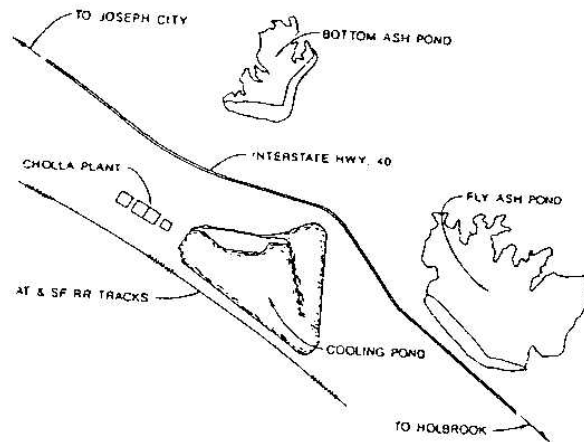


# **CHOLLA POWER PLANT Fly Ash Dam, Bottom Ash Dam, Sedimentation Pond, and Bottom Ash Monofill**

## **Annual CCR Impoundment and Landfill Inspection Report 2016**



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## 1.0 INTRODUCTION

Arizona Public Service Company (APS) prepared this report to comply with the Environmental Protection Agency's (EPA) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule (2015) requiring "...inspections by a qualified professional engineer at intervals not exceeding one year to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards" (CFR 257.83(b)(1) for CCR surface impoundments and CFR 257.84(b)(1) for CCR landfills).

This report includes a review of relevant data in the operating record and visual inspections of the Fly Ash Dam, Bottom Ash Dam, Sedimentation Pond, and the Bottom Ash Monofill. The Fly Ash Dam and Bottom Ash Dam are instrumented with piezometers, settlement monuments, seepage totalizers, and wells.

Inspection Conducted by

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## **2.0 SITE BACKGROUND AND INSPECTION CONDITIONS**

The Cholla Power Plant is located nine miles west of Holbrook, Arizona. The plant is located in the north half of Section 23, Township 18 North, Range 19 East in Navajo County, adjacent to and north of the Little Colorado River. The plant site and off-site facilities comprise portions of Sections 22 through 27 in Township 18 North, Range 19 East and Section 30 in Township 18 North, Range 20 East. The plant began operation of Unit 1 at the site in 1961 and Units 2, 3 and 4 were constructed between 1976 and 1981. Three operational units (Units 1, 3, and 4) currently burn low sulfur coal to provide a total net generating capacity of 855 megawatts (MW). Units 1, 3, and 4 are operated based on load and economic factors.

The coal combustion process produces bottom ash (silty sand, Unified Soil Classification System SM) and fly ash (low plasticity silt, Unified Soil Classification System ML). The plant has three coal combustion waste impoundments: the Bottom Ash Pond, the Fly Ash Pond, and the Bottom Ash Monofill. The Bottom Ash Pond and the Fly Ash Pond are used for ash disposal. The Bottom Ash Monofill is a coal combustion waste landfill used for long-term storage and disposal of dewatered bottom ash transferred from the Bottom Ash Pond. The Sedimentation Pond collects water from drains located on the plant site and receives minimal amounts of coal combustion byproducts in storm water, process water, and plant washdown from the west side of the plant. These coal combustion waste facilities are the subject of this inspection report.

The field inspection was conducted on Wednesday, October 19, 2016 and Thursday, October 20, 2016. Conditions were mild (40-70 degrees Fahrenheit) with clear skies. Winds were light both days. Approximately 4.34 inches of precipitation had fallen since the start of the year. Only Unit 4 was running at the time of the inspection.

Instrumentation at the dams generally consists of open standpipe PVC piezometers, open well points, simulated weirs, flow meters with totalizers, and brass survey caps on a concrete base measured using a Global Positioning Survey System (GPS). Water levels in the piezometers are measured with an electronic water level indicator attached to a cable stamped with one-foot increments. Impounded water levels within the Bottom Ash and Fly Ash Ponds are measured by an elevation indicator set at the edge of the water in each pond and elevations are based on NAVD88.

The benchmark for the elevations reported for GPS surveys of the settlement monuments at the Cholla Power Plant is based on the Randell 2 monument located on the north side of the Joseph City I-40 overpass. Detailed information of Randell 2 can be found on the National Geodetic Survey (NGS) website. The latitude and longitude of the monument are based on the NAVD88 datum. The NGS lists the elevation of the monument as 5088.09 feet (NAVD88).

## **3.0 IMPOUNDMENT DESCRIPTIONS**

### **3.1 FLY ASH DAM**

The Fly Ash Dam is represented on Figure 1 – Fly Ash Pond Site Map.

The Fly Ash Dam (listed by the Arizona Department of Water Resources (ADWR) as Dam #09.28) was constructed between 1976 and 1978, has a capacity of 18,000 acre-feet, is approximately 80 feet high with an approximately 4,583-foot long clay core zoned earth embankment, and has a Federal Emergency Management Agency (FEMA) rating of intermediate size and high hazard. The maximum operating water level is 5,114 feet above mean sea level (MSL) and the water level was measured most recently by survey to be at elevation (EL) 5093.96 feet on October 14, 2016. The water level in the Fly Ash Pond is measured on a monthly basis because the water level gauge is located in an area that has been covered with evaporates and no longer be read. The monthly water level readings are taken during the settlement monument survey (see Appendix A).

### **3.2 BOTTOM ASH DAM**

The Bottom Ash Dam is represented on Figure 2 – Bottom Ash Pond Site Map.

The Bottom Ash Dam (ADWR Dam #09.27) was constructed between 1976 and 1978, has a capacity of 2,300 acre-feet, is approximately 73 feet high with an approximately 4,040-foot long clay core zoned earth embankment, and has a FEMA rating of intermediate size and high hazard. The maximum operating water level is 5,117.8 feet above MSL and the water level was observed to be at EL 5019.13 feet on October 19, 2016.

In 1993, the pond was re-permitted to an operating level 5,118.6 feet above mean sea level (MSL) (NAVD 29). In 1997, a reassessment of the flood pool allocation revealed the need to lower the operating level to 5,117.8 feet above MSL (NAVD 29). In April 1999, APS obtained a major modification of ADEQ APP permit, File No. 100568, that allows dewatered bottom ash to be dredged from the pond and placed in a new facility known as the Bottom Ash Monofill located on a 43-acre parcel located adjacent to the north and east sides of the Bottom Ash Pond.

### **3.3 SEDIMENTATION POND**

The Sedimentation Pond is represented on Figure 3 – Sedimentation Pond Site Map.

The Sedimentation Pond is a holding pond that was placed into service in 1976 by constructing an embankment along the southeast and northwest sides. The area surrounding the Sedimentation Pond was subsequently mass-filled such that the crest appears to be at ground level. It has two cells with a maximum depth of 10 feet, a surface area of approximately 1.6 acres, and a total capacity of approximately 10.7 acre-feet. The crest is at EL 5019 and the east cell water level was observed to be at approximate EL 5014.0 feet during the inspection.

### **3.4 BOTTOM ASH MONOFILL**

The Bottom Ash Monofill is represented on Figure 4 – Bottom Ash Monofill Site Map.

The Bottom Ash Monofill is a coal combustion waste landfill that was constructed beginning in the late 1990s. In 2009, an amendment to Cholla Plant Aquifer Protection Permit No. P-100568 was executed by Arizona Department of Environmental Quality (ADEQ) for the currently-permitted 43-acre footprint and maximum storage elevation of 5,261 feet above mean sea level, with final slopes of 3H:1V (horizontal:vertical). Storm water run on is diverted around the landfill by a diversion ditch sized to convey the peak 100-year flow. On-site storm water runoff is conveyed to a retention basin and eventually routed to the Bottom Ash Pond. The retention basin has a capacity of 8.2 acre-feet with an overall depth of 12 feet and 3H:1V side slopes.

In 2015, the Bottom Ash Monofill was expanded to the north and east to its maximum APP-permitted footprint to add capacity for continuing operations at the Plant.

## **4.0 FIELD INSPECTIONS**

This section contains the 2016 annual field inspections conducted by a team consisting of APS and AECOM engineers at the Fly Ash Dam (Section 4.1), the Bottom Ash Dam (Section 4.2), the Sedimentation Pond (Section 4.3), and the Bottom Ash Monofill (Section 4.4). The results are reprinted and formatted to fit this report.

#### 4.1 APS FIELD INSPECTION – FLY ASH DAM

<b>Fly Ash Dam</b>		<b>State Identification Number (SID): 09.28</b>							
SID: <b>09.28</b>	Dam Name: <b>Fly Ash Dam</b>	Type: <b>Earth</b>	Purpose: <b>Fly ash disposal</b>	Not Applicable	No	Yes	Monitor	Repair	Investigate
Contact(s): <b>Byron Conrad, P.E. (APS)</b>		Report Date: <b>January 13, 2017</b>							
Inspected by: <b>Byron Conrad, P.E. (APS), Cletis Mark (APS), Lee Wright, P.E. (AECOM)</b>		Inspection Date: <b>October 20, 2016</b>							
Reviewed by: <b>Byron Conrad, P.E. (APS)</b>		Review Date: <b>December 30, 2016</b>							
Design Dam Crest Elevation (ft): <b>5,120</b>		Design Spillway Crest Elevation: <b>None</b>							
Design Total Freeboard (ft): <b>6</b>		Measured Total Freeboard (ft): <b>N/A</b>							
Statutory Dam Height (ft): <b>80</b>		Structural Height (ft): <b>80</b>							
Dam Crest Length (ft): <b>4,583</b>		Upstream Slope: <b>3:1</b>	Downstream Slope: <b>3:1</b>						
Dam Crest Width (ft): <b>24</b>		Lat: <b>34° 56' 10.0"</b>	Water Rights: <b>N/A</b>						
		Long: <b>110° 16' 06.0"</b>							
Reservoir Area (acres): <b>420</b>		Reservoir Storage (ac-ft): <b>18,000</b>							
Inflow Design Flood/Safe Flood-Passing Capacity: <b>PMF – fully contained</b>									
Reservoir Level During Inspection (ft): <b>Approx. 5093.96</b>		Photos: <b>Yes</b>	Page: <b>1 of 4</b>						

Fly Ash Dam			SID: 09.28	N/A	No	Yes	Mon	Rep	Inv
COMPLIANCE CHECKLIST									
<b>1</b>	<b>CONDITION SUMMARY, LICENSE, EAP, NEXT INSPECTION</b>								
a	Recorded downstream hazard: <b>High</b>	Should hazard be revised?		X					
b	If high hazard, estimate downstream persons-at-risk (PAR): <b>30-300</b>	Is there a significant increase since the last inspection?		X					
c	Recorded size: <b>Intermediate</b>	Should size be revised?		X					
d	Any safety deficiencies? <b>No</b>	Describe:		X					
e	Any statute or rule violations? <b>No</b>	Describe and list required action:		X					
f	Safe storage level on License: <b>5,114 feet</b>	Should level be revised?		X					
g	Any License violations? <b>No</b>	Describe and list required action:		X					
h	Date of current License: <b>10/21/1986</b>	Should new License be issued?		X					
i	Date of last Emergency Action Plan revision: <b>12/1/2011</b>	Should EAP be revised? <b>See Comment viii.</b>			X				
j	Any Agency actions? <b>No</b>	Describe and list required action:		X					
k	Normal inspection frequency: <b>Weekly, Annually</b>	Should inspection frequency be revised?		X					
l	Recommended date for next inspection: <b>October 2017</b>								

MONITORING CHECKLIST									
<b>2</b>	<b>INSTRUMENTATION AND MONITORING</b>								
a	Describe: 1) A review of the file indicates 37 piezometers and wells in and around the embankment. 2) Ten settlement monuments located along the crest. 3) Water level gauge in the reservoir (submerged by rising pond level in 2015 and needs to be re-established). 4) Flow measurement devices at each downstream sump to estimate seepage rates and on the return lines to the reservoir.								
b	Any repair or replacement required? <b>Yes.</b>	Describe: <b>See comment v.</b>			X				
c	Date of last monitoring report: <b>January 2016</b>	Should new readings be taken and new report provided? <b>Annual reporting is required.</b>			X				

DAM EMBANKMENT CHECKLIST									
<b>3</b>	<b>DAM CREST</b>								
a	Settlements, slides, depressions?		X						
b	Misalignment?		X						
c	Longitudinal/Transverse cracking?		X						
d	Animal burrows? <b>None observed. Continue to monitor.</b>		X		X				
e	Adverse vegetation?		X						
f	Erosion?		X						
<b>4</b>	<b>UPSTREAM SLOPE</b>								
a	Erosion?		X						
b	Inadequate ground cover?		X						
c	Adverse vegetation? <b>Shrubs and other vegetation observed.</b>			X	X				
d	Longitudinal/Transverse cracking?		X						
e	Inadequate riprap?		X						
f	Stone deterioration?	X							
g	Settlements, slides, depressions, bulges?		X						
h	Animal burrows? <b>None observed. Continue to monitor.</b>		X		X				

Fly Ash Dam			SID: 09.28	N/A	No	Yes	Mon	Rep	Inv
<b>5</b>	<b>DOWNSTREAM SLOPE</b>								
a	Erosion?	None observed.			X				
b	Inadequate ground cover?				X				
c	Adverse vegetation?	See Comment ii.				X	X		
d	Longitudinal/Transverse cracking?				X				
e	Inadequate riprap?				X				
f	Stone deterioration?	Some of the riprap along the toe is beginning to deteriorate. See comment ix.				X	X		
g	Settlements, slides, depressions, bulges?				X				
h	Soft spots or boggy areas?	There is evidence of historic seepage beyond the downstream toe. Continue to monitor.			X		X		
i	Movement at or beyond toe?				X				
j	Animal burrows?	None observed. Continue to monitor.			X		X		
<b>6</b>	<b>ABUTMENT CONTACTS</b>								
a	Erosion?	See Comment iv.				X	X		
b	Differential movement?				X				
c	Cracks?				X				
d	Settlements, slides, depressions, bulges?				X				
e	Seepage?	Historic seepage near the downstream right abutment area (I-40 seep) indicated by evaporates and soft ground. Continue to monitor.				X	X		
f	Animal burrows?	None observed. Continue to monitor.			X		X		
<b>7</b>	<b>SEEPAGE/PIPING CONTROL DESIGN FEATURE(S)</b>								
a	Describe:	1) The Geronimo and Hunt seepage collection and pump back systems are located downstream of the dam near I-40 for fluid interception. 2) Discharge from the crest side of the reservoir creates a beach to prevent water from being stored against the upstream face.							
b	Internal drains flowing?				X				
c	Seepage at or beyond toe?	Yes.				X	X		
d	If so, does seepage contain fines?	APS measures turbidity of seep water.			X				
e	Evidence of sand boils at or beyond toe?				X				

<b>RESERVOIR CHECKLIST</b>									
<b>8</b>	<b>RESERVOIR</b>								
a	High water marks?				X				
b	Erosion/slides into pool area?				X				
c	Sediment accumulation?	Suspended FGD solids and fly ash are designed to settle in the reservoir.				X			
d	Floating debris present?				X				
e	Depressions, sinkholes, or vortices?				X				
f	Low ridges/saddles allowing overflow?				X				
g	Structures below dam crest elevation?				X				



*Additional comments and recommendations:*

- i. F-35 is repaired. See photo IMG\_2186.
- ii. Excessive natural vegetation has been removed from the toe of the dam in several locations, but is still thick along the toe and fence line elsewhere (see photos IMG\_0364 and IMG\_2148). Continue clearing along the entire toe of the dam.
- iii. Erosion due to surface water runoff near the Geronimo Sump and along both sides of the access road has been repaired (see photo IMG\_2181).
- iv. Minor erosion was observed in the downstream groin of the West Abutment (see photo IMG\_2172). Continue to monitor and repair as needed.
- v. Remove accumulated sediments from the water level gauge in the pond or move the gauge to a location in the reservoir (see photo IMG\_2197).
- vi. The weekly inspection reports for the period between October 15, 2015 and September 30, 2016 indicate the following:
  - a. There was excessive vegetation along the crest and slopes that was first observed on October 15, 2015. Corrective Action Requests were written for vegetation removal. Vegetation along the crest was removed by January 5, 2016.
  - b. The inspector noted soft spots and boggy areas beyond the downstream slope required repair beginning on December 17, 2015. This issue was resolved by January 5, 2016.
  - c. Erosion along the downstream slope and abutment contacts was observed on October 15, 2015. The erosion was extensive enough to require repair and a Corrective Action Request was written. The erosion along the downstream slope was repaired prior to December 15, 2015. The erosion along the abutment contacts was repaired prior to April 21, 2016.
- vii. The weekly inspection reports do not indicate that there were any appearances of actual or potential structural weakness or other conditions which have the potential to disrupt the operation or safety of the CCR unit.
- viii. APS is in the process of updating the Emergency Action Plan before April 17, 2017 to comply with the initial plan requirement of CFR 257.73.
- ix. The riprap in several areas of the downstream slope is deteriorating. The deterioration does not appear to affect the safety of the dam. Continue to monitor the condition of the riprap and replace as necessary.

#### 4.2 APS FIELD INSPECTION – BOTTOM ASH DAM

<b>Bottom Ash Dam</b>		<b>State Identification Number (SID): 09.27</b>							
SID: <b>09.27</b>	Dam Name: <b>Bottom Ash Dam</b>	Type: <b>Earth</b>	Purpose: <b>Bottom ash containment</b>	Not Applicable	No	Yes	Monitor	Repair	Investigate
Contact(s): <b>Byron Conrad, P.E. (APS)</b>		Report Date: <b>January 13, 2017</b>							
Inspected by: <b>Byron Conrad, P.E. (APS), Cletis Mark (APS), Lee Wright, P.E. (AECOM)</b>		Inspection Date: <b>October 19, 2016</b>							
Reviewed by: <b>Byron Conrad, P.E. (APS)</b>		Review Date: <b>December 30, 2016</b>							
Design Dam Crest Elevation (ft): <b>5,123.3</b>		Design Spillway Crest Elevation: <b>None</b>							
Design Total Freeboard (ft): <b>5.5</b>		Measured Total Freeboard (ft): <b>N/A</b>							
Statutory Dam Height (ft): <b>73</b>		Structural Height (ft): <b>73</b>							
Dam Crest Length (ft): <b>4,040</b>		Upstream Slope: <b>3:1</b>	Downstream Slope: <b>3:1</b>						
Dam Crest Width (ft): <b>12</b>		Lat: <b>34° 57' 07.0"</b>	Water Rights: <b>N/A</b>						
		Long: <b>110° 17' 22.7"</b>							
Reservoir Area (acres): <b>80</b>		Reservoir Storage (ac-ft): <b>2,300</b>							
Inflow Design Flood/Safe Flood-Passing Capacity: <b>PMF – fully contained.</b>									
Reservoir Level During Inspection (ft): <b>5109.13</b>		Photos: <b>Yes</b>	Page: <b>1 of 4</b>						

Bottom Ash Dam			SID: 09.27	N/A	No	Yes	Mon	Rep	Inv
COMPLIANCE CHECKLIST									
<b>1</b>	<b>CONDITION SUMMARY, LICENSE, EAP, NEXT INSPECTION</b>								
a	Recorded downstream hazard: <b>High</b>	Should hazard be revised?		<b>X</b>					
b	If high hazard, estimate downstream persons-at-risk (PAR): <b>&lt;30</b>	Is there a significant increase since the last inspection?		<b>X</b>					
c	Recorded size: <b>Intermediate</b>	Should size be revisited?		<b>X</b>					
d	Any safety deficiencies? <b>No</b>	Describe:		<b>X</b>					
e	Any statute or rule violations? <b>No</b>	Describe and list required action:		<b>X</b>					
f	Safe storage level on License: <b>5,117.8 feet</b>	Should level be revised:		<b>X</b>					
g	Any License violations? <b>No</b>	Describe and list required action:		<b>X</b>					
h	Date of current License: <b>12/11/1998</b>	Should new License be issued?		<b>X</b>					
i	Date of last Emergency Action Plan revision: <b>1/4/2012</b>	Should EAP be revised?			<b>X</b>				
j	Any Agency actions? <b>No</b>	Describe and list required action:		<b>X</b>					
k	Normal inspection frequency: <b>Weekly, Annually</b>	Should inspection frequency be revised?		<b>X</b>					
l	Recommended date for next inspection: <b>October 2017</b>								

MONITORING CHECKLIST									
<b>2</b>	<b>INSTRUMENTATION AND MONITORING</b>								
a	Describe: <ol style="list-style-type: none"> <li>1) <b>19 piezometers and wells in and around the embankment.</b></li> <li>2) <b>10 settlement monuments.</b></li> <li>3) <b>A V-notch weir and seepage monitoring systems.</b></li> <li>4) <b>Water level gauge in the reservoir.</b></li> </ol>								
b	Any repair or replacement required? <b>No.</b>	Describe:		<b>X</b>					
c	Date of last monitoring report: <b>January 2016</b>	Should new readings be taken and new report provided? <b>Annual reporting is required.</b>			<b>X</b>				

DAM EMBANKMENT CHECKLIST									
<b>3</b>	<b>DAM CREST</b>								
a	Settlements, slides, depressions?		<b>X</b>						
b	Misalignment?		<b>X</b>						
c	Longitudinal/Transverse cracking?		<b>X</b>						
d	Animal burrows? <b>Animal burrows were primarily in the windrow along the downstream side.</b>			<b>X</b>	<b>X</b>				
e	Adverse vegetation? <b>Vegetation appeared to have been cleared recently.</b>		<b>X</b>		<b>X</b>				
f	Erosion?		<b>X</b>						
<b>4</b>	<b>UPSTREAM SLOPE</b>								
a	Erosion? <b>There is vegetation along the upstream slope.</b>		<b>X</b>						
b	Inadequate ground cover?		<b>X</b>						
c	Adverse vegetation?		<b>X</b>		<b>X</b>				
d	Longitudinal/Transverse cracking?		<b>X</b>						
e	Inadequate riprap?		<b>X</b>						
f	Stone deterioration?		<b>X</b>						
g	Settlements, slides, depressions, bulges?		<b>X</b>						
h	Animal burrows? <b>None observed. Continue to monitor.</b>		<b>X</b>		<b>X</b>				

Bottom Ash Dam			SID: 09.27	N/A	No	Yes	Mon	Rep	Inv
5	DOWNSTREAM SLOPE								
a	Erosion?				X				
b	Inadequate ground cover?				X				
c	Adverse vegetation?	Vegetation appeared to have been cleared recently.				X		X	
d	Longitudinal/Transverse cracking?				X				
e	Inadequate riprap?				X				
f	Stone deterioration?	Some of the riprap along the toe is beginning to deteriorate. See comment iv.					X	X	
g	Settlements, slides, depressions, bulges?				X				
h	Soft spots or boggy areas?	Historic seepage at the toe and active seepage (0.33 gallons/28 seconds) at the right groin area. Continue to monitor.					X	X	
i	Movement at or beyond toe?	Minor evidence of soil wasting from areas below the riprap adjacent to the downstream toe.					X	X	
j	Animal burrows?	None observed. Continue to monitor.				X			
6	ABUTMENT CONTACTS								
a	Erosion?				X				
b	Differential movement?				X				
c	Cracks?				X				
d	Settlements, slides, depressions, bulges?				X				
e	Seepage?	Yes.					X	X	
f	Animal burrows?	None observed. Continue to monitor.				X			
7	SEEPAGE/PIPING CONTROL DESIGN FEATURE(S)								
a	Describe:			Several monitoring, seepage, and pump back collection systems are located downstream of the dam.					
b	Internal drains flowing?					X			
c	Seepage at or beyond toe?					X	X		
d	If so, does seepage contain fines?				X				
e	Evidence of sand boils at or beyond toe?				X				

<b>RESERVOIR CHECKLIST</b>									
<b>8</b>	<b>RESERVOIR</b>								
a	High water marks?				X				
b	Erosion/slides into pool area?			X					
c	Sediment accumulation?	Bottom ash settles in the reservoir, is removed, and placed in the Bottom Ash Monofill.							
d	Floating debris present?			X					
e	Depressions, sinkholes, or vortices?			X					
f	Low ridges/saddles allowing overflow?			X					
g	Structures below dam crest elevation?	There is a divider dike in the center of the pond.							

*Additional comments and recommendations:*

- i. Excessive natural vegetation has recently been removed from the crest and toe of the dam (see photos IMG\_2035, IMG\_2106, and IMG\_2108). Continue clearing along the toe of the dam in accordance with the NMOSE “*Vegetation Management on Dams*” (2011) document.
- ii. APS is in the process of updating the Emergency Action Plan before April 17, 2017 to comply with the initial plan requirement of CFR 257.73.
- iii. Relatively fewer animal burrows were observed compared to the 2015 inspection. The majority of animal burrows occurred along the edge of the crest and did not extend beyond a depth of approximately 12 inches. Continue to monitor the frequency of the burrows and implement deterrents if necessary.
- iv. The riprap in several areas of the downstream slope is deteriorating. The deterioration does not appear to affect the safety of the dam. Continue to monitor the condition of the riprap and replace as necessary.
- v. The weekly inspection reports for the period between October 15, 2015 and September 30, 2016 indicate the following:
  - a. There was excessive vegetation along the crest and slopes beginning on October 15, 2015. Corrective Action Requests were written for vegetation removal. Vegetation along the crest was removed by April 2016. Subsequent weekly inspection reports noted the presence of adverse vegetation along the upstream and downstream slopes, but there was very little vegetation along the downstream toe observed during this inspection.
  - b. Erosion along the abutment contacts was noted as requiring monitoring on October 15, 2015. Monitoring continued throughout the review period.
- vi. The weekly inspection reports do not indicate that there were any appearances of actual or potential structural weakness or other conditions which have the potential to disrupt the operation or safety of the CCR unit.

### 4.3 APS FIELD INSPECTION – SEDIMENTATION POND

<b>Sedimentation Pond</b>		State Identification Number (SID): <b>N/A</b>							
SID: <b>N/A</b>	Dam Name: <b>Sedimentation Pond</b>	Type: <b>Earth</b>	Purpose: <b>CCR-Impacted Surface Water Collection</b>	<b>Not Applicable</b>	<b>No</b>	<b>Yes</b>	<b>Monitor</b>	<b>Repair</b>	<b>Investigate</b>
Contact(s): <b>Byron Conrad, P.E. (APS)</b>		Report Date: <b>January 13, 2017</b>							
Inspected by: <b>Byron Conrad, P.E. (APS), Cletis Mark (APS), Lee Wright, P.E. (AECOM)</b>		Inspection Date: <b>October 20, 2016</b>							
Reviewed by: <b>Byron Conrad, P.E. (APS)</b>		Review Date: <b>December 30, 2016</b>							
Design Dam Crest Elevation (ft): <b>5019</b>		Design Spillway Crest Elevation: <b>Twin 16-inch corrugated polyethylene pipes, ungated, with trash rack</b>							
Design Total Freeboard (ft): <b>2</b>		Measured Total Freeboard (ft): <b>Not measured</b>							
Statutory Dam Height (ft): <b>11</b>		Structural Height (ft): <b>East embankment: 11 ft West embankment: 0 ft (areal fill around the Pond raised the surrounding ground surface to the elevation of the dam crest)</b>							
Dam Crest Length (ft): <b>1,100</b>		Upstream Slope: <b>1.5:1 (by inspection)</b>	Downstream Slope: <b>1.5:1 (by inspection)</b>						
Dam Crest Width (ft): <b>24</b>		Lat: <b>34° 56' 29.9"N</b>	Water Rights: <b>N/A</b>						
		Long: <b>110° 18' 14.9"W</b>							
Reservoir Area (acres): <b>1.6</b>		Reservoir Storage (ac-ft): <b>10.7</b>							
Inflow Design Flood/Safe Flood-Passing Capacity: <b>Not Calculated</b>									
Reservoir Level During Inspection (ft): <b>5014 (by observation)</b>		Photos: <b>Yes</b>	Page: <b>1 of 3</b>						

Sedimentation Pond			SID: N/A	N/A	No	Yes	Mon	Rep	Inv
COMPLIANCE CHECKLIST									
1	CONDITION SUMMARY/LICENSE/EAP/NEXT INSPECTION								
a	Recorded downstream hazard: <b>Very Low</b>	Should hazard be revised?		X					
b	If high hazard, estimate downstream persons-at-risk (PAR): <b>N/A</b>	Is there a significant increase since the last inspection?		X					
c	Recorded size: <b>Small</b>	Should size be revised?		X					
d	Any safety deficiencies? <b>No</b>	Describe:		X					
e	Any statute or rule violations? <b>No</b>	Describe and list required action:		X					
f	Safe storage level on License: <b>N/A</b>	Should level be revised:		X					
g	Any License violations? <b>No</b>	Describe and list required action:		X					
h	Date of current License: <b>N/A</b>	Should new License be issued?		X					
i	Date of last Emergency Action Plan revision: <b>N/A</b>	Should EAP be revised?		X					
j	Any Agency actions? <b>No</b>	Describe and list required action:		X					
k	Normal inspection frequency: <b>Weekly, Annually</b>	Should inspection frequency be revised?		X					
l	Recommended date for next inspection: <b>October 2017</b>								

MONITORING CHECKLIST									
2	INSTRUMENTATION AND MONITORING								
a	Describe: <b>There are no instruments or other monitoring devices for this structure due to its small size.</b>								
b	Any repair or replacement required? <b>No.</b>	Describe: <b>N/A</b>	X						
c	Date of last monitoring report: <b>January 2016</b>	Should new readings be taken and new report provided? <b>N/A</b>		X					

DAM EMBANKMENT CHECKLIST									
3	DAM CREST								
a	Settlements, slides, depressions?		X						
b	Misalignment?		X						
c	Longitudinal/Transverse cracking?		X						
d	Animal burrows? <b>None observed. Continue to monitor.</b>		X			X			
e	Adverse vegetation?		X						
f	Erosion?		X						
4	UPSTREAM SLOPE								
a	Erosion?			X					
b	Inadequate ground cover?		X						
c	Adverse vegetation?		X						
d	Longitudinal/Transverse cracking?		X						
e	Inadequate riprap?	X							
f	Stone deterioration?	X							
g	Settlements, slides, depressions, bulges?		X						
h	Animal burrows? <b>None observed. Continue to monitor.</b>		X			X			

Sedimentation Pond		SID: N/A	N/A	No	Yes	Mon	Rep	Inv
<b>5</b>	<b>DOWNSTREAM SLOPE</b>							
a	Erosion?			X				
b	Inadequate ground cover? <b>Mostly gravel-faced.</b>			X				
c	Adverse vegetation?			X				
d	Longitudinal/Transverse cracking?			X				
e	Inadequate riprap?			X				
f	Stone deterioration?			X				
g	Settlements, slides, depressions, bulges?			X				
h	Soft spots or boggy areas?			X				
i	Movement at or beyond toe?			X				
j	Animal burrows? <b>None observed. Continue to monitor.</b>			X		X		
<b>6</b>	<b>ABUTMENT CONTACTS</b>							
a	Erosion? <b>Abutments not defined due to general plant grading.</b>	X						
b	Differential movement?	X						
c	Cracks?	X						
d	Settlements, slides, depressions, bulges?	X						
e	Seepage?	X						
f	Animal burrows?	X						
<b>7</b>	<b>SEEPAGE/PIPING CONTROL DESIGN FEATURE(S)</b>							
a	Describe: <b>None.</b>							
b	Internal drains flowing?	X						
c	Seepage at or beyond toe?	X						
d	If so, does seepage contain fines?	X						
e	Evidence of sand boils at or beyond toe?	X						

<b>RESERVOIR CHECKLIST</b>								
<b>8</b>	<b>RESERVOIR</b>							
a	High water marks?			X				
b	Erosion/slides into pool area?		X					
c	Sediment accumulation? <b>Suspended sediment and CCR are designed to settle in the two chambers of the impoundment.</b>			X				
d	Floating debris present?		X					
e	Depressions, sinkholes, or vortices?		X					
f	Low ridges/saddles allowing overflow?		X					
g	Structures below dam crest elevation? <b>Yes, two 16-inch corrugated polyethylene pipe outlets in the south chamber (see photo IMG_2267).</b>			X				

*Additional comments and recommendations:*

- i. Adjust the embankment crest road grading to cause runoff to flow into the south chamber of the impoundment to eliminate erosion on the downstream slope of the embankment.
- ii. The weekly inspection reports for the period between October 15, 2015 and September 30, 2016 do not indicate that there were any appearances of actual or potential structural weakness or other conditions which have the potential to disrupt the operation or safety of the CCR unit.



#### 4.4 APS FIELD INSPECTION – BOTTOM ASH MONOFILL

Bottom Ash Monofill		State Identification Number (SID): <b>N/A</b>							
SID: <b>N/A</b>	Landfill Name: <b>Bottom Ash Monofill</b>	Type: <b>Landfill</b>	Purpose: <b>Permanent Storage of Dry Bottom Ash Dredged from Bottom Ash Pond</b>	<b>Not Applicable</b>	<b>No</b>	<b>Yes</b>	<b>Monitor</b>	<b>Repair</b>	<b>Investigate</b>
Contact(s): <b>Byron Conrad, P.E. (APS)</b>		Report Date: <b>January 13, 2017</b>							
Inspected by: <b>Byron Conrad, P.E. (APS), Cletis Mark (APS), Lee Wright, P.E. (AECOM)</b>		Inspection Date: <b>October 19, 2016</b>							
Reviewed by: <b>Byron Conrad, P.E. (APS)</b>		Review Date: <b>December 30, 2016</b>							
Design Maximum Ash Elevation (ft): <b>5261</b>		Current Ash Elevation: <b>5204 feet for capped west portion, 5124 feet for newly-prepared east portion.</b>							
Dam Crest Length (ft): <b>Not a dam, not applicable.</b>		Design Side Slope: <b>3:1</b>	Observed Side Slope: <b>3:1, steeper (2:1) towards the south end of the west side.</b>						
Dam Crest Width (ft): <b>Not a dam, not applicable.</b>	Lat: <b>34°57'35.4"</b>	Water Rights: <b>N/A</b>							
	Long: <b>110°17'06.3</b>								
Landfill Area (acres): <b>43</b> (maximum permitted area)		Landfill Capacity (ac-ft): <b>2,417</b>							
Inflow Design Flood/Safe Flood-Passing Capacity: <b>Diversion of 100-year, 24-hour run-on storm</b>									
Photos: <b>Yes</b>		Page: <b>1 of 2</b>							

Bottom Ash Monofill			SID: N/A	N/A	No	Yes	Mon	Rep	Inv
MONITORING CHECKLIST									
1	INSTRUMENTATION AND MONITORING								
a	Describe: There are no instruments or other monitoring devices for this structure.								
b	Any repair or replacement required? N/A		Describe: N/A			X			
c	Date of last monitoring report: January 2016		Should new readings be taken and new report provided? N/A			X			
2	CONDITION SUMMARY								
a	Waste placed in good practices? Yes. See Comment i.					X			
3	LANDFILL CONFIGURATION								
a	Settlements, slides, slope stability? No, none apparent					X			
b	Cracking? No, none apparent					X			
c	Run on control?						X	X	
d	Run off control? Yes.						X		
e	Erosion? Minor erosion of interim soil cover on side-slopes and erosion along the bank in the outlet channel, likely from stormwater. See Comment ii.						X		X
f	Dust control issues? No dust control issues evident during inspection.					X			

*Additional comments and recommendations:*

- i. Waste is placed in the Bottom Ash Monofill on an annual basis after being dredged from the Bottom Ash Pond. The waste appeared to have been placed in accordance with good practice.
- ii. There is evidence of head cutting in the inlet to the Stormwater Detention Basin (see photo IMG\_1986). The head cutting does not appear to have become worse compared to a similar observation in the 2015 Annual Inspection. This is in addition to other areas of significant erosion in the diversion channel, likely due to flow entering the channel from offsite sources (see photos IMG\_1963 and IMG\_1964). Based on the state and location of the erosion during the inspection, the degree of the erosion does not seem to compromise storage or performance of the landfill.
- iii. The weekly inspection reports for the period between October 15, 2015 and September 30, 2016 indicate the following:
  - a. Erosion was observed on December 17, 2015. The erosion was extensive enough to require repair and a Corrective Action Request was written. Additional erosion was observed on February 4, 2016 and a second Corrective Action Request was written
- iv. The weekly inspection reports do not indicate that there were any appearances of actual or potential structural weakness or other conditions which have the potential to disrupt the operation or safety of the CCR unit.

## 5.0 BASIC DATA REPORT REVIEW

### 5.1 FLY ASH DAM

#### 5.1.1 Geometry Changes Since Last Inspection

There have not been any significant changes to the geometry of the unit since the last inspection in 2015.

#### 5.1.2 Instrumentation

The location of geotechnical and other related instrumentation in the vicinity of the Fly Ash Pond are shown on Figure 5 - Fly Ash Pond Instrumentation Map.

The minimum and maximum recorded readings for each instrument over the October 1, 2015 – September 30, 2016 (current) review period are reported in the following table:

Instrument Name	Minimum	Maximum	Unit
Open Standpipe Piezometers (10/1/15 to 9/30/16)			
F-81	5059.13	5064.56	elevation head
F-88	4997.50	5000.48	elevation head
F-89	5056.71	5058.65	elevation head
F-90	4989.82	4992.53	elevation head
F-91	5002.31	5004.43	elevation head
F-92	5009.97	5011.20	elevation head
F-93	5017.40	5018.36	elevation head
F-100	5080.94	5082.73	elevation head
F-101	5050.26	5051.37	elevation head
F-102	5025.60	5026.67	elevation head
F-103	5017.12	5017.97	elevation head
F-104	5065.84	5067.77	elevation head
F-105	5087.51	5090.26	elevation head
F-106	5015.34	5016.27	elevation head
F-107	5024.75	5025.76	elevation head
F-108	5058.54	5060.74	elevation head
F-109	5035.23	5036.31	elevation head
F-110	5091.26	5093.72	elevation head
F-111	5030.37	5031.05	elevation head
F-112	5027.06	5027.58	elevation head
F-113	5039.15	5039.77	elevation head
F-114	Dry	Dry	elevation head
F-115	5030.26	5030.78	elevation head

Instrument Name	Minimum	Maximum	Unit
F-117	5087.66	5089.26	elevation head
F-123	5088.65	5089.67	elevation head
F-124	5087.73	5088.21	elevation head
F-125	Dry	Dry	elevation head
F-126	5082.43	5085.80	elevation head
F-127	5075.32	5077.99	elevation head
F-128	5092.19	5092.76	elevation head
F-129	5086.48	5095.61	elevation head
F-130	5080.14	5083.24	elevation head
F-131	5060.33	5062.02	elevation head
F-132	5089.30	5090.05	elevation head
F-133	5081.46	5084.03	elevation head
F-134	5066.04	5068.25	elevation head
W-123	5036.44	5038.01	elevation head
Settlement Monuments (10/1/15 to 9/30/16)			
M-1	5120.909	5121.030	EL (ft)
M-2	5120.447	5120.503	EL (ft)
M-3	5119.833	5119.861	EL (ft)
M-4	5119.020	5119.075	EL (ft)
M-5	5117.971	5118.068	EL (ft)
M-5A	5117.758	5117.838	EL (ft)
M-5B	5117.627	5117.679	EL (ft)
M-5C	5117.960	5118.040	EL (ft)
M-6	5119.073	5119.127	EL (ft)
M-6A	5118.704	5118.751	EL (ft)
M-6B	5119.710	5119.758	EL (ft)
M-6C	5120.034	5120.122	EL (ft)
M-7	5119.500	5119.576	EL (ft)
M-8	5119.625	5119.722	EL (ft)
M-9	5120.016	5120.108	EL (ft)
M-10	5119.928	5120.000	EL (ft)
Totalizers (10/1/15 to 9/30/16)			
Geronimo	26.94	45.32	gpm
Hunt	4.57	14.14	gpm

The data for the piezometers over the current review period indicate no significant elevation changes or trends related to the performance of the dam.

The data for the settlement monuments over the current review period indicate no significant elevation changes or trends related to the performance of the dam. The settlement surveys use a base point near the dam (fly ash base point 2000) that had originally been calibrated to the NGS Randell 2 monument in Joseph City, Arizona prior to 1990. In June 2010, fly ash base point 2000 was recalibrated to the Randell 2 monument and the resulting raw data from the 2010 survey include all differential movement between these two survey points over a time frame of more than 20 years. Settlement surveys conducted since 2010 indicate little to no movement at the survey monuments.

The data for the totalizers over the current review period indicates that the seepage flow rates have only slightly increased when compared to the October 1, 2014 – September 30, 2015 review period. However, the data from the current review period is generally similar to the data recorded since March 2015.

### **5.1.3 CCR and Water Elevations**

The CCR and water elevations of the CCR unit at the time of the inspection are recorded on the Field Inspection form presented in Section 4.1.

### **5.1.4 Storage Capacity**

The estimated remaining storage capacity of the CCR unit at the time of the inspection was 10,000 acre-feet (ac-ft).

### **5.1.5 Approximate Impounded Volume at Time of Inspection**

The approximate volume of impounded water and CCR at the time of the inspection was 8,000 ac-ft.

### **5.1.6 Structural Weakness or Operational Change/Disruption**

No conditions associated with structural weakness were identified during the field inspection.

No conditions that are or could be disruptive to the operation and safety of the CCR unit and appurtenant structures were identified during the field inspection.

There are no significant changes to the structural integrity or operation of the impoundment since the 2015 inspection.

## 5.2 BOTTOM ASH DAM

### 5.2.1 Geometry Changes Since Last Inspection

There have not been any significant changes to the geometry of the unit since the last inspection in 2015.

### 5.2.2 Instrumentation

The location of geotechnical and other related instrumentation in the vicinity of the Bottom Ash Pond are shown on Figure 6 - Bottom Ash Pond Instrumentation Map.

The minimum and maximum recorded readings for each instrument over the October 1, 2015 – September 30, 2016 (current) review period are reported in the following table:

Instrument Name	Minimum	Maximum	Unit
Open Standpipe Piezometers (10/1/15 to 9/30/16)			
B-200	5045.94	5047.77	elevation head
B-201	5043.99	5045.63	elevation head
B-202	5040.44	5041.93	elevation head
B-204	5097.22	5100.15	elevation head
B-206	5028.76	5030.21	elevation head
B-207	5031.43	5033.02	elevation head
B-208B	Dry	Dry	elevation head
B-209	5072.32	5073.15	elevation head
B-210	5066.22	5066.85	elevation head
B-211	Dry	Dry	elevation head
B-212	5091.10	5092.22	elevation head
B-213	5080.04	5080.48	elevation head
B-214	5079.24	5079.92	elevation head
B-215	5079.08	5079.76	elevation head
B-216	5072.48	5074.04	elevation head
B-217	5101.35	5102.85	elevation head
B-218	5093.27	5095.25	elevation head
B-225	5058.79	5059.82	elevation head
W-227	5090.47	5092.47	elevation head
Settlement Monuments (10/1/15 to 9/30/16)			
M-11	5123.292	5123.373	EL (ft)
M-12	5122.853	5122.913	EL (ft)
M-13	5122.410	5122.850	EL (ft)
M-14	5119.409	5119.487	EL (ft)
M-15	5123.003	5123.069	EL (ft)

Instrument Name	Minimum	Maximum	Unit
M-16	5123.542	5123.658	EL (ft)
M-17	5122.951	5123.025	EL (ft)
M-18	5123.206	5123.274	EL (ft)
M-19	5123.335	5123.416	EL (ft)
PI	5123.400	5123.483	EL (ft)
Totalizers (10/1/15 to 9/30/16)			
West Abutment Totalizer	4.94	5.50	gpm
West Abutment Weir	1.50	2.50	gpm
P-226	10.35	18.23	gpm
Tanner Wash Totalizer	8.13	12.42	gpm
Petroglyph	6.88	8.43	gpm

The data for the piezometers over the current review period indicate no significant elevation changes or trends related to the performance of the dam.

The data for the settlement monuments over the current review period indicate no significant elevation changes or trends related to the performance of the dam. The settlement surveys use a base point near the dam (bottom ash base point 1000) that had originally been calibrated to the NGS Randell 2 monument in Joseph City, Arizona prior to 1990. In June 2010, bottom ash base point 1000 was recalibrated to the Randell 2 monument and the resulting raw data from the 2010 survey include all differential movement between these two survey points over a time frame of more than 10 years. Settlement surveys conducted since 2010 indicate little to no movement at the survey monuments.

The data for the totalizers and seeps under the current review period indicates that the seepage flow rates have not significantly increased since the totalizers were last reset/replaced.

### **5.2.3 CCR and Water Elevations**

The CCR and water elevations of the CCR unit at the time of the inspection are recorded on the Field Inspection form presented in Section 4.2.

### **5.2.4 Storage Capacity**

The estimated remaining storage capacity of the CCR unit at the time of the inspection was 675 ac-ft.

### **5.2.5 Approximate Impounded Volume at Time of Inspection**

The approximate volume of impounded water and CCR at the time of the inspection was 1,625 ac-ft.

### **5.2.6 Structural Weakness or Operational Change/Disruption**

No conditions associated with structural weakness were identified during the field inspection.

No conditions that are or could be disruptive to the operation and safety of the CCR unit and appurtenant structures were identified during the field inspection.

There are no significant changes to the structural integrity or operation of the impoundment since the 2015 inspection.



### **5.3 SEDIMENTATION POND**

#### **5.3.1 Geometry Changes Since Last Inspection**

There have not been any significant changes to the geometry of the unit since the last inspection in 2015.

#### **5.3.2 Instrumentation**

There are no instruments associated with the Sedimentation Pond.

#### **5.3.3 CCR and Water Elevations**

The depth of CCR in the Sedimentation Pond at the time of the inspection was approximately 5 feet, which corresponds to an elevation of 5014 feet.

#### **5.3.4 Storage Capacity**

The estimated remaining storage capacity of the Sedimentation Pond at the time of the inspection was 3.21 ac-ft.

#### **5.3.5 Approximate Impounded Volume at Time of Inspection**

The approximate volume of impounded CCR in the Sedimentation Pond at the time of the inspection was 7.49 ac-ft. Since the CCR unit is periodically emptied, the impounded CCR volume varies throughout the year.

#### **5.3.6 Structural Weakness or Operational Change/Disruption**

No conditions associated with structural weakness were identified during the field inspection.

No conditions that are or could be disruptive to the operation and safety of the CCR unit and appurtenant structures were identified during the field inspection.

There are no significant changes to the structural integrity or operation of the impoundment since the 2015 inspection.

## **5.4 BOTTOM ASH MONOFILL**

### **5.4.1 Geometry Changes Since Last Inspection**

There have not been any significant changes to the geometry of the unit since the last inspection in 2015.

### **5.4.2 Instrumentation**

There are no instruments associated with the Bottom Ash Monofill.

### **5.4.3 CCR Volume**

The CCR elevations at the time of the inspection are recorded on the Field Inspection form presented in Section 4. Based on planned fill rate, the CCR unit contained between 1,085 and 1,240 ac-ft at the time of inspection (survey data is not available). The estimated maximum storage capacity is 2,417 ac-ft.

### **5.4.4 Structural Weakness or Operational Change/Disruption**

No conditions associated with structural weakness were identified during the field inspection.

No conditions that are or could be disruptive to the operation and safety of the CCR unit and appurtenant structures were identified during the field inspection.

There are no significant changes to the structural integrity or operation of the impoundment since the 2015 inspection.

## 6.0 OPERATION AND MAINTENANCE RECOMMENDATIONS

The following items were noted during inspections as requiring attention.

### 6.1 FLY ASH DAM

Action Item	Action Status
1) Identify and remediate scattered animal burrows.	1) Mark animal burrows identified during weekly inspections. 2) Establish regular schedule (e.g. semi-annually) to remediate identified burrows. NOTE: This will always be an ongoing maintenance activity.
2) Continue monitoring the groin of the West Abutment and the access road near the Geronimo sumps for erosion.	Repair as needed.
3) Continue to maintain, treat, and remove excessive vegetation.	Remove trees, shrubs, and other deleterious vegetation on face of dam as per NMOSE (2011). NOTE: This will always be an ongoing maintenance activity.
4) Re-establish the water level gauge in the reservoir or establish a new alternative means of regularly recording reservoir levels.	The water level gauge was submerged early in 2015, covered in evaporites, and is now unreadable. No current means other than land survey of measuring pond level and rate of rise/decline. Currently, the bottom ash water level is read on a 30-day interval when the settlement monuments are surveyed.
5) The above-ground portion of the pipe at Geronimo Well Pump D is leaking.	Repair the leak.
6) Update the Emergency Action Plan.	EAP under CFR 257.73 is due 4/17/2017. APS is currently in the process of updating the EAP.

## 6.2 BOTTOM ASH DAM

Action Item	Action Status
1) Identify and remediate scattered animal burrows.	1) Mark animal burrows identified during weekly inspections. 2) Establish regular schedule (e.g. semi-annually) to remediate identified burrows. NOTE: This will always be an ongoing maintenance activity.
2) Continue to maintain, treat, and remove excessive vegetation.	Remove trees, shrubs, and other deleterious vegetation on face of dam as per NMOSE (2011). NOTE: This will always be an ongoing maintenance activity.
3) Remove vegetation and debris from the V-notch weir at the West Abutment.	Location is currently obscured and access restricted. Location should be cleared so that it can be accessed and measured during regular inspections. Add to maintenance work list and repair as needed.
4) Update the Emergency Action Plan.	EAP under CFR 257.73 is due 4/17/2017. APS is currently in the process of updating the EAP.

## 6.3 SEDIMENTATION POND

Action Item	Action Status
1) Adjust the embankment crest road grading to cause runoff to flow into the south chamber of the impoundment to eliminate erosion on the downstream slope of the embankment	Add to maintenance work list and repair.

## 6.4 BOTTOM ASH MONOFILL

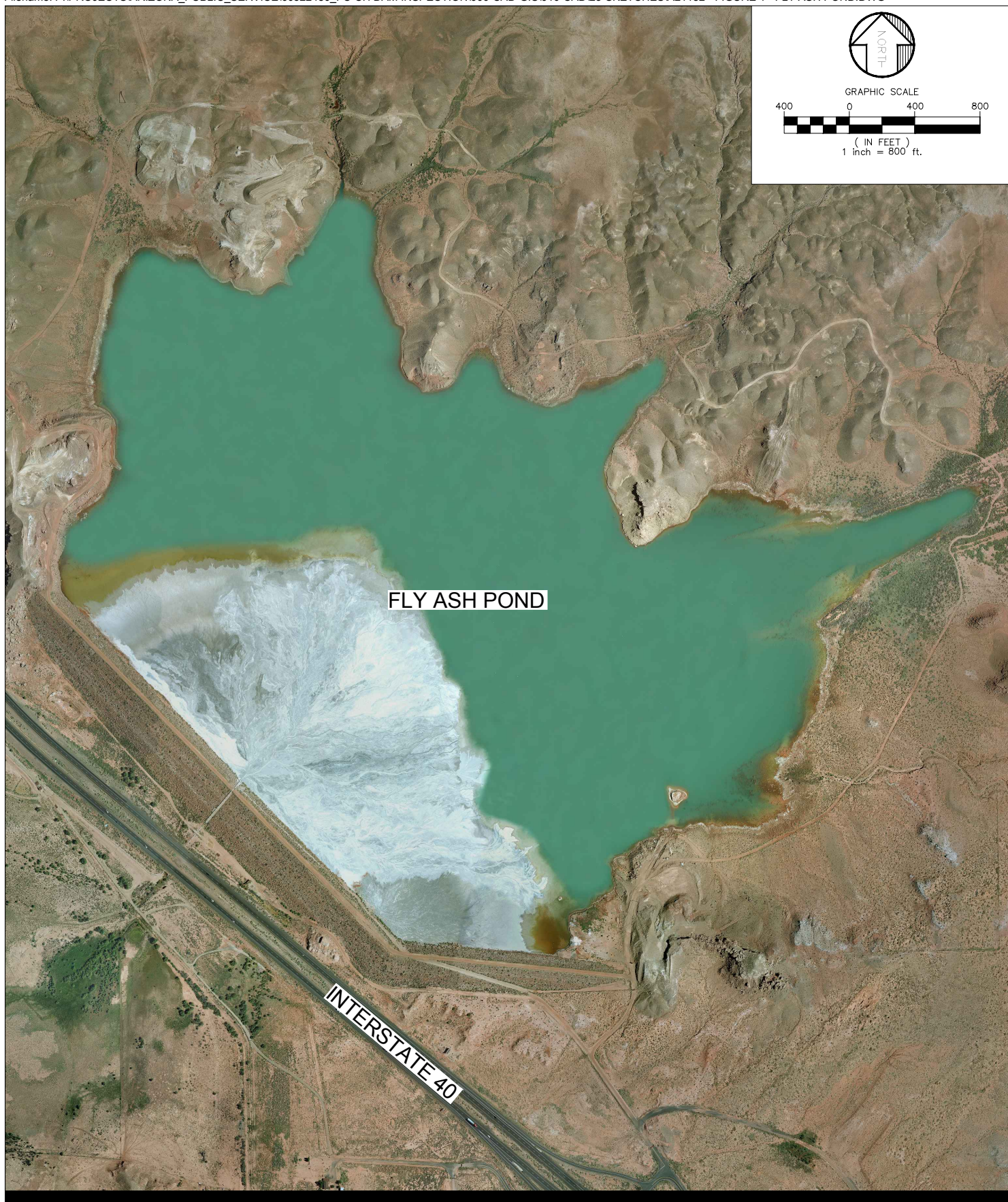
Action Item	Action Status
1) There is evidence of head cutting in the inlet to the Stormwater Detention Basin and erosion along the slopes of the diversion channel.	Monitor and repair as needed. NOTE: This will always be an ongoing maintenance activity.

## 7.0 REFERENCES

- United States Environmental Protection Agency (EPA), 2015. *40 CFR Parts 257 and 261 – Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*. Federal Register Vol. 80, No. 74. April 17.
- Federal Emergency Management Agency. 2005. *Technical Manual for Dam Owners, Impacts of Plants on Earthen Dams, FEMA Manual 534*. September.
- National Geodetic Survey. Web. 2016. < [http://www.ngs.noaa.gov/cgi-bin/ds\\_desig.prl](http://www.ngs.noaa.gov/cgi-bin/ds_desig.prl)>. 18 November.
- New Mexico Office of the State Engineer (NMOSE). Dam Safety Bureau. 2011. *Vegetation Management on Dams*. 3 pgs. August 15.

## FIGURES









**CHOLLA POWER PLANT**  
**CCR IMPOUNDMENT AND LANDFILL INSPECTION REPORT**  
ARIZONA PUBLIC SERVICE

**BOTTOM ASH POND**  
**SITE MAP**

**AECOM**  
**FIGURE 2**

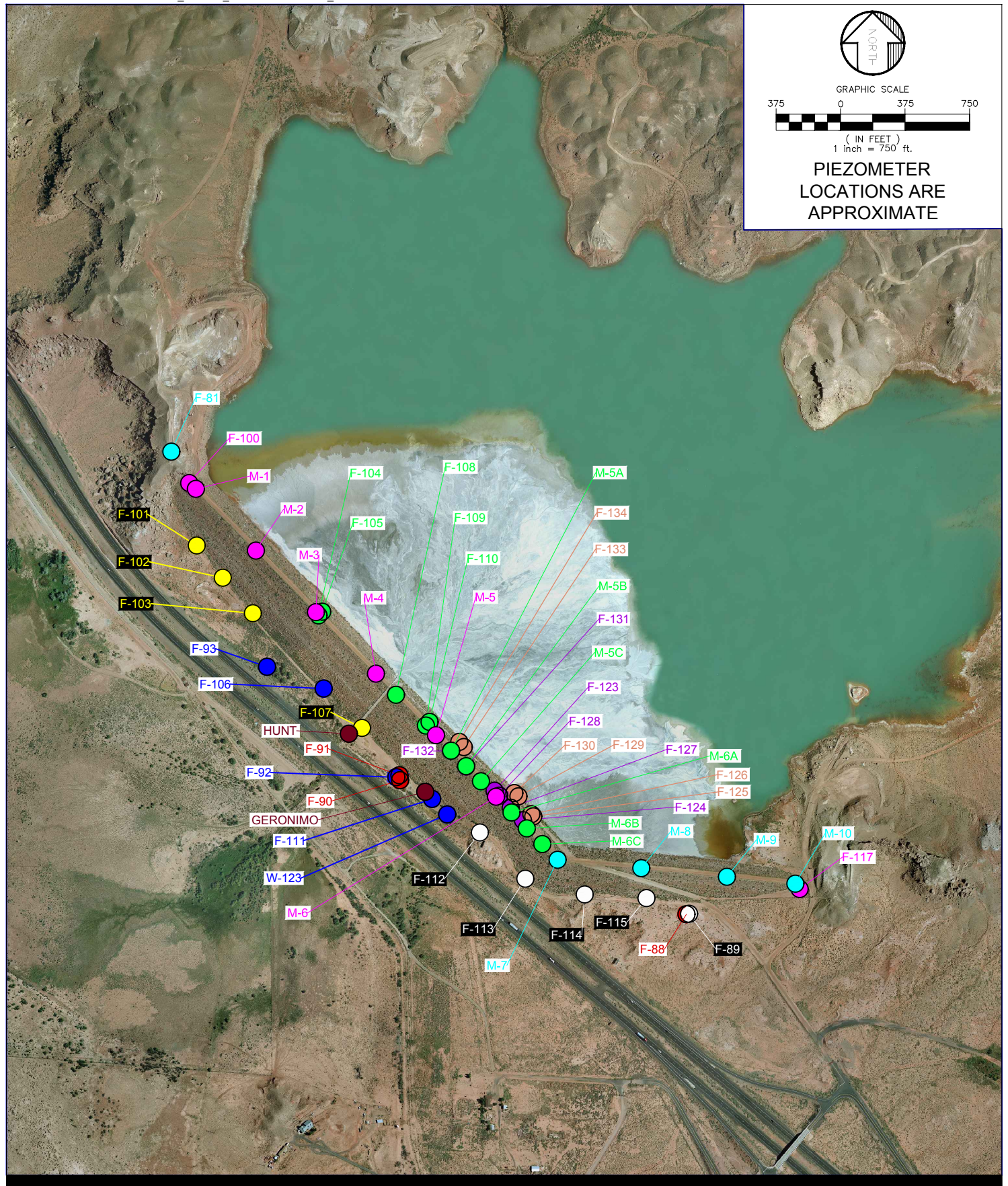




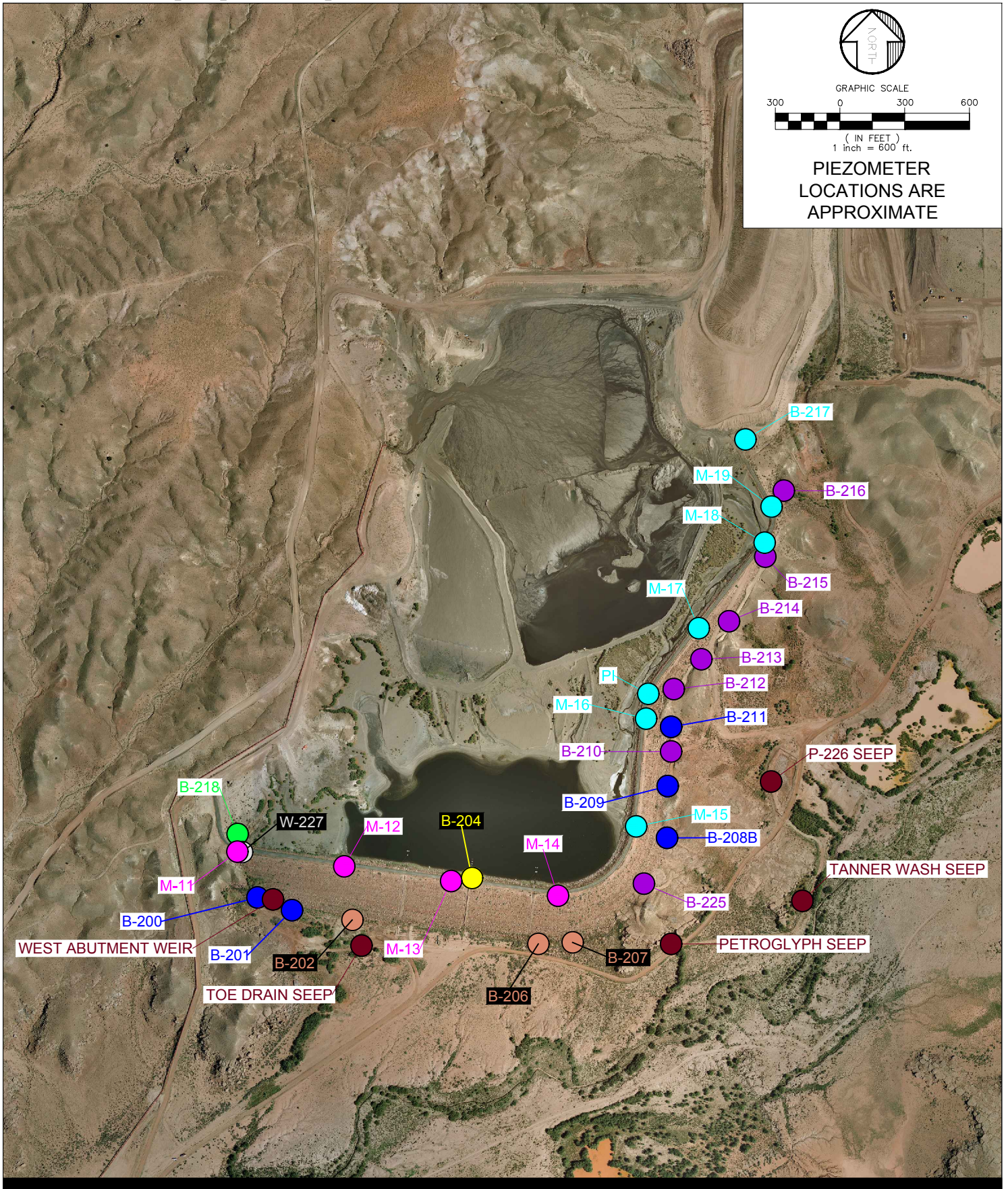














**APPENDIX A**  
**FLY ASH DAM PHOTO LOG**



#### 20161020 – IMG\_0364

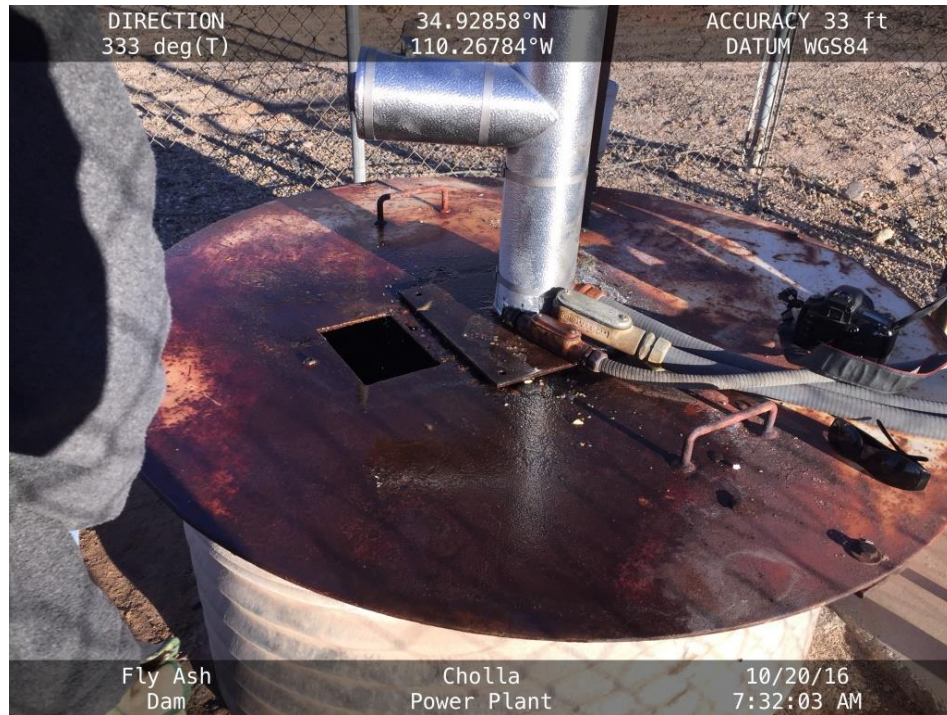
Dense vegetation along the toe of the Fly Ash Dam near the fenceline, facing east.



#### 20161020 – IMG\_2148

Dense vegetation along the toe of the Fly Ash Dam near the fenceline, facing west.





**20161020 – IMG\_2153**  
Water leaking out of the piping in Geronimo Sump D.



**20161020 – IMG\_2159**  
Riprap deterioration along the toe of the Fly Ash Dam.





### 20161020 – IMG\_2172

Minor erosion in the groin of the West Abutment.



### 20161020 – IMG\_2181

Area of repaired erosion near the Geronimo Sump along the access road, facing west.





### 20161020 – IMG\_2186

A newly-installed monument around piezometer F-35.



### 20161020 – IMG\_2197

Accumulated sediment on the Fly Ash Pond water level gauge.





### 20161020 – IMG\_2199

The crest of the Fly Ash Dam, facing west from the east abutment.



### 20161020 – IMG\_2200

The upstream slope of the Fly Ash Dam, facing west from the east abutment.





### 20161020 – IMG\_2201

The downstream slope of the Fly Ash Dam, facing west from the east abutment.



### 20161020 – IMG\_2206

The upstream slope of the Fly Ash Dam, facing northwest from the East Embankment.





#### 20161020 – IMG\_2214

A piezometer completion along the crest of the Fly Ash Dam, facing northwest.



#### 20161020 – IMG\_2225

The crest of the Fly Ash Dam, facing northwest.





#### 20161020 – IMG\_2229

Evidence of previous seepage (white evaporates) along the downstream toe of the Fly Ash Dam, facing south.



#### 20161020 – IMG\_2238

The upstream slope of the Fly Ash Dam and the beach created by deposition, facing southwest.



**20161020 – IMG\_2248**  
The I-40 Seep in a relatively soft, but dry condition.

**APPENDIX B**  
**BOTTOM ASH DAM PHOTO LOG**





**20161019 – IMG\_2013**  
The crest of the Bottom Ash Dam, facing east.



**20161019 – IMG\_2023**  
The upstream slope of the Bottom Ash Dam, facing east.





**20161019 – IMG\_2034**

The upstream slope of the Bottom Ash Dam, facing west.



**20161019 – IMG\_2035**

The crest of the Bottom Ash Dam with vegetation recently removed, facing east.





**20161019 – IMG\_2047**

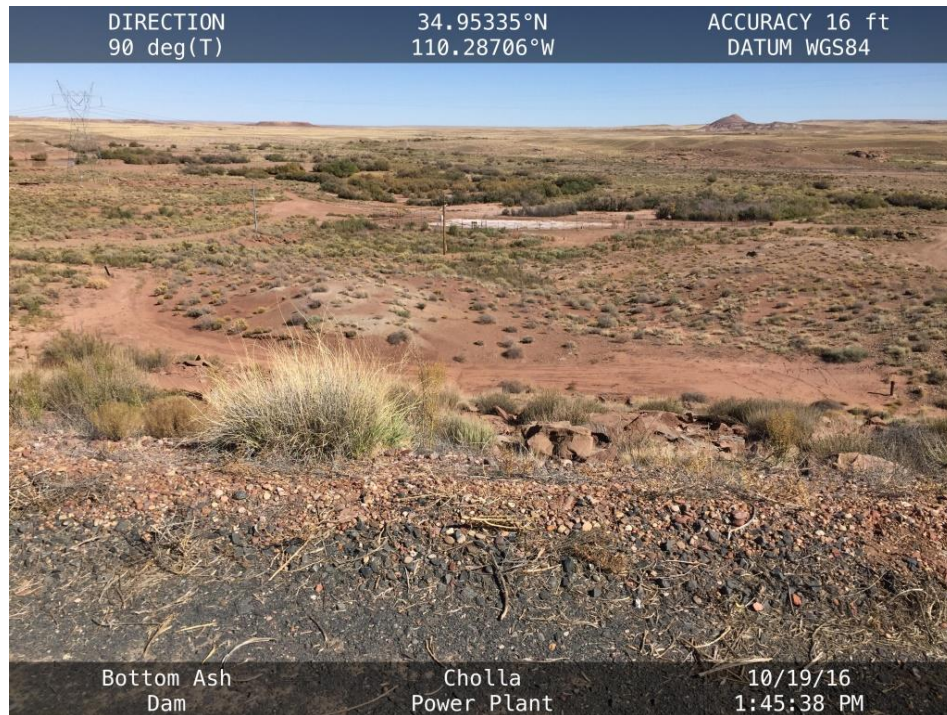
An animal burrow in the crest of the South Embankment.



**20161019 – IMG\_2049**

The crest of the Bottom Ash Dam, facing southwest.





### 20161019 – IMG\_2061

The P-232 seep at the downstream toe of the Bottom Ash Dam, facing east.



### 20161019 – IMG\_2062

The downstream slope of the East Embankment, facing south.





**20161019 – IMG\_2064**

The downstream slope of the East Embankment, facing northeast.



**20161019 – IMG\_2071**

An animal burrow in the crest of the East Embankment.





### 20161019 – IMG\_0313

An animal burrow along the downstream slope of the East Embankment.



### 20161019 – IMG\_2100

The toe of the South Embankment with most of the vegetation removed, facing east.





### 20161019 – IMG\_2105

The toe of the South Embankment with most of the vegetation removed, facing east.



### 20161019 – IMG\_2106

The toe of the South Embankment with most of the vegetation removed, facing east.



**20161019 – IMG\_2108**

The toe of the South Embankment with most of the vegetation removed, facing west.

**APPENDIX C**  
**SEDIMENTATION POND PHOTO LOG**





**20161020 – IMG\_2249**  
Sign for the Sedimentation Pond.



**20161020 – IMG\_2251**  
The south half of the southern cell, facing northeast.





### 20161020 – IMG\_2253

The southeast embankment and the southern cell, facing east.



### 20161020 – IMG\_2255

The southern cell and southeast embankment of the Sedimentation Pond, facing northeast.





### 20161020 – IMG\_2256

The downstream slope of the southeast embankment, facing east.



### 20161020 – IMG\_2264

The upstream slope of the southeast embankment, facing southwest.





### 20161020 – IMG\_2266

Canal between the railroad tracks (left) and the Sedimentation Pond (right), facing southwest.



### 20161020 – IMG\_2267

The two 16-inch corrugated polyethylene pipes that serve as the spillway.





### 20161020 – IMG\_2269

The northern portion of the Sedimentation Pond, facing southwest from the east embankment.



### 20161020 – IMG\_2276

The northern cell of the Sedimentation Pond, facing southwest from the east embankment.

**APPENDIX D**

**BOTTOM ASH MONOFILL PHOTO LOG**





### 20161019 – IMG\_1948

Erosion rills along the western slope of the Bottom Ash Monofill, facing east.



### 20161019 – IMG\_1953

The diversion channel along the west side of the Bottom Ash Monofill, facing south.





### 20161019 – IMG\_1958

The diversion channel along the west side of the Bottom Ash Monofill, facing north.



### 20161019 – IMG\_1962

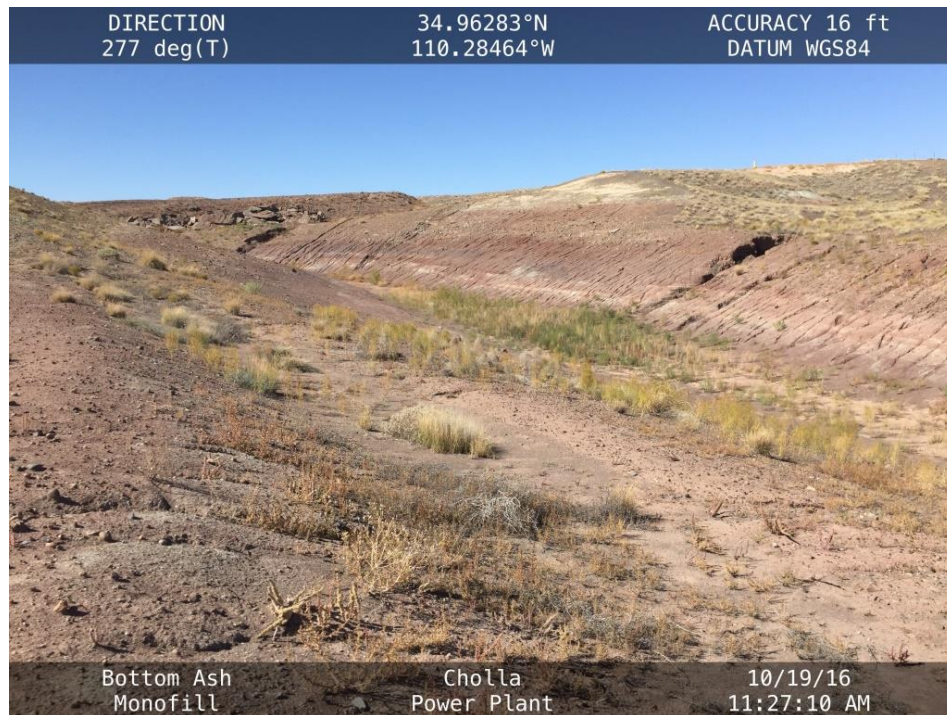
The northern slope of the Bottom Ash Monofill, facing east.





### 20161019 – IMG\_1963

Deep headcutting in the diversion channel along the north side of the Monofill, facing north.



### 20161019 – IMG\_1964

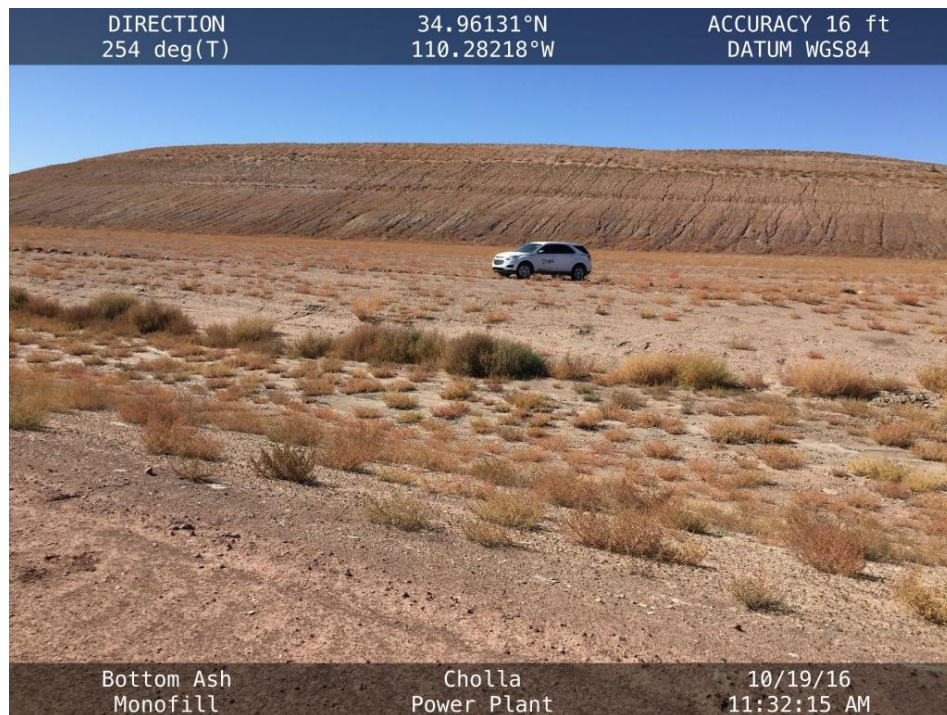
The diversion channel along the north side of the Bottom Ash Monofill, facing west.





### 20161019 – IMG\_1978

The diversion channel along the east side of the Bottom Ash Monofill, facing south.



### 20161019 – IMG\_1982

The eastern slope of the Bottom Ash Monofill, facing west.





### 20161019 – IMG\_1986

The Stormwater Detention Basin with erosion and vegetation, facing south from the north side.



### 20161019 – IMG\_1993

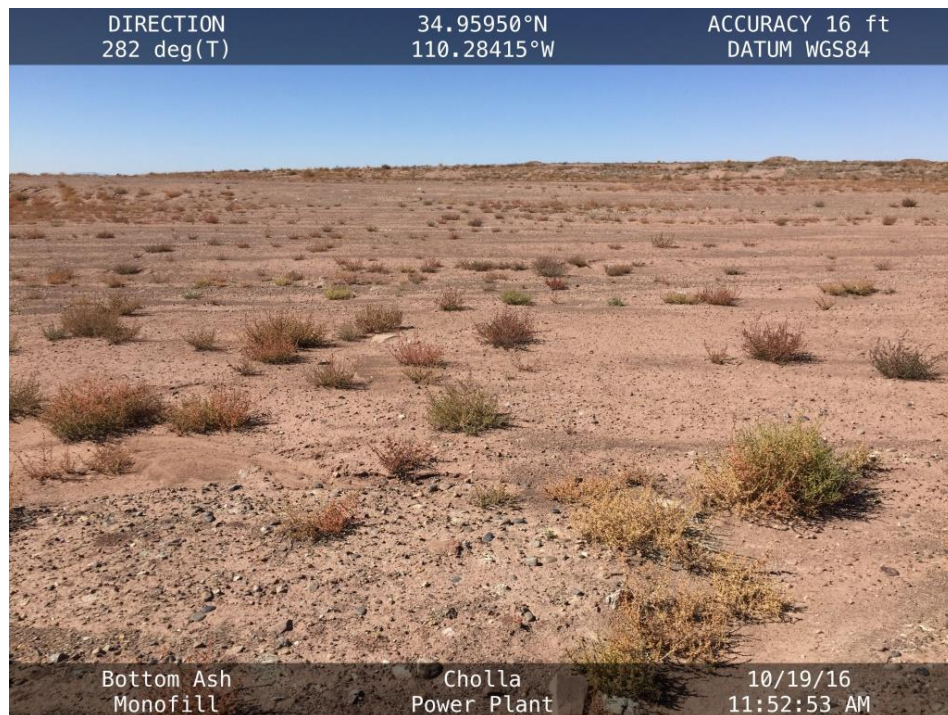
The south side of the Stormwater Detention Basin, facing east.





### 20161019 – IMG\_1997

The eastern slope of the Bottom Ash Monofill, facing north from the top of the unit.



### 20161019 – IMG\_1998

The top surface of the Bottom Ash Monofill, facing west across the top of the unit.