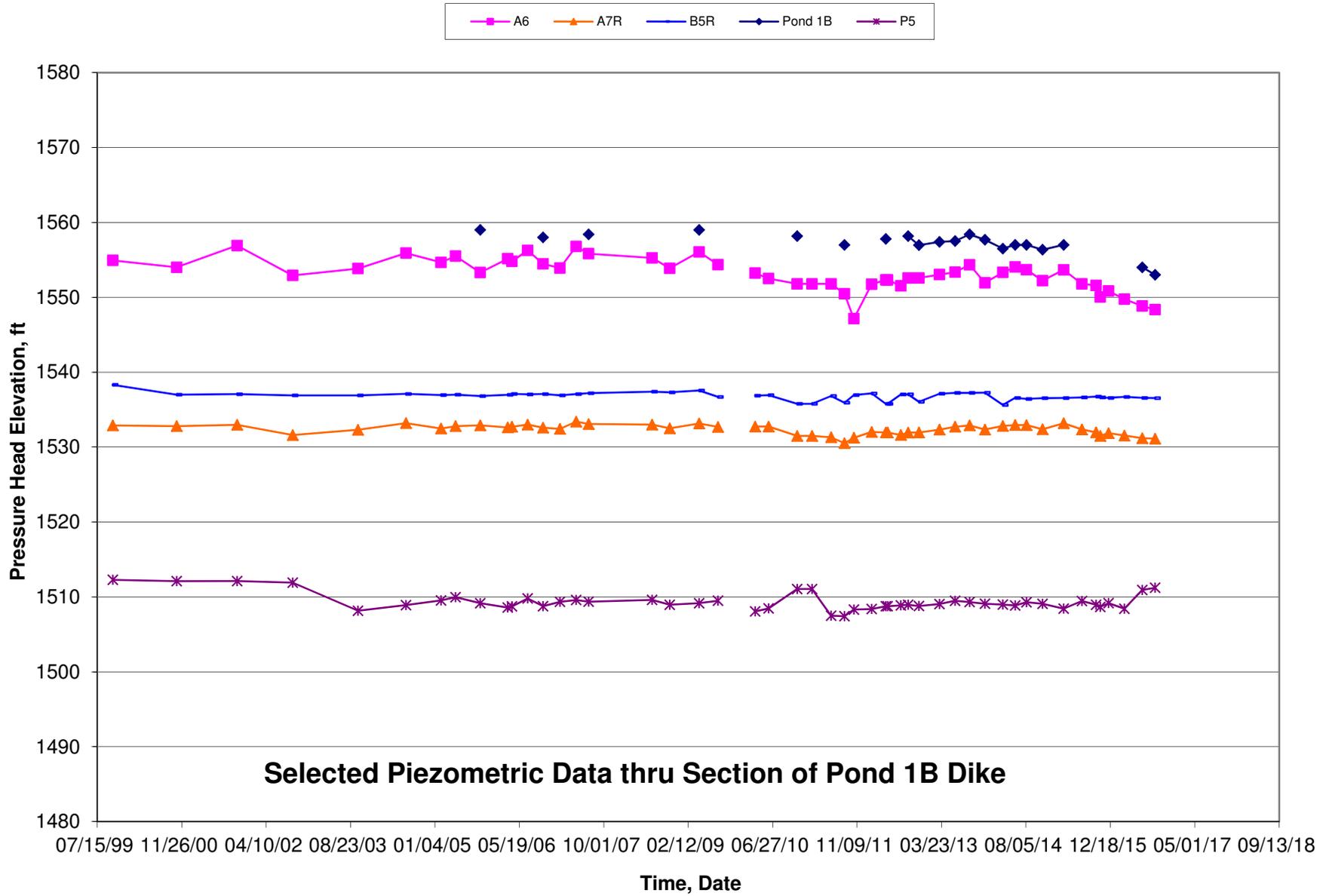


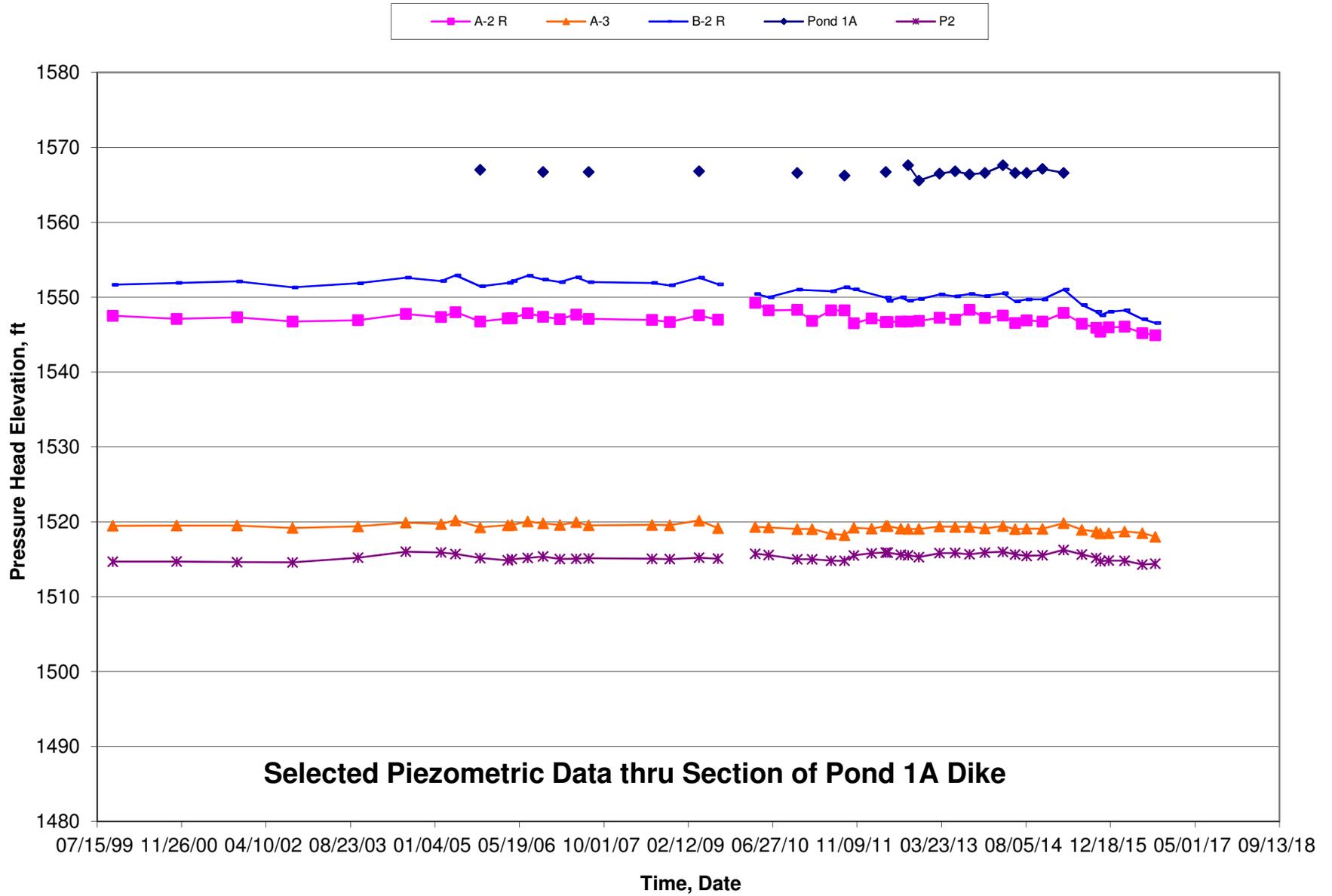
Picture 31-Pond 2, Gabion Channel



Picture 32-Pond 2, Culvert below gabion channel

**APPENDIX D: SELECTED PLOTS of PIEZOMETRIC DATA**





## **FIGURES**

**FIGURE 1: ASH POND 1A AND 1B COMPLEX - INSPECTION  
LOCATION PLAN**

**FIGURE 2: ASH POND 2 COMPLEX - INSPECTION LOCATION PLAN**

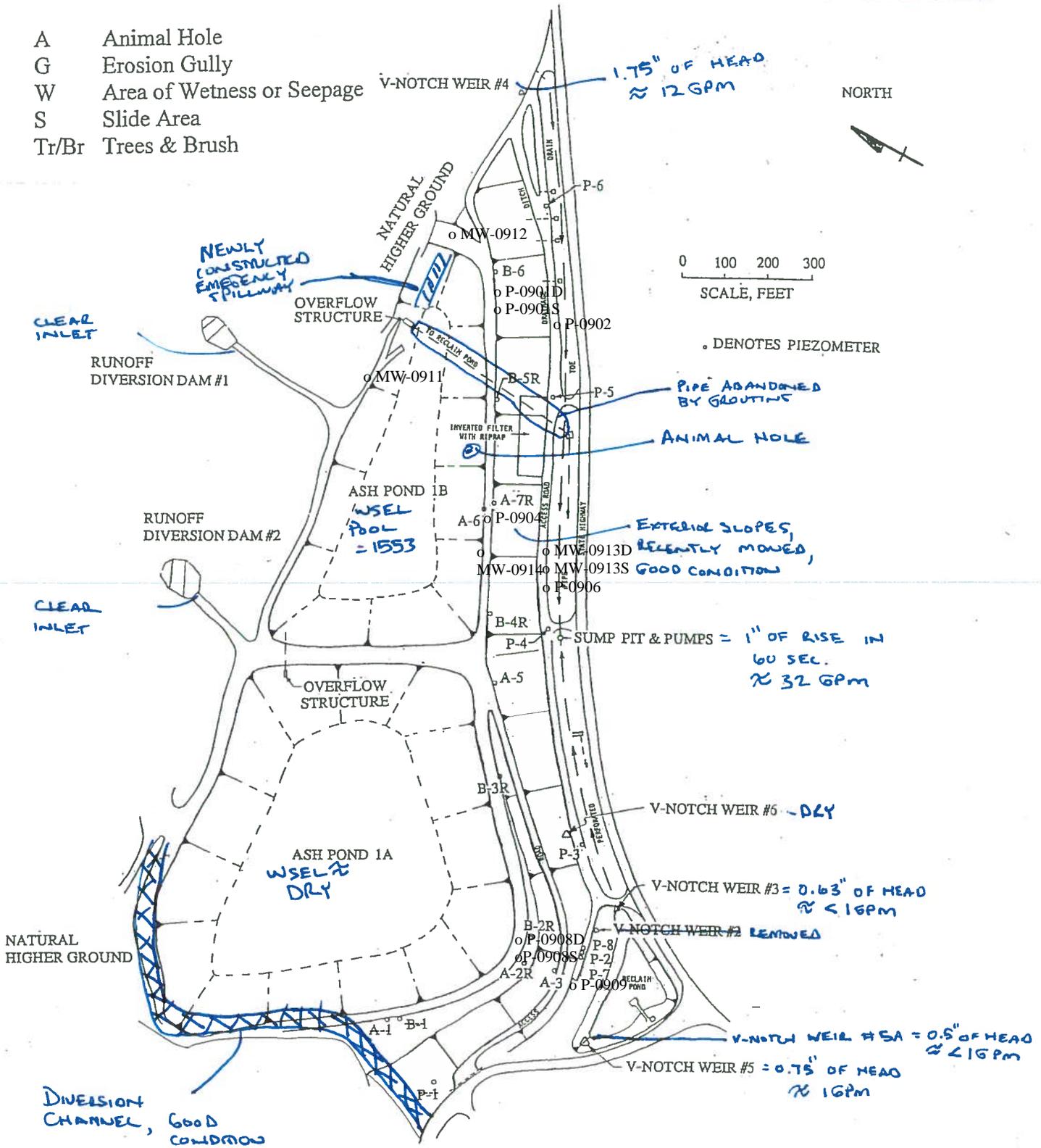
FIGURE 1

Date: OCT 20, 2016

Weather: PARTLY SUNNY 60's

Legend

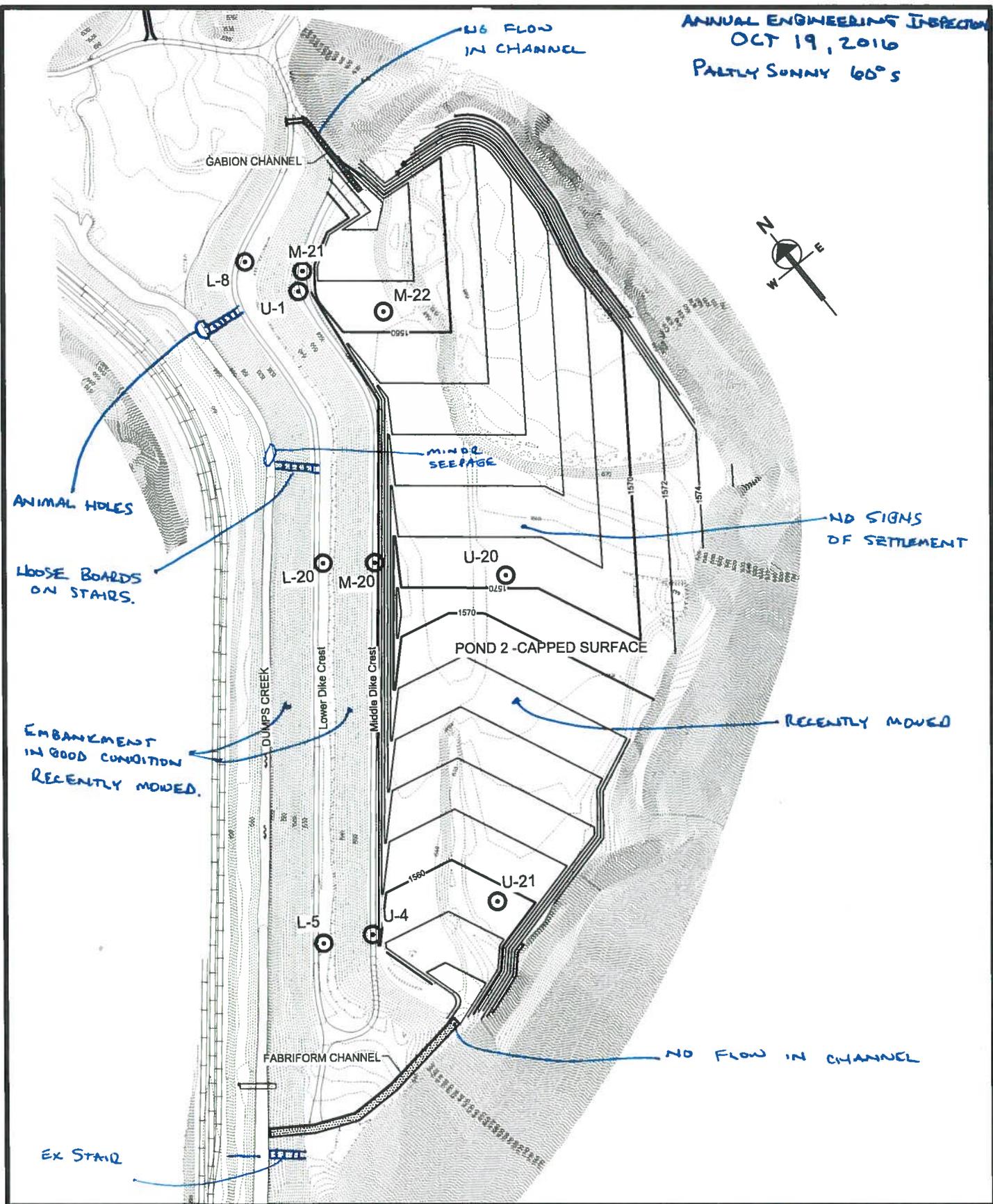
- A Animal Hole
- G Erosion Gully
- W Area of Wetness or Seepage
- S Slide Area
- Tr/Br Trees & Brush



PLANT

FIGURE 1  
CLINCH RIVER PLANT  
ASH POND 1A AND 1B COMPLEX  
INSPECTION LOCATION PLAN

ANNUAL ENGINEERING INSPECTION  
 OCT 19, 2016  
 PARTLY SUNNY 60°S



DRN BY: DWP	APPALACHIAN POWER COMPANY	DWG NO: Figure 2
DATE: 11-19-2014	CLINCH RIVER PLANT	 <b>AEP SERVICE CORP.</b> 1 RIVERSIDE PLAZA COLUMBUS, OH 43215
SCALE: 1"=250'	POND 2 - INSPECTION LOCATION PLAN	

PLOT DATE: DD-MMM-YYYY

## **CLINCH RIVER POND 1 – CCR RULE REQUIREMENTS**

### **REVIEW OF AVAILABLE INFORMATION (257.83(b)(1)(i))**

A review of available information regarding the status and condition of the Pond 1 which include files available in the operating record, such as design and construction information, previous periodic structural stability assessments, previous routine inspection reports, and previous annual inspections has been conducted.

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

In spring of 2016 the principal outlet pipe located in Pond 1B was grouted closed as a result of a routine camera inspection which discovered increased infiltration into the pipe at the several joints. Concrete grout was pumped into the portion of the pipe that runs through the dike and up the drainage shaft. As a result, a temporary pump has been placed in the pond to convey any storm water the pond may collect. In order to pass a large storm event a temporary spillway was cut into the crest of the dam. The pump system and spillway will be removed when the pond is closed which is scheduled to begin in 2017.

Based on interviews with plant personnel and field observations there were no other changes to Pond 1 since the last annual inspection that would affect the stability or operation of the impounding structure.

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

As a result of grouting the principle outlet pipe a temporary pump has been placed in the pond to convey any storm water the pond may collect. In order to pass a large storm event a temporary spillway was cut into the crest of the dam. No other modifications have been made to the geometry of the Pond 1 since the previous annual inspection.

### **DEFICIENCIES (257.83(b)(2)(vi))**

In spring of 2016 the principal outlet pipe located in Pond 1B was grouted closed as a result of a routine camera inspection which discovered increased infiltration into the pipe at the several joints. Concrete grout was pumped into the portion of the pipe that runs through the dike and up the drainage shaft. As a result, a temporary pump has been placed in the pond to convey any storm water the pond may collect. In order to pass a large storm event a temporary spillway was cut into the crest of the dam. The pump system and spillway will be removed when the pond is closed which is scheduled to begin in 2017.

There were no other 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 other deficiencies noted this inspection or during any of the routine inspections. 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.

**INSTRUMENTATION (257.83(b)(2)(ii))**

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

**Table 1**

<b>INSTRUMENTATION DATA Pond 1A/1B</b>			
<b>Instrument</b>	<b>Type</b>	<b>Maximum Reading since last annual inspection</b>	<b>Date of reading</b>
A-2R	Piezometer	1546.06	3/10/2016
A-3	Piezometer	1518.72	3/10/2016
A-5	Piezometer	1543.22	12/7/2015
A-6	Piezometer	1550.83	12/7/2015
A-7R	Piezometer	1531.86	12/7/2015
B-2R	Piezometer	1548.23	3/10/2016
B-3R	Piezometer	1541.75	12/7/2015
B-4R	Piezometer	1540.94	12/7/2015
B-5R	Piezometer	1536.57	6/24/2016
B-6	Piezometer	1520.01	9/8/2016
MW-0911	Monitoring Well	1563.46	3/10/2016
MW-0912	Monitoring Well	1546.95	12/7/2015
MW-0913D	Monitoring Well	1506.68	9/8/2016
MW-0913S	Monitoring Well	1507.14	6/24/2016
MW-0914	Monitoring Well	1529.36	9/8/2016
P-0901D	Piezometer	1526.58	9/8/2016
P-0901S	Piezometer	1526.86	12/7/2015
P-0902	Piezometer	1510.04	3/10/2016
P-0904	Piezometer	1546.14	12/7/2015
P-0906	Piezometer	1509.17	12/7/2015
P-0908D	Piezometer	1505.25	12/7/2015
P-0908S	Piezometer	1546.21	12/7/2015
P-0909	Piezometer	1512.06	12/7/2015
P-2R (P-2)	Piezometer	1514.83	12/7/2015
P-3R (P-3)	Piezometer	1508.27	9/8/2016
P-4R (P-4)	Piezometer	1505.41	12/7/2015
P-5R (P-5)	Piezometer	1511.22	9/8/2016
P-6R (P-6)	Piezometer	1510.66	6/24/2016
P-7	Piezometer	1498.09	12/7/2015
P-8	Piezometer	1495.09	12/7/2015
Weir 5A	Weir	3 gpm	6/28/2016
Weir 3	Weir	2 gpm	9/8/2016
Weir 4	Weir	12 gpm	12/3/2016
Weir 5	Weir	12 gpm	6/28/2016
Weir 6	Weir	0.25 gpm	6/28/2016

**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.

**Table 2**

<b>IMPOUNDMENT CHARACTERISTICS</b>	
<b>Bottom Ash Pond</b>	
Approximate <b>Minimum</b> depth of impounded water since last annual inspection	12 ft. (1553.0)
Approximate <b>Maximum</b> depth of impounded water since last annual inspection	13.8 ft. (1554.8)
Approximate <b>Present</b> depth of impounded water at the time of the inspection	12 ft. (1553.0)
Approximate <b>Minimum</b> depth of CCR since last annual inspection	70 ft. (1570)
Approximate <b>Maximum</b> depth of CCR since last annual inspection	70 ft. (1570)
Approximate <b>Present</b> depth of CCR at the time of the inspection	70 ft. (1570)
Storage Capacity of impounding structure at the time of the inspection	1320 ac-ft.
Approximate volume of impounded water at the time of the inspection	7 ac-ft.
Approximate volume of CCR at the time of the inspection	1310 ac-ft