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ENGINEERS & CONSULTANTS

DRAFT REPORT

CCW IMPOUNDMENTS INSPECTION REPORT

MITCHELL POWER PLANT MARSHALL COUNTY, WEST VIRGINIA

PREPARED FOR:

U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC

UNDER SUBCONTRACTO TO:

LOCKHEED MARTIN
EDISON, NJ

Engineering & Construction Management
Hydro-Nuclear-Fossil

Geotechnical Engineering

Seismic and Structural Engineering

Hydrological & Hydraulic Engineering

Tunnel Engineering

Environmental Engineering & Permitting

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PROJECT NO. 09-4157
OCTOBER 2009

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October 8, 2009
Project No. 09-4157

Mr. Dennis Miller
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TRANSMITTAL
ASSESSMENT OF DAM SAFETY OF
COAL COMBUSTION SURFACE IMPOUNDMENTS
DRAFT INSPECTION REPORT
SITE 24 (MITCHELL)

Dear Mr. Miller:

Transmitted herewith are two copies of the referenced Draft inspection Report for management units located at Site 24.

If you have any questions or require any additional information, please contact me at (412) 856-9700, ext. 1008, or john.osterle@rizzoassoc.com.

Respectfully submitted,
Paul C. Rizzo Associates, Inc.

John P. Osterle, P.E.
Vice President
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JPO/krc/lck

cc: Stephen Hoffman – USEPA

TABLE OF CONTENTS

PAGE

LIST OF TABLES AND FIGURES iii
1.0 EXECUTIVE SUMMARY 1
1.1 GENERAL 1
1.2 SUMMARY OF FIELD INSPECTION FINDINGS 2
1.3 SUMMARY OF O&M STATUS 3
1.4 CONCLUSIONS 4
1.4.1 Project Description 4
1.4.2 Field Inspection 4
1.5 SUMMARY OF RECOMMENDATIONS 5
1.6 CERTIFICATION 5
1.6.1 List of All Field Inspection Participants 5
1.6.2 Signature of Independent Engineer 6
1.6.3 PE Stamp 6
2.0 PROJECT DESCRIPTION 7
2.1 EXISTING PROJECT FEATURES AND HAZARD POTENTIAL CLASSIFICATION 7
2.1.1 Conner Run Dam 7
2.1.2 Bottom Ash Complex 8
2.2 SUMMARY OF STANDARD OPERATING PROCEDURES 10
2.2.1 Purpose of the Project 10
2.2.2 Current Inspection Schedule 10
2.3 MODIFICATIONS CONDUCTED FOR PROJECT SAFETY 11
2.4 ENGINEERING INFORMATION 11
2.4.1 Geologic Conditions 12
2.4.2 Slope Stability Analyses 14
2.4.3 Hydrologic Analyses 17
3.0 FIELD INSPECTION 20
3.1 FIELD INSPECTION OBSERVATIONS 20
3.1.1 Conner Run Dam 20

DRAFT
US EPA ARCHIVE DOCUMENT

3.1.2 Bottom Ash Pond 21
3.1.3 Clear Water Pond 22
4.0 ANALYSIS 23
4.1 SAFETY, OPERATIONS, AND MAINTENANCE 23
4.2 DESIGN AND OPERATION CHANGES 24
4.3 INSPECTION AND MONITORING 24
5.0 RECOMMENDATIONS/CONCLUSIONS 25

FIGURES
APPENDIX A – AEP DRAWINGS
APPENDIX B – FIELD INSPECTION CHECKLISTS
APPENDIX C – MITCHELL POWER STATION PHOTO LOG
APPENDIX D – STABILITY ANALYSIS RESULTS
APPENDIX E – INSTRUMENTATION DATA

DRAFT

US EPA ARCHIVE DOCUMENT

LIST OF TABLES

TABLE NO.	TITLE	PAGE
TABLE 1-1	SUMMARY OF RECOMMENDATIONS	5
TABLE 2-1	CONNER RUN DAM LOCATION DATA	8
TABLE 2-2	BOTTOM ASH POND LOCATION DATA	9
TABLE 2-3	CLEAR WATER POND LOCATION DATA	10
TABLE 2-4	EMBANKMENT MATERIAL PERMIABILITIES	10
TABLE 2-5	CONNER RUN DAM SOIL STRENGTH PARAMETER	14
TABLE 2-6	CONNER RUN DAM STABILITY ANALYSES RESULTS	15
TABLE 2-7	CONNER RUN DAM 2006 STABILITY ANALYSES RESULTS	15
TABLE 2-8	BOTTOM ASH COMPLEX SOIL STRENGTH PARAMETER	16
TABLE 2-9	BOTTOM ASH COMPLEX STABILITY ANALYSES RESULTS	17
TABLE 2-10	SUMMARY OF FLOOD ROUTING ANALYSIS	18

LIST OF FIGURES

FIGURE NO.	TITLE
FIGURE 1-1	SITE VICINITY MAP
FIGURE 1-2	SITE FEATURES
FIGURE 1-3	CONNER RUN DAM FEATURES
FIGURE 1-4	BOTTOM ASH COMPLEX FEATURES
FIGURE 2-1	TYPICAL SECTION CONNER RUN DAM
FIGURE 3-1	PHOTOGRAPH LOCATION MAP CONNER RUN DAM
FIGURE 3-2	PHOTOGRAPH LOCATION MAP BOTTOM ASH COMPLEX

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CCW IMPOUNDMENT ASSESSMENT REPORT
MITCHELL POWER STATION
MARSHALL COUNTY, WEST VIRGINIA

1.0 EXECUTIVE SUMMARY

1.1 GENERAL

This section is a summary of the Independent Engineer's Review of Management Units for the Mitchell Power Plant. The Report was prepared by Paul C. Rizzo Associates, Inc. (RIZZO) for the United States Environmental Protection Agency (USEPA) under subcontract to Lockheed Martin. This section summarizes the finding, assessments, conclusions, and recommendations of the Independent Engineer.

The Mitchell plant is a coal-fired power plant located on the south bank of the Ohio River in Moundsville, Marshall County, West Virginia. The plant is owned and operated by American Electric Power Service Corporation (AEP). A Site Vicinity map is shown on ***Figure 1-1***, and an aerial photograph of the plant is shown on ***Figure 1-2***. Under normal operating conditions, byproducts of coal combustion, including fly ash, bottom ash, boiler slag, flue gas emission control residuals, and other general wastewater products, are sluiced to either the Conner Run Dam, located southeast of the plant, or the onsite Bottom Ash Complex. The Conner Run Dam is a fly ash pond impounded by a 355-foot-high rock fill berm. An aerial photograph of the impoundment is provided on ***Figure 1-3***. The Bottom Ash Complex is located south of the main generation facilities and is made up of a Bottom Ash Pond and a Clear Water Pond. An aerial photograph showing the facility arrangement of the Bottom Ash Complex is provided on ***Figure 1-4***. Site plan views and sections for the impoundments are included in ***Appendix A***.

The Conner Run Dam is cross-valley impoundments constructed of zones of clay, granular material, and coarse refuse (mine gob). The downstream slope of the dam is covered by an approximately 800-foot-wide benched berm constructed from coarse refuse. The impoundment has been classified as high hazard potential structures by the USEPA. High Hazard Potential structures are classified as structures where failure or misoperation will probably cause loss of human life. The predominant risk of failure for the impoundment is environmental damage.

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The Bottom Ash Complex is made up of a Bottom Ash Pond and a Clear Water Pond. The Bottom Ash Pond is constructed using a side-hill configuration where the diked embankments are made of a soil and gravel berms and are polyvinyl chloride (PVC)-lined along the upstream slope. The Clear Water Pond is of similar construction to the Bottom Ash pond. Both the upstream and downstream slopes are either wholly or partially vegetated. The crest of the berm acts as a gravel roadway around the impoundment. The Ponds have been classified as significant hazard potential structures by the USEPA. Significant hazard potential structures are classified as structures where failure is not likely to result in loss of life, but may cause significant economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. The predominant risk of failure for the two impoundments is environmental damage.

1.2 SUMMARY OF FIELD INSPECTION FINDINGS

The Site inspection was conducted on September 3, 2009. The inspection team consisted of representatives from AEP, the USEPA, and RIZZO. The team stopped at each of the Project features to inspect the structures and the surrounding area. Particular attention was paid to Site features that may contribute to typical failure modes of embankment structures, such as settlement, seepage, and slope stability. A copy of the USEPA inspection checklists for each impoundment are included in ***Appendix B***.

The Conner Run Dam was found to be well-maintained and in good condition at the time of inspection. The upstream embankment and crest were clear of vegetation, and no seepage was observed. The downstream slope and toe of the dam are not visible for inspection, since an 800-foot-wide benched berm constructed of coarse refuse from Consol Energy butts up against the slope. There were no signs of sloughing or sliding along the slopes of the berm. At the time of the inspection, the Conner Run Dam was under construction as part of an effort to raise the crest of the dam for increased storage capacity. The only inflows to the impoundments include the slurry, which is pumped in, and storm runoff. The trash rack was clear of debris, and the outlet structure was free flowing.

The Bottom Ash Pond was found to be well-maintained and in good condition. A small wet zone was found at the toe of the northwest corner of the impoundment. The source of the water is unknown and could just be ponded surface water. No other seepage was observed. The only inflows to the impoundment include the slurry, which is pumped in from the plant, and storm runoff. The outlet was clear of debris and free-flowing. There were some uneven surfaces and rain ruts along the downstream slope, but no signs of sloughing or sliding. Vegetation control

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along the upstream and downstream slopes was considered to be good. A line of trees exists along the downstream slope of east embankment. This slope exists well above the normal pool elevation, and the trees do not pose a hazard to the safety of the impoundment.

The Clear Water Pond was found to be well-maintained and in good condition. The vegetation along the slopes was trimmed, and no seepage was observed. The only inflows to the impoundment include the waste water that flows in from the Bottom Ash Pond and storm runoff. The outlet was clear of debris and free-flowing. There were some uneven surfaces and rain ruts along the downstream slope, but no signs of sloughing or sliding. Vegetation control along the upstream and downstream slopes was considered to be good. A small animal borrow was discovered along the west upstream embankment about five feet from the water line.

1.3 Summary of O&M Status

The Project is attended full-time by plant operators and dedicated safety personnel. The Conner Run Dam is also attended to by construction personnel. The different impoundments are regulated by separated agencies.

The current inspection schedule for the Conner Run Dam consists of weekly inspections by construction personnel, monthly inspections by plant personnel, and a yearly inspection is performed by AEP's Engineering staff and the West Virginia Department of Environmental Protection, Division of Water and Waste Management EE/Dam Safety Section (WVDWWM). The impoundment is also regulated by the Mine Safety and Health Administration (MSHA). MSHA performs a yearly inspection of the Conner Run Dam, separate from AEP's yearly inspection.

The current inspection schedule for the Bottom Ash Complex consists of monthly inspections by plant personnel and a yearly inspection is performed by AEP's Engineering staff and the West Virginia Department of Environmental Protection (WVDEP), Division of Water and Waste Management, EE/Dam Safety Section.

The facility has monitoring wells and piezometers installed at or around the various impoundments. At the time of inspection, the facility's impoundments appeared to be well-maintained and in good working order.

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1.4 CONCLUSIONS

1.4.1 Project Description

The Mitchell Power Station is a coal-fired power plant along the Ohio River, south of a Moundsville, Marshall County, West Virginia. Coal combustion waste (CCW) byproducts are sluiced to onsite storage ponds or an offsite fly ash pond.

The Conner Run Dam is currently undergoing a multi-stage dam raise operation. Currently, the dam has a crest elevation of 1000 feet with a embankment height of 355 feet. The downstream slope of the dam is covered by a 800-foot-wide berm constructed from coarse refuse. The impoundments upstream slope is at 3H:1V.

The Bottom Ash Complex was constructed to provide disposal capacity of bottom ash generated at the Mitchell Plant. The Bottom Ash Pond and Clear Water Pond are constructed using a side-hill configuration with a berm constructed of a granular soil with a PVC liner on the upstream slope. The impoundments upstream and downstream slopes are 3H:1V with a crest width of 20 feet. The liner is overlain with approximately 2 to 3 feet of composite soil and is vegetated on top for erosion control.

The impoundments appear to be well-maintained and operated. Annual inspections are performed by AEP and the WVDWWM, while MSHA conducts their own separate annual inspection of the Conner Run Dam. The impoundments are also subject to a walk-through visual inspection by AEP site personnel every month. The construction personnel perform weekly inspections of the Conner Run Dam so long as operations continue.

1.4.2 Field Inspection

The field inspection was performed in accordance with USEPA guidelines considering typical embankment failure modes. The embankments are in good condition, and only minor maintenance issues may need to be addressed by the owner. No seepage was noted at the time of inspection, except for a small wet zone at the northwest toe of the Bottom Ash Pond, which may be ponded surface water. All the downstream slopes appear to be well-maintained. Recommendations were developed based on our field observations and our technical review of the Project documentation provided by AEP.

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1.5 SUMMARY OF RECOMMENDATIONS

The following recommendations result from the document review and field inspection. The recommendations are summarized below in ***Table 1-1*** and discussed in detail in ***Section 5.0.***

TABLE 1-1
SUMMARY OF RECOMMENDATIONS

NO.	RECOMMENDATION	TIMEFRAME
1	Maintain routine vegetation control	According to AEP's current Maintenance Plan.
2	Fill animal burrow in Clear Water Pond	According to AEP's current Maintenance Plan.
3	Maintain crest and slopes to control erosion	According to AEP's current Maintenance Plan.
4	Consider regrading uneven surface along downstream slope	Not Applicable.
5	Consider regrading upstream slope along east end of Bottom Ash Pond for safety reasons	Not Applicable.
6	Continue to monitor wet zone at northeast toe of dike	According to AEP's current Maintenance Plan.
7	Maintain newly installed piezometers and establish monitoring schedule	Before next scheduled formal inspection.

1.6 CERTIFICATION

1.6.1 List of All Field Inspection Participants

The field inspection was conducted on September 3, 2009. The individuals participating in the inspection were:

Gary F. Zych, P.E.	AEP – Environmental Services
Dana E. Limes	AEP – Environmental Services
Jeff W. Palmer	AEP – Krammer/Mitchell
Ted Carpenter	AEP – Krammer/Mitchell
Wayne L. Irons	AEP – Krammer/Mitchell
Chester A. Smith Jr.	AEP – Krammer/Mitchell
Craig Dufficy	USEPA
John P. Osterle, P.E.	RIZZO – Independent Engineer
Kevin R. Cass, P.E.	RIZZO

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1.6.2 Signature of Independent Engineer

I acknowledge that the management units referenced herein were personally inspected by me on September 3, 2009 and were found to be in the following condition:

SATISFACTORY

No existing or potential management unit safety deficiencies are recognized. Acceptable performance is expected under all applicable loading conditions (static, hydrologic, seismic) in accordance with the applicable criteria. Minor maintenance items may be required.

Signature ________________________

John P. Osterle, P.E.
WV Registration No. 13548
Independent Engineer
Paul C. Rizzo Associates, Inc.

1.6.3 PE Stamp

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2.0 PROJECT DESCRIPTION

2.1 EXISTING PROJECT FEATURES AND HAZARD POTENTIAL CLASSIFICATION

2.1.1 Conner Run Dam

The Conner Run Dam is identified as a High Hazard Potential structure, according to USEPA guidelines. Because the impoundment ultimately discharges into the Ohio River, it falls under the National Pollutant Discharge Elimination System (NPDES) permit program, which controls water pollution by regulating point sources that discharge pollutants into waters of the United States (NPDES #: NWVD0005304).

The Conner Run Dam was constructed to provide long-term disposal for fly ash generated by the Mitchell and Kammer Power Plants. The existing dam is a zoned earthfill embankment with a starter dam, a clay core, a upstream course refuse shell, and a downstream coarse coal refuse shell. CCW material from the plant was used for a bottom ash chimney drain and foundation blanket drain within the dam. Over the years, coarse refuse from Consol Energy has been deposited along the downstream berm, resulting in what is effectively an 800-foot-wide benched berm along the downstream slope. According to lab test, the coarse mine refuse (mine gob) that makes up the berm is silty gravel with sand, based on the Unified Soil Classification System.

The Conner Run Dam is currently undergoing a multi-stage dam raise operation. The current construction work is taking the dam crest form the previous Stage 7 elevation of 937 feet to the proposed Stage 9F elevation of 1050 feet. The structure is regulated by MSHA, the WVDWWM, and the USEPA. At the time of inspection, MSHA and WVDWWM had granted partial approval of the design plans, allowing the dam to be raised to elevation 1000 feet and the operating pool elevation to 984 feet. Currently, the dam has a crest elevation of 1000 feet with a embankment height of 355 feet. The impoundments upstream slope is at 3H:1V. During the dam raise, the 20-foot-wide clay core and chimney drain are raised at a 1H:1V with the upstream slope. Part of the existing dam upstream slope is founded on the fly ash and fine refuse already existing in the impoundment, which can be seen on the typical section on ***Figure 2-1***.
At the time of inspection, the pool elevation was at 968.5 feet with approximately 31.5 feet of freeboard. The pool area for the impoundment is approximately 71 acres. The outlet for the impoundment is a 72-inch diameter concrete-lined spillway pipe, which lets out into a grouted

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riprap discharge channel downstream of the dam. This channel flows into an impact basin and ultimately the outlet channel.

Based on the field reconnaissance, a review of United States Geological Survey (USGS) maps and aerial photographs, Conner Run Dam has been classified by the Independent Engineer as a High Hazard Potential structure, due to the probable loss of human life caused by misoperation or failure of the structure. The location information for the impoundment is summarized in ***Table 2-1***. Coordinates are located at the center of the impoundment.

TABLE 2-1
CONNER RUN DAM LOCATION DATA

	Degrees	**Minutes**	**Seconds**
Longitude	39	49	36
Latitude	80	48	15
State	West Virginia	**County**	Marshall

2.1.2 Bottom Ash Complex

The Impoundments that make up the Bottom Ash Complex are identified as a Significant Hazard Potential structures, according to USEPA guidelines. Because the impoundments ultimately discharge into the Ohio River, they fall under the NPDES permit program, which controls water pollution by regulating point sources that discharge pollutants into waters of the United States (NPDES #: NWVD0005304).

The Bottom Ash Complex was constructed in the early 1970s and is made up of a Bottom Ash Pond and a Clear Water Pond. It is intended to provide disposal capacity of bottom ash generated at the Mitchell Plant. The Complex lies to the south of the Mitch Power Plant, with WV Route 2 bordering it on the east, and railroad tracks an the Ohio River bordering it on the west. Typical section and a plan view of the Bottom Ash Complex are included in ***Appendix A***.

The Bottom Ash Pond is constructed using a side-hill configuration applying both incised pond and diked pond construction methods. The berm is constructed of a granular soil with a PVC liner on the upstream slope. The liner is overlain with approximately 2 to 3 feet of composite soil and is vegetated on top for erosion control. The impoundment has a crest elevation of 690 feet. The impoundment's upstream and downstream slopes are 3H:1V with a crest width of 20 feet. According to information provided by AEP, the Bottom Ash Pond has an approximate area

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of 10.2 acres. At the time of inspection, the pool elevation was at 676 feet with approximately 14 feet of freeboard. The Bottom Ash Pond is made up of two wet ponds and a slightly higher dry area in the southeast corner for the removal of the bottom ash. The two wet ponds are separated by a low berm running north-to-south while several fingers jut out into the pond from the center berm. The southern downstream slope of the Bottom Ash Pond is also the northern upstream slope of the Clear Water Pond, and vice-versa.

The Clear Water Pond is constructed as the Bottom Ash pond, using a side-hill configuration. The berm is constructed of a granular soil with a PVC liner on the upstream slope. The liner is overlain with approximately 2 to 3 feet of composite soil and is vegetated on top for erosion control. The impoundment has a crest elevation of 675 feet. The impoundment's upstream and downstream slopes are 3H:1V with a crest width of 20 feet. According to information provided by AEP, the Bottom Ash Pond has an approximate area of 6.8 acres. At the time of inspection, the pool elevation was at 664.2 feet with approximately 10 feet of freeboard.

Bottom ash is sluiced from the Plant into the northeastern corner of the Bottom Ash Pond. Waste water flows from the east to the west portions of the pond through a splitter dike that runs under the center berm. Overflow from the western portion of the Bottom Ash Pond flows to the Clear Water Pond through a 30-inch diameter pipe. The Clear Water Pond outlet flows to the Ohio River from a 36-inch corrugated metal pipe.

Based on the field reconnaissance, a review of USGS maps and aerial photographs, and the Pennsylvania Department of Environmental Protection (PADEP) hazard classification, the Bottom Ash Pond and Clear Water Pond have been classified by the Independent Engineer as significant hazard potential structures, due to the environmental damage that would be caused by misoperation or failure of the structure. The location information for the impoundments is summarized in ***Tables 2-2 and 2-3***. Coordinates are located at the center of the impoundments.

TABLE 2-2
BOTTOM ASH POND LOCATION DATA

	DEGREES	MINUTES	SECONDS
LONGITUDE	39	49	30
LATITUDE	80	48	56
STATE	West Virginia	**COUNTY**	Marshall

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TABLE 2-3
CLEAR WATER POND LOCATION DATA

	DEGREES	MINUTES	SECONDS
LONGITUDE	39	49	25
LATITUDE	80	48	54
STATE	West Virginia	**COUNTY**	Marshall

2.2 SUMMARY OF STANDARD OPERATING PROCEDURES

2.2.1 Purpose of the Project

The Mitchell Power Station is a coal-fired power plant along the Ohio River, south of Moundsville, Marshall County, West Virginia. CCW byproducts are sluiced to onsite storage ponds or an offsite fly ash pond. The Conner Run Dam was constructed to provide long-term disposal for fly ash generated by the Mitchell and Kammer Power Plants.
The Bottom Ash Complex was constructed to provide disposal capacity of bottom ash generated at the Mitchell Plant.

To date, there have been no failures, overtopping events, or uncontrolled releases into the Ohio River from any of the CCW impoundments.

2.2.2 Current Inspection Schedule

The current inspection schedule for the structures at the Mitchell Power Plant are as follows:

- **Visual Inspection by Site Staff**: Performed monthly by AEP site personnel.
- **Engineering Inspection**: An annual inspection of all CCW impoundments performed by AEP Engineering Staff in conjunction with the WVDWWM.
- **MSHA Inspection**: An annual of the Conner Run Dam (only) performed by the MSHA.

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2.3 MODIFICATIONS CONDUCTED FOR PROJECT SAFETY

No known safety improvements have been conducted since construction of the facility.

2.4 ENGINEERING INFORMATION

The following documents provided by AEP were reviewed in the preparation of this Report:

- "Proposed Dam Raising Stages 8 Through 10," Conner Run Dam and Fly Ash Retention Pond, August 18, 2004.
- "Design Modifications and Response to MSHA Comments," Conner Run Dam, December 20, 2005.
- "Annual Inspection Report, Conner Run Fly Ash Dam," October 2008.
- "Monitoring and Emergency Action Plan and Maintenance Plan," Conner Run Fly Ash Impoundment Dam, December 2007.
- "Site Inspection and Observation Report," Conner Run Dam and Fly Ash Impoundment, March 11, 2009.
- "Response to WVDWWM Order Number DS2009-0001 (Item 2)," Conner Run Dam and Fly Ash Impoundment, March 16, 2009.
- "Response to WVDWWM Order Number DS2009-0001 (Item 3)," Conner Run Dam and Fly Ash Impoundment, March 18, 2009.
- Conner Run Weekly Impoundment Inspection Forms.
- "Dike Inspection Report, Bottom Ash Complex, October 2008.
- "Response to WVDWWM Order Number DS2009-0001 (Item 2)," Mitchell Bottom Ash Complex, March 18, 2009.
- "Response to WVDWWM Order Number DS2009-0001 (Item 3)," Mitchell Bottom Ash Complex, March 18, 2009.
- "Site Inspection and Observation Report," Mitchell Bottom Ash Complex, March 22, 2009.
- Mitchell Plant Dam and Dike Inspection Checklists.

Documentation reviewed as a part of the inspection included design stability calculations for normal, seismic, and flood loading conditions, the construction drawings for the Ponds, and the Hydrologic Study. The review of these documents did not include a detailed check of calculations; however, assumptions made in the analysis, such as loading conditions and material

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properties, were well-documented, and the assumptions and results of the analyses appeared reasonable to the reviewers.

2.4.1 Geologic Conditions

A review of geologic maps of the project area compiled by the West Virginia Geologic and Economic Survey in 1969 entitled "Geologic Map of West Virginia" indicates that the bedrock units underlying the Site belong to the Pennsylvanian Formation. The rock in the Pennsylvania Formation consists of cyclic sequences sedimentary rocks consisting of sandstone, shale, clay, coal, and limestone.

According to existing geotechnical reports provided by AEP, the dike structures for the Bottom Ash Complex consist primarily of loose to very dense clayey, silty, sands. The dike foundation consists of loose to very dense sands and gravels. The estimated vertical and horizontal permeabilities of the dike material range from 6.0×10^{-4} centimeters per second (cm/sec) to 5.4×10^{-3} cm/sec and the estimated vertical and horizontal permeabilities of the foundation soil range from 1.4×10^{-3} to 1.2×10^{-2} cm/sec. These values were used in seepage analyses of the Bottom Ash Complex performed by Geo/Environmental Associates, Inc. (GA).

At the request of WVDWWM, GA performed a review of the available coal mine mapping in the area of the Bottom Ash Complex and found that the boundary of the abandoned Woodland Mines exists approximately 102 feet (horizontally) from the downstream toe of the eastern embankment of the Bottom Ash Pond and about 130 feet below drainage. GA checked to confirm that the Bottom Ash pond was outside of the zone of influence of the Woodland Mines.

According to existing geotechnical reports provided by AEP, the Conner Run Dam is constructed on bedrock and is made up of a clay foundation (starter dam), a clay core, a upstream course refuse shell (mine gob), and a downstream coarse coal refuse shell, as shown on ***Figure 2-1***. Part of the rebuild is constructed on existing fly ash/fine refuse in the impoundment. The estimated vertical and horizontal permeabilities of the various zones is presented in ***Table 2-4***. These values were determined by a seepage analysis of the Conner Run Dam performed by GA.

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TABLE 2-4
EMBANKMENT MATERIAL PERMIABILITIES

MATERIAL TYPE	VERTICAL PERMIABILITY, k_v (ft/sec)	HORIZONTAL PERMIABILITY, k_h (ft/sec)
Course Refuse	$9.5x10^{-5}$	$8.6x10^{-4}$
Fly Ash/Fine Refuse	$9.2x10^{-8}$	$9.2x10^{-6}$
Clay Core Fill	$3.3x10^{-9}$	$3.0x10^{-8}$
Clay Foundation	$3.3x10^{-9}$	$3.0x10^{-8}$
Bedrock	$3.3x10^{-10}$	$3.0x10^{-9}$

At the request of WVDWWM, GA performed an evaluation of the abandoned Woodland Mine and McElroy Mine beneath the Conner Run Dam and the fly ash impoundment. The evaluation included subsidence analysis, roof caving approximations, and pillar crushing calculations. The results of the subsidence analysis predicted a maximum tensile strain ranging from 0.014 millistrains to 0.3 millistrains and a maximum vertical displacement at the ground surface ranging from 0.09 feet to 0.21 feet. This falls within the recommended allowable ground surface tension of 5.0 millistrains. The estimated subsidence due to the this strain would result in 3.5 percent deflection in the 72-inch diameter overflow pipe, which is less than the recommended maximum of 5 percent. Pillar-crushing factor of safety calculations were performed for the area under the embankment and the area under the impoundment. The results showed that most pillars had a factor of safety greater than 1.5, but there were pillars with factors of safety less than 1.5 and some less than 1.0. Through further analysis, however, GA determined that failure of the suspect pillars would not develop into a progressive failure and therefore should not have a significant impact on either the impoundment or the dam. GA's roof caving calculations determined that the maximum roof collapse propagation was less than the minimum rock cover over the mine workings, and that the remaining rock cover would remain intact in the event of significant roof caving.

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2.4.2 Slope Stability Analyses

2.4.2.1 Conner Run Dam

Several slope stability analyses of the Conner Run Dam have been performed over the past five years for the dam raise project. Stability analyses were performed for several embankment profiles and at different stages of the multi-stage dam raise project.

A series of stability analyses were recently prepared by GA on the main embankment profile for Conner Run Dam in the report dated March 16, 2009. For the analyses, GA looked at the upstream and downstream slopes for both static and dynamic (pseudo-static) loading conditions. For the dynamic analyses a horizontal seismic coefficient 0.05g was used. The phreatic surface used in the analyses was approximated based on the seepage analysis that was performed.

Strength parameters for the embankment and foundation materials were obtained from laboratory tests performed by AEP and from the design report prepared by AEP, dated December 1988. The soil strength parameters are included in ***Table 2-5***.

TABLE 2-5
CONNER RUN DAM SOIL STRENGTH PARAMETER

MATERIAL	MOIST UNIT WEIGHT (PCF)	SAT. UNIT WEIGHT (PCF)	EFFECTIVE STRENGTH PARAMETERS	
			COHESION (PSF)	FRICTION ANGLE (DEGREES)
Course Refuse	115	120	0	32
Fly Ash/Fine Refuse	85	90	0	28
Clay Fill	123	128	600	15
Clay Foundation	123	128	200	20
Bottom Ash Drain	110	110	0	36
Bedrock	168	168	10,000	39

The analyses were performed for recommended minimum factors of safety required by WVDWWM:

- Static Loading Condition: 1.5
- Dynamic Loading Condition: 1.2

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The analyses were performed following the Morgenstern-Price method and the computer program, SLOPE/W. A total of six separate stability runs were performed, including static and dynamic analyses of a failure plane through the upstream slope, through the downstream shell of the dam, and through the built up refuse berm. The results of the analyses are presented in ***Table 2-6***. Graphical results of the stability analyses are included in ***Appendix D***.

TABLE 2-6
CONNER RUN DAM STABILITY ANALYSES RESULTS

EMBANKMENT SECTION	STATIC	SEISMIC
Downstream (Failure through Conner Run Dam d/s Shell)	3.17	2.45
Downstream (Failure through Refuse Berm)	2.13	1.79
Upstream	1.92	1.53

The results show that for the main embankment the required factors of safety are exceeded for all load cases. On the upstream slope, however, RIZZO is not certain if a deeper failure plane, which passes through the fly/ash, was analyzed in the 2009 analysis.

In 2006 a series of stability analysis were performed for the modified Conner Run Dam Stages 9B, 9C, 9D, 9E, and 9F for four separate embankment profiles, also prepared by GA. All the same parameters were used, including the soil strength data, seismic conditions, and phreatic surface. In this analysis, GA specifically looked at the upstream slope with residual strength parameters for the fly ash/fine refuse material. A residual strength of 100 psf and friction angle of 0° was used for the fly ash for failure during a liquefaction event. For the same embankment profile as the 2009 analysis, the results of the stability analysis for a deep failure plain through the fly ash are provided in ***Table 2-7***. Graphical results of the stability analyses are included in ***Appendix D***.

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TABLE 2-7
CONNER RUN DAM 2006 STABILITY ANALYSES RESULTS
(RESIDUAL STRENGTH OF LIQUEFIED FLY ASH)

EMBANKMENT SECTION	STAGE	FOS
Upstream (Deep failure through the fly ash with residual strength)	9B	1.44
Upstream (Deep failure through the fly ash with residual strength)	9C	1.53
Upstream (Deep failure through the fly ash with residual strength)	9D	1.29
Upstream (Deep failure through the fly ash with residual strength)	9E	1.07
Upstream (Deep failure through the fly ash with residual strength)	9F	1.01

The results of the analyses show a minimum factor of safety of 1.01 for the upstream slope for liquefaction conditions. However, it should be stated that a recent assessment of the fly ash material from a lab analysis performed by Ohio State University indicated that the material is not susceptible to liquefaction during the design seismic event. In addition, field vane shear tests that were performed on fly ash from the bottom of borehole B04-1 yielded a remolded strength exceeding 200 psf.

2.4.2.2 Bottom Ash Complex

A series of stability analyses were recently prepared by GA on the embankments of the Bottom Ash Pond and Clear Water Pond (report dated March 18, 2009). Five separate embankment profiles (SP1-SP5) were analyzed for both static and dynamic (pseudo-static) loading conditions. Stability analyses were performed for the upstream and downstream slopes of all profiles except SP1. SP1 was only analyzed along the upstream slope. For the dynamic analyses, a horizontal seismic coefficient of k = 0.05g was used. The phreatic surfaces used in the analyses were conservatively modeled based on the preatic levels predicted in the seepage analysis. For analyses in the downstream direction, the phreatic surfaces were based on the maximum design storm pool elevation, while the upstream analyses were based on the normal operating pool levels. The Bottom Ash pond was analyzed assuming the pond was filled with only water and no CCW.

Strength parameters for the embankment and foundation materials were obtained from laboratory tests performed by GA, and are summarized in ***Table 2-8***. Graphical results of the stability analyses are included in ***Appendix D***.

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TABLE 2-8
BOTTOM ASH COMPLEX SOIL STRENGTH PARAMETER

MATERIAL	MOIST UNIT WEIGHT (PCF)	SAT. UNIT WEIGHT (PCF)	EFFECTIVE STRENGTH PARAMETERS	
			COHESION (PSF)	FRICTION ANGLE (DEGREES)
Soil Fill Dike	124	134	300	29
Foundation Soil	120	130	0	34
Soil Dike Liner	121	131	900	0

The analyses were performed for recommended minimum factors of safety required by WVDWWM:

- Static Loading Condition: 1.5
- Dynamic Loading Condition: 1.2

The analyses were performed following the Morgenstern-Price method and the computer program, SLOPE/W. A total of 18 separate stability runs were performed, static and dynamic for all slopes. The results of the analyses are presented in ***Table 2-9.***

TABLE 2-9
BOTTOM ASH COMPLEX STABILITY ANALYSES RESULTS

PROFILE	STATIC	SEISMIC
SP1, Upstream	2.70	2.30
SP2, Upstream	3.18	2.62
SP2, Downstream	2.35	2.06
SP3, Upstream	3.23	2.68
SP3, Downstream	2.12	1.88
SP4, Upstream	2.95	2.46
SP4, Downstream	2.10	1.81
SP5, Upstream	3.24	2.65
SP5, Downstream	3.71	3.05

The results show that for the main embankment the required factors of safety are exceeded for all load cases and all structures.

2.4.3 Hydrologic Analyses

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GA's 2006 Report, "Design Modifications and Responses to MSHA Comment," presented a Hydraulics and Hydrology Study, which looked at flood routing for Conner Run Dam. The design storm used in the analysis was the 72-hour Probable Maximum Flood (PMF). The flood routing was modeled through the 72-inch diameter overflow pipe. A summary of the flood routing analysis is provided in ***Table 2-10***. The analysis showed that the facility is capable of decanting 90 percent of the peak storage volume within the 10 day requirement and maintain a freeboard of 3 feet for dam raise Stages 9B/9C and 9D. Stages 9E and 9F were not capable of meeting the 10 day requirement, but were capable of providing a minimum freeboard of 3 feet in the event of a second 72-hour PMF occurring 10 days after the peak stage of the first PMF.

TABLE 2-10
SUMMARY OF FLOOD ROUTING ANALYSIS

STAGE	EMBANK. CREST ELEV. (FT)	NORMAL POOL/ SPILLWAY ELEV. (FT)	PEAK INFLOW DURING PMF (CFS)	PEAK OUTFLOW DURING PMF (CFS)	PEAK STAGE DURING PMF (CFS)	MINIMUM FREEBOARD DURING PMF (CFS)	DAYS TO DECANT 90% OF PEAK STORAGE VOLUME
9B/9C	980	962	21193	477	976.19	3.81	7.0
9D	1000	984	21054	444	996.25	3.75	8.8
9E	1025	1010	21140	413 (1st PMF)	1020.60 (1st PMF)	4.40 (1st PMF)	10.8
				428 (2st PMF)	1021.42 (2st PMF)	3.58 (2st PMF)	NA
9F	1050	1036	21230	390 (1st PMF)	1045.48 (1st PMF)	4.52 (1st PMF)	12.6
				410 (2st PMF)	1046.45 (2st PMF)	3.55 (2st PMF)	NA

As part of the design modifications, GA provided ditch designs for the modified embankment conditions for a 100-year, 24-hour storm event. GA also updated the design of the sedimentation structures to meet the new criteria.

GA conducted a hydrology analysis for their 2009 Site Inspection and Observation Report for the Bottom Ash Pond and Clear Water Pond. The design storm used in the analysis is one half of the 6-hour Probable Maximum Precipitation (PMP) event. The impoundments are raised dikes above ground level; therefore, the only inflow into the Ponds is waste water from the Plant. There is no storm runoff from a watershed. The maximum design storm raises the pool elevation

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of the Bottom Ash Pond from the normal operating pool elevation of 676 feet by 2.37 feet, and the pool elevation of the Clear Water Pond from the normal operating pool elevation of 664 feet by 2.5 feet.

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3.0 FIELD INSPECTION

3.1 FIELD INSPECTION OBSERVATIONS

The Site inspection was conducted on September 3, 2009. The inspection team consisted of representatives from AEP, the USEPA, and RIZZO. The team stopped at each of the Project features to inspect the structures and the surrounding area. Particular attention was paid to Site features that may contribute to typical failure modes of embankment structures, such as settlement, seepage, and slope stability. Photographs taken during the Site inspection are provided in ***Appendix C***, and their locations are shown on ***Figures 3-1 and 3-2***.

The individuals participating in the inspection were:

Gary F. Zych, P.E.	AEP – Environmental Services
Dana E. Limes	AEP – Environmental Services
Jeff W. Palmer	AEP – Krammer/Mitchell
Ted Carpenter	AEP – Krammer/Mitchell
Wayne L. Irons	AEP – Krammer/Mitchell
Chester A. Smith Jr.	AEP – Krammer/Mitchell
Craig Dufficy	USEPA
John P. Osterle, P.E.	RIZZO – Independent Engineer
Kevin R. Cass, P.E.	RIZZO

3.1.1 Conner Run Dam

The Conner Run Dam was under construction at the time of inspection as part of an effort to raise the crest of the dam for increased storage capacity. Aside from grading and equipment associated with the construction activities, the dam was found to be well-maintained and in good condition at the time of inspection. The upstream embankment was clear of vegetation with no signs of settlement, sloughing, or sliding. The width of the existing crest varies from about 300 feet to 600 feet, and was well-maintained, given the current construction (**Photographs 2 through 5**). There were no signs of any wet or soft ground and no signs of sliding. Because of the 800-foot-wide coarse refuse berm covering the downstream embankment, the slope and toe were not visible for inspection. The refuse berm itself appeared in good condition (**Photograph 8 and 9**), with no signs of sliding or erosion. The upper benches and slop of the berm were lightly vegetated, while the lower benches were more so (**Photograph 13**).

The only inflows to the impoundments include the slurry, which is pumped in, and storm runoff.

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The overflow structure was in good condition (**Photograph 6**). The concrete structure showed no signs of cracking or distress, and the trashrack was free of debris or other obstructions. The concrete tail wall of the outlet was in good condition with no major damage and only minor staining (**Photograph 10).** The grouted riprap of the discharge channel was in good condition with only some minor shrinkage cracks. Some isolated voids of about 3 inches were observed in a few locations, most likely from where pieces of rock or grout broke away. Some vegetation was observed growing in the edge of the grouted riprap and at the waterline in the channel (**Photograph 12**). Thicker vegetation was observed at the inlet and outlet of the impact basin. Some sparse vegetation was observed growing in the impact basin itself (**Photograph 14**). The concrete for the impact basin was in good condition. No major cracks or spalling were observed.

3.1.2 Bottom Ash Pond

At the time of inspection, the Bottom Ash Pond appeared to be well-maintained and in good condition. The Site inspection team traversed the area of the impoundment, concentrating on the crest, the upstream and downstream slopes, the toe and the overflow structures. The crest of the berm showed no signs of significant damage, with only some minor rutting along the crest of the eastern embankment along the tree line (**Photograph 19**). There were some uneven surfaces and rain ruts along the downstream slope of the impoundment, but were no signs of settlement or sliding. The upstream slope was in good conditions with no signs of slope instability, wet areas, or erosion.

Vegetation control along the upstream and downstream slopes was considered to be good. Some heavier vegetation was observed along the waterline of the pond and at the overflow structure located on the upstream slope of the south embankment (**Photographs 25, 26 and 32**). Significant vegetation and signs of erosion were observed along the center berm and fingers within the impoundment, but are not considered a hazard to the safety of the impoundment. A small wet zone was found at the toe of the northwest corner of the impoundment (**Photographs 28 and 29**). The source of the water is unknown and could just be ponded surface water. No other seepage was observed. A line of trees exists along the downstream slope of east embankment (**Photograph 19**). This slope exists well above the normal pool elevation, and the trees do not pose a hazard to the safety of the impoundment. The upstream slope of the eastern bank (area where the pond is incised) is quite steep, with some more significant erosion in the northeast corner (**Photograph 20**). Though we do not think this is a stability problem for the upstream slope, it could be safety hazard for the equipment operators handling the ash removal in the area.

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The only inflows to the impoundment include the slurry, which is pumped in from the plant, and storm runoff. The overflow structure and skimmer was in good to fair condition (**Photograph 33**). The concrete showed no signs of cracking, and the water was free-flowing. Some rust and corrosion were present on the stop log components.

The dikes containing the metal cleaning tank secondary containment basin were looked at as well (**Photograph 30**). The vegetation around the secondary containment basin was little heavier, but the embankment looked in good condition, with no signs of erosion or sliding. The exposed PVC liner on the upstream slope looked to be in good condition.

3.1.3 Clear Water Pond

At the time of inspection, the Clear Water Pond appeared to be well-maintained and in good condition. The Site inspection team traversed the area of the impoundment, concentrating on the crest, the upstream and downstream slopes, the toe, and the overflow structures. The crest of the berm showed no signs of significant damage, with only some minor rutting along the crest of the southern embankment (**Photograph 38**). There were some uneven surfaces and rain ruts along the downstream slope of the impoundment, but no signs of settlement or sliding. The upstream slope was in good conditions with no signs of slope instability, wet areas, or erosion.

Vegetation control along the upstream and downstream slopes was considered to be good. Some heavier vegetation was observed along the waterline of the pond. No seepage was observed along the toe or along the downstream slope. A small animal borrow was discovered along the west upstream embankment about five feet from the water line that should be taken care of (**Photograph 39**).

The only inflows to the impoundment include the waste water that flows in from the Bottom Ash Pond and storm runoff. The overflow structure was in good condition (**Photograph 40**). The concrete showed no signs of cracking or distress, and the water was free-flowing. Water was observed at the outlet discharging into the Ohio River. Some corrosion was observed along the metal walkway to the outlet structure. It appears to be about the same as was previously reported in past inspections.

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4.0 ANALYSIS

4.1 SAFETY, OPERATIONS, AND MAINTENANCE

The stability of the embankments for each management unit was analyzed as described in ***Section 2.4.2*** of this Report. The resulting factors of safety exceed the requirements for all load cases. Our review of available published geologic information and the seepage analysis for the Site generally agree with the range of soil parameters and phreatic surfaces used in the stability analyses. For Conner Run Dam, a large portion of the upstream slope has been built upon the existing fly ash/fine refuse material within the impoundment for the dam raise project. The use of residual strength parameters for lab and filed test for the fly ash are important in determining the structural stability of the upstream slope of the dam against sliding, since the upstream slope presents a higher risk of failure than the downstream slope. The factor of safety of 1.01 obtained from the analyses is conservative, considering that field tests have shown the residual strength of the fly ash to be twice of that which was used, and according the lab test, the material may not even be subject to liquefaction. The coarse refuse berm that was placed along the downstream slope of the dam significantly increases the slope stability factor of safety of the embankment. Although the berm makes it difficult to inspect the downstream toe of the dam for seepage, AEP has a well-designed plan for controlling and monitoring the seepage at the site, which is described in ***Section 4.3***. We conclude that the embankment has an adequate factor of safety against slope instability. For the Bottom Ash Complex, the Bottom Ash Pond and Clear Water Ponds appear to be well-maintained, and from our review of the stability and the adequate structural performance of the embankments thus far, we conclude that the embankments have an adequate factor of safety against slope stability. These assessments are consistent with the evaluations performed by GA and the WVDWWM.

The hydrologic analyses reported in ***Section 2.4.3*** were reviewed by RIZZO. Waste material is currently sluiced into the ponds, and additional inflow into the pond is from storm runoff. The reported analysis assumes a 72-hour PMF for the design flood. We conclude that the management units have adequate protection against a failure due to overtopping. All stages of the dam raise project are capable of maintaining the required minimum freeboard during the design flood. Though Stages 9E and 9F were not capable of decanting 90 percent of the peak storage volume within the required time, GA's analysis showed that they were able to handle a second PMF event while still maintaining the minimum required freeboard. Therefore, we conclude that the management units have adequate protection against a failure due to overtopping.

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4.2 DESIGN AND OPERATION CHANGES

There have been no changes to the design or operation of the Bottom Ash Complex. Conner Run Dam is currently in the process of a multi-stage construction effort to raise the crest of the Dam to allow for more storage capacity in the Fly Ash pond. These modifications have been underway since the dam was originally constructed in 1969.

4.3 INSPECTION AND MONITORING

As described in ***Section 1.3***, the management units are inspected on a regular basis by plant personnel, AEP, WVDWWM, and the PADEP.

There was no instrument data to review as part of the inspection of the Bottom Ash Complex. The only consistent measurement is the water surface elevation which, according to AEP, remains fairly constant due to the fixed position of the overflow weirs at both ponds. Four standpipe piezometers were installed around the Bottom Ash Complex. Locations are indicated on the Site drawings included in ***Appendix A***. RIZZO is unaware of any routine monitoring plan established for reading the instruments.

At the Conner Run Dam, AEP has installed 13 standpipe piezometers, 2 pneumatic piezometers, and a magnetic ring extensometer. Locations are indicated on the Site drawings included in ***Appendix A***. These instruments are read on a weekly basis as part of the Site's routine construction inspection. AEP also monitors the flow through the outlet channel and obtains seepage/runoff flow data from Consol Energy. Seepage flow from the underdrains, which discharges downstream of the dam, as well as several locations where minor controlled seepage is being monitored, is all measured on a weekly basis by AEP. Time-versus-reading graphs for the instrumentation were included in GA's Site Inspection and Observation Report for Conner Run Dam dated March 11, 2009. The instrumentation data from the report has been included in ***Appendix E***.

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5.0 RECOMMENDATIONS/CONCLUSIONS

Based on our review of the engineering documentation, inspection reports, and the results of our field inspection, we conclude that the Conner Run Dam and Bottom Ash Complex impoundments are structurally sound and all are in Satisfactory condition as defined by the USEPA (i.e., no existing or potential management unit safety deficiencies are recognized). Acceptable performance is expected under all applicable loading conditions (static, hydrologic, seismic) in accordance with applicable criteria. Minor maintenance items may be required.

The following recommendations were generated during the preparation of this Inspection Report. All of the recommendations are considered dam safety items. Each recommendation is presented below, along with a proposed schedule to address the recommendation.

We recommend Site personnel continue to perform required maintenance and monitoring activities at the Bottom Ash Complex as outlined by the approved Maintenance Plan. Specific locations where maintenance may be needed are noted in ***Sections 3.1.2 and 3.1.3***. This includes maintaining vegetation control measures on both the upstream and downstream slopes of the impoundments as part of a regular maintenance routine. Animal burrows should be identified and repaired as necessary to prevent potential seepage issues in the embankments. We recommend that routine maintenance be performed to control erosion along the crest and slopes of the impoundments. This includes periodic grading of the slopes to repair zone of erosion and uneven surfaces and grading of the crest to remove ruts and to promote proper drainage. The upstream slop of the eastern Bottom Ash Pond should be graded and repaired for the safety of equipment operators working in the bottom ash loading/hauling area. AEP should monitor the wet zone at the northwest toe of the Bottom Ash pond to determine the source, since the issue has been noted in several past inspections of the facility.

The four standpipe piezometers that were installed around the Bottom Ash Complex should kept clear and marked accordingly. We recommend a regular monitoring schedule be established for the instruments to monitor pore water levels. The piezometers should be read at a set interval and when significant changes in the pool water elevation occur.

Schedule: According to AEP's current Maintenance Program.

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FIGURES

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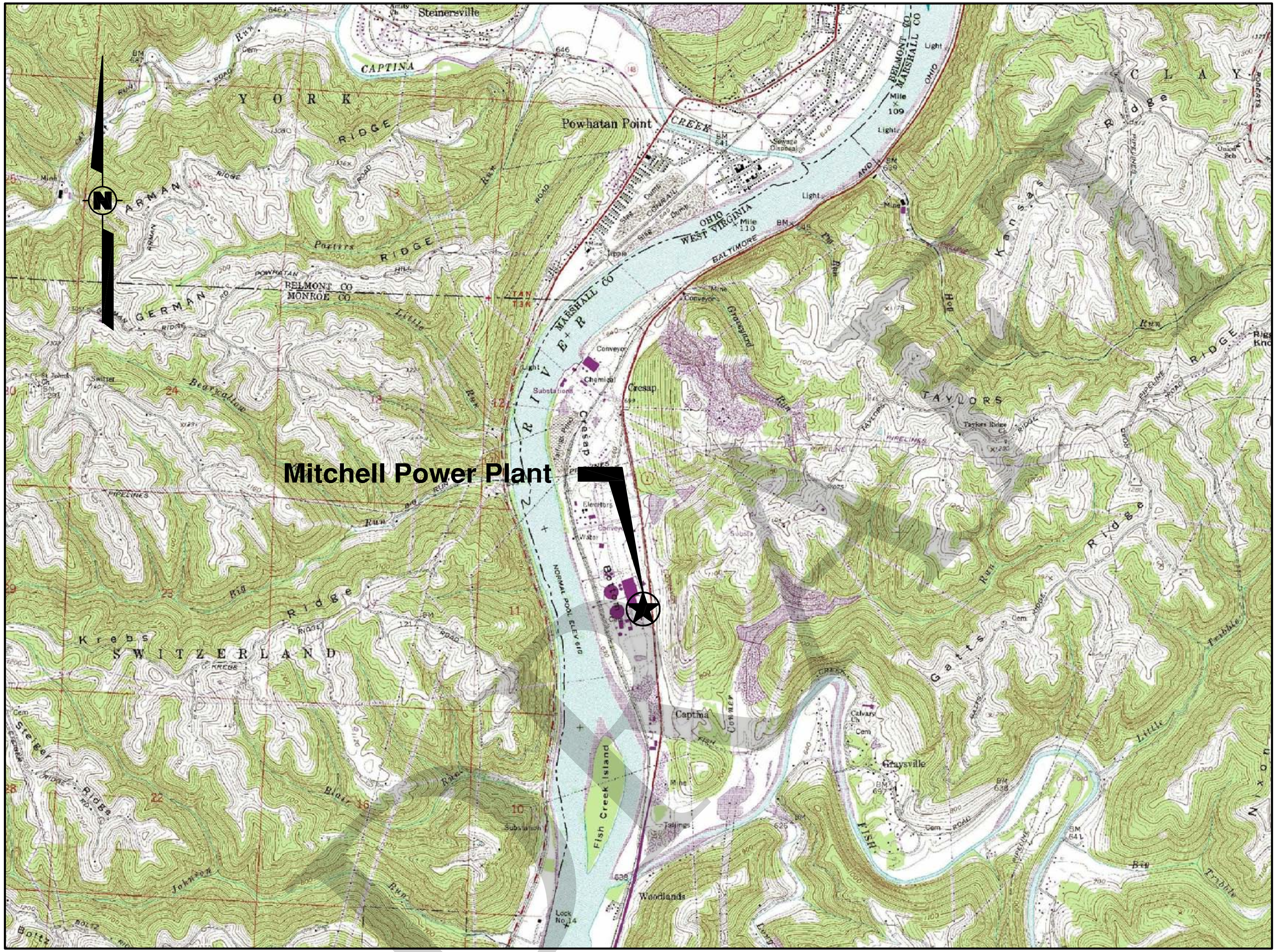

REFERENCE:
U.S.G.S. 7.5 MIN. TOPOGRAPHIC MAP,
POWHATAN POINT, OHIO

FIGURE 1–1

SITE VICINITY MAP
MITCHELL POWER PLANT
CCW IMPOUNDMENT ASSESSMENT
PREPARED FOR

USEPA
WASHINGTON, D.C.

Paul C. Rizzo Associates, Inc.
ENGINEERS & CONSULTANTS

CAD FILE NUMBER: 09–4157–B3(M)

CHECKED BY / APPROVED BY: KRC 9/26/09

DRAWN BY

PLOT 1=1

US EPA ARCHIVE DOCUMENT

CAD FILE NUMBER	09-4157-B3(M)
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PLOT	1=1

REFERENCE:
ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE (ESRI), 2009, USA PRIME IMAGERY

DRAFT

FIGURE 1-2

SITE FEATURES
MITCHELL POWER PLANT
CCW IMPOUNDMENT ASSESSMENT
PREPARED FOR

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WASHINGTON, D.C.

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ENGINEERS & CONSULTANTS

REFERENCE:
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FIGURE 1-3

CONNER RUN DAM FEATURES
MITCHELL POWER PLANT
CCW IMPOUNDMENT ASSESSMENT
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REFERENCE:
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FIGURE 1-4

BOTTOM ASH COMPLEX FEATURES
MITCHELL POWER PLANT
CCW IMPOUNDMENT ASSESSMENT
PREPARED FOR

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WASHINGTON, D.C.

Paul C. Rizzo Associates, Inc.
ENGINEERS & CONSULTANTS

PLOT	DRAWN BY		CHECKED BY	APPROVED BY		CAD FILE NUMBER
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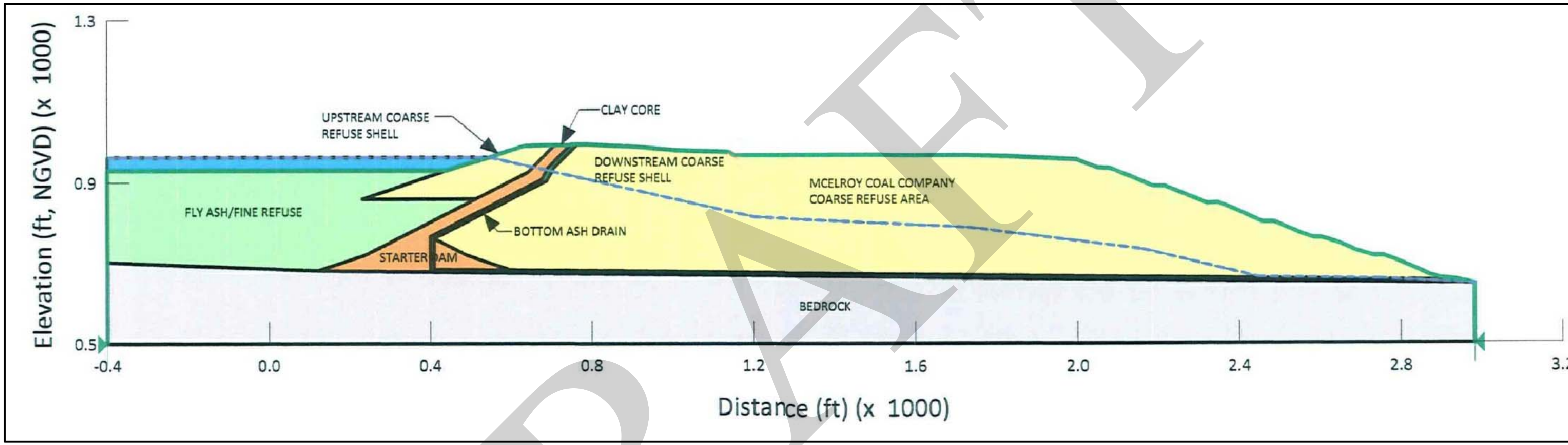

TYPICAL SECTION

AS–BUILT CONDITIONS, MARCH 2009

(N.T.S.)

FIGURE 2–1
TYPICAL SECTION
CONNER RUN DAM
MITCHELL POWER PLANT
CCW IMPOUNDMENT ASSESSMENT
PREPARED FOR

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WASHINGTON, D.C.

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CAD FILE NUMBER	09–4157–B3(M)
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CAD FILE NUMBER	09-4157-B3(M)
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KRC 9/26/09	
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PLOT 1=1	

REFERENCE:
ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE (ESRI), 2009, USA PRIME IMAGERY

FIGURE 3–1
PHOTOGRAPH LOCATION MAP
CONNER RUN DAM FEATURES
MITCHELL POWER PLANT
CCW IMPOUNDMENT ASSESSMENT
PREPARED FOR

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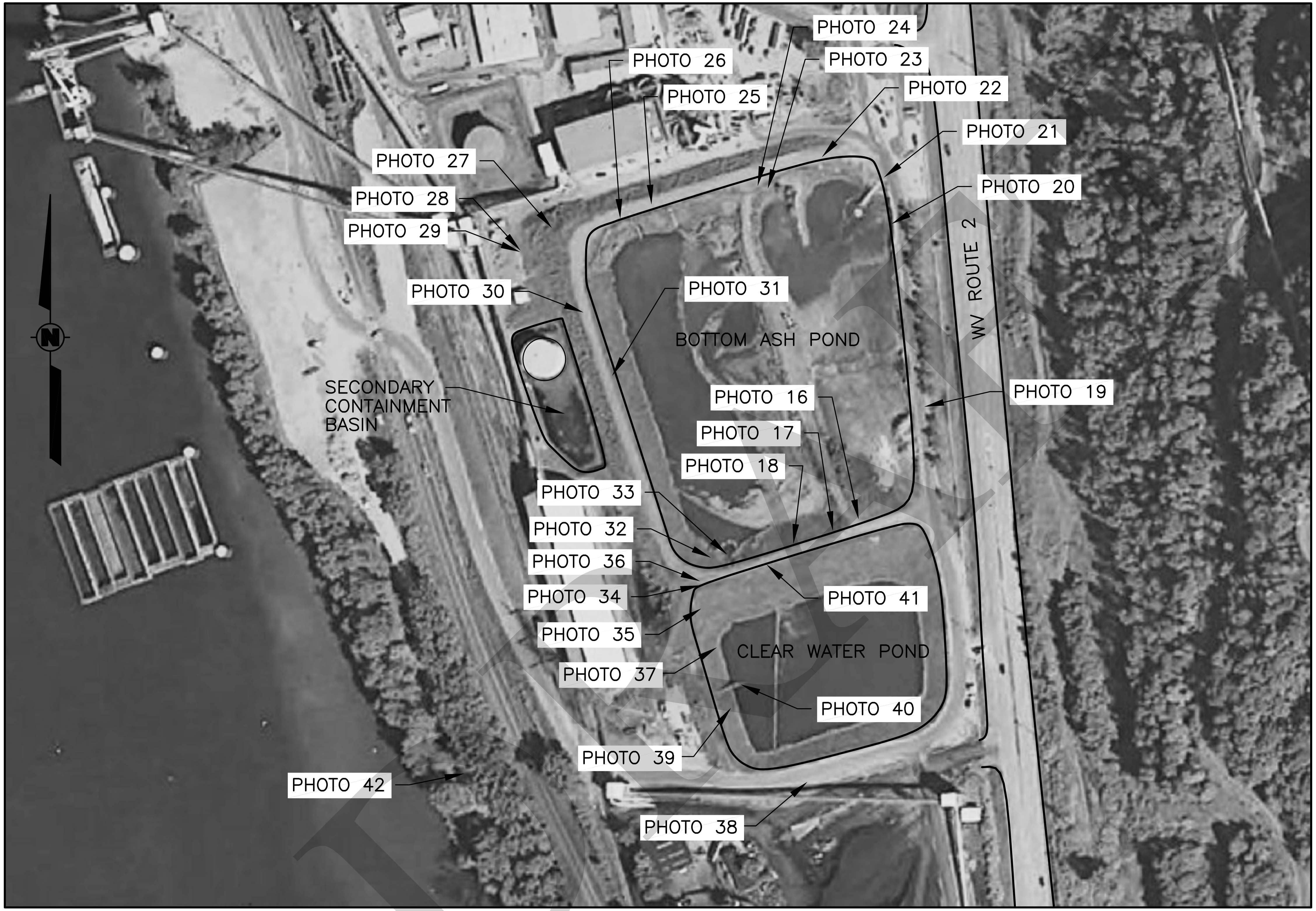

REFERENCE:
ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE (ESRI), 2009, USA PRIME IMAGERY

FIGURE 3-2
PHOTOGRAPH LOCATION MAP
BOTTOM ASH COMPLEX
MITCHELL POWER PLANT
CCW IMPOUNDMENT ASSESSMENT
PREPARED FOR

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WASHINGTON, D.C.

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ENGINEERS & CONSULTANTS

CAD FILE NUMBER	09-4157-B3(M)
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APPENDIX A

AEP DRAWINGS

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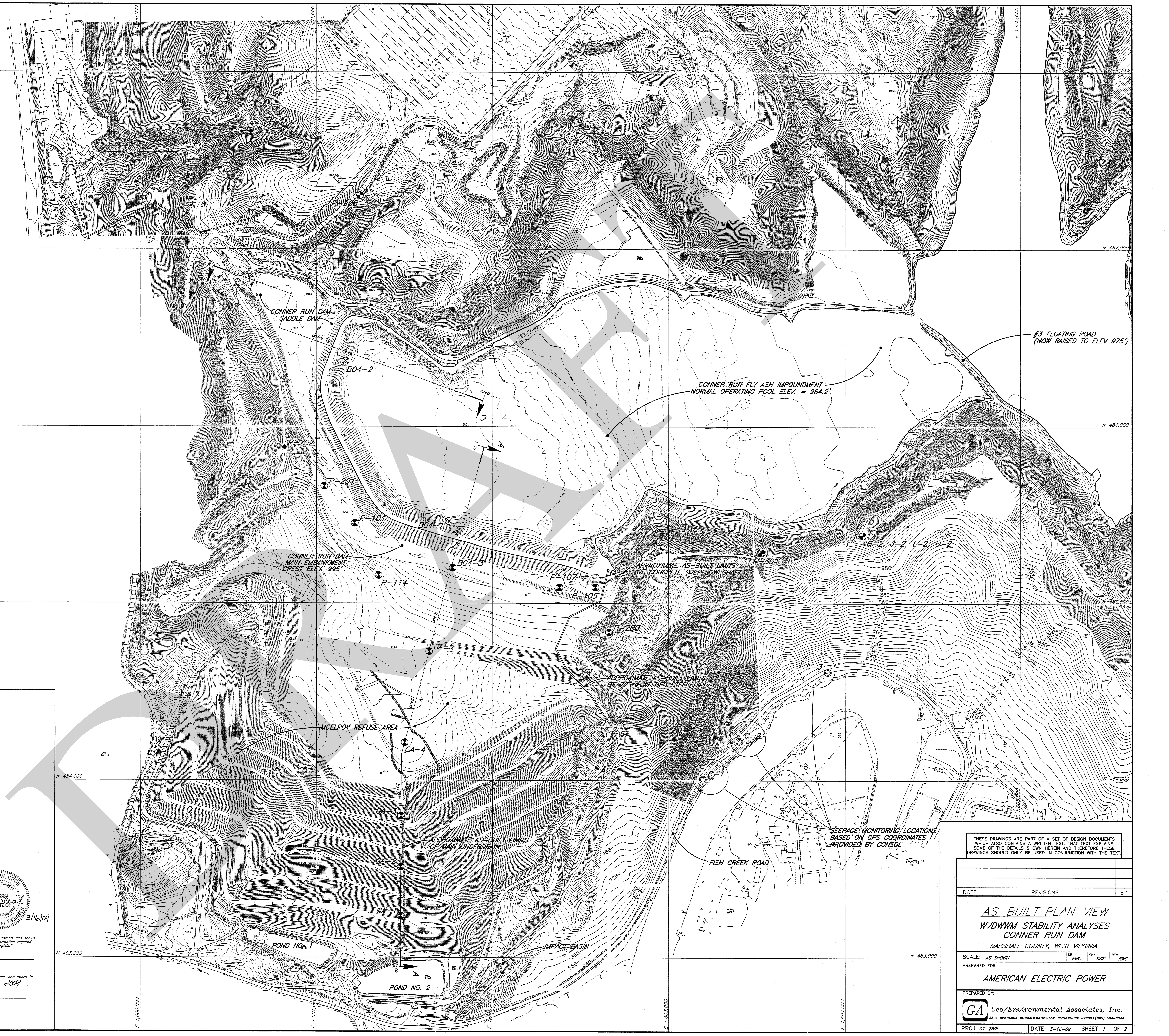


NOTES:

1. BASE TOPOGRAPHIC MAPPING PROVIDED BY CONSOL, DATED DECEMBER 30, 2008 AND BY AEPSC, DATED DATED MAY 2008 AND NOVEMBER 2001.
2. LOCATIONS SHOWN FOR PIEZOMETERS GA-4 AND GA-5 ARE BASED ON DESIGN LOCATIONS.

LEGEND

A — A PROFILE LIMITS (0+00)

EXISTING STANDPIPE PIEZOMETER

EXISTING PNEUMATIC PIEZOMETER

SEEPAGE/RUNOFF MONITORING LOCATION

SAMPLED AND CORED BORING WITH EXTENSOMETER

ROGER W. CECIL REGISTERED No. 14367 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

3/16/09

"I, the undersigned, hereby certify that this map is correct and shows, to the best of my knowledge and belief, all the information required by the surface mining laws of the State of West Virginia."

Roger W. Cecil
ROGER W. CECIL, R.P.E. No. 14367

State of Tennessee, County of Knox, taken, subscribed, and sworn to before me this 16th of March 2009

C. Elaine Ailey
Notary Public

My Commission Expires 9/8/09

C. ELAINE AILEY STATE OF TENNESSEE NOTARY PUBLIC KNOX COUNTY

THESE DRAWINGS ARE PART OF A SET OF DESIGN DOCUMENTS WHICH ALSO CONTAINS A WRITTEN TEXT. THAT TEXT EXPLAINS SOME OF THE DETAILS SHOWN HEREIN AND THEREFORE THESE DRAWINGS SHOULD ONLY BE USED IN CONJUNCTION WITH THE TEXT.

DATE	REVISIONS	BY

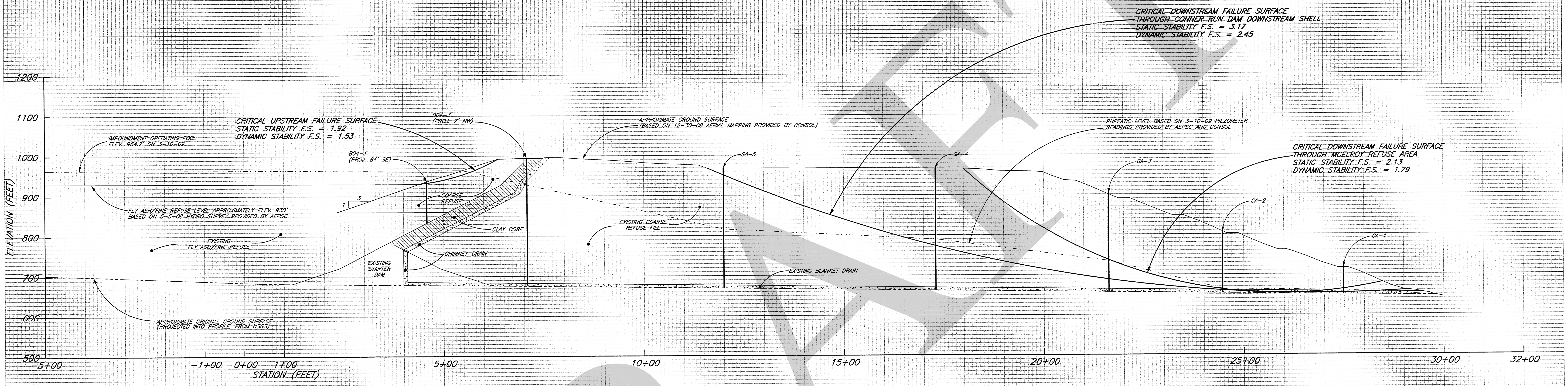
AS-BUILT PLAN VIEW
WVDWWM STABILITY ANALYSES
CONNER RUN DAM
MARSHALL COUNTY, WEST VIRGINIA

SCALE: AS SHOWN | DR RWC | CHK SWF | REV RWC

PREPARED FOR:
AMERICAN ELECTRIC POWER

PREPARED BY:
GA Geo/Environmental Associates, Inc.
3502 OVERLOOK CIRCLE • KNOXVILLE, TENNESSEE 37909 • (865) 584-0344

PROJ: 01-2691 | DATE: 3-16-09 | SHEET 1 OF 2



MAIN EMBANKMENT PROFILE A-A

NOTES

1. APPROXIMATE AS-BUILT EMBANKMENT SURFACE ADAPTED FROM AERIAL MAPPING PROVIDED BY CONSOL, DATED DECEMBER 30, 2008.
2. PHREATIC LEVEL BASED ON MARCH 10, 2009 PIEZOMETER READINGS PROVIDED BY AEPSC AND CONSOL.
3. CONNER RUN FLY ASH IMPOUNDMENT POOL LEVEL BASED ON THE MARCH 10, 2009 LEVEL OF 964.2 FEET, NGVD, PROVIDED BY AEPSC.
4. FLY ASH/FINE REFUSE LEVEL OF 930 FEET, NGVD BASED ON HYDRO SURVEY PROVIDED BY AEPSC, DATED MAY 5, 2008.

ROGER W. CECIL REGISTERED 14367 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

Roger W Cecil 3/16/09

"I, the undersigned, hereby certify that this map is correct and shows, to the best of my knowledge and belief, all the information required by the surface mining laws of the State of West Virginia."

Roger W Cecil
ROGER W. CECIL, R.P.E. No. 14367

ELAINE AILEY STATE OF TENNESSEE NOTARY PUBLIC KNOX COUNTY

State of Tennessee, County of Knox, taken, subscribed, and sworn to before me this 16th day of March, 2009.

Elaine Ailey
Notary Public

My Commission Expires 9/8/09

THESE DRAWINGS ARE PART OF A SET OF DESIGN DOCUMENTS WHICH ALSO CONTAINS A WRITTEN TEXT. THAT TEXT EXPLAINS SOME OF THE DETAILS SHOWN HEREIN AND THEREFORE THESE DRAWINGS SHOULD ONLY BE USED IN CONJUNCTION WITH THE TEXT.

DATE	REVISIONS	BY

MAIN EMBANKMENT PROFILE A-A

WVDWWM STABILITY ANALYSIS
CONNER RUN DAM

MARSHALL COUNTY, WEST VIRGINIA

SCALE: AS SHOWN | DR RWC | CHK SWF | REV RWC

PREPARED FOR:

AEP SERVICE CORPORATION

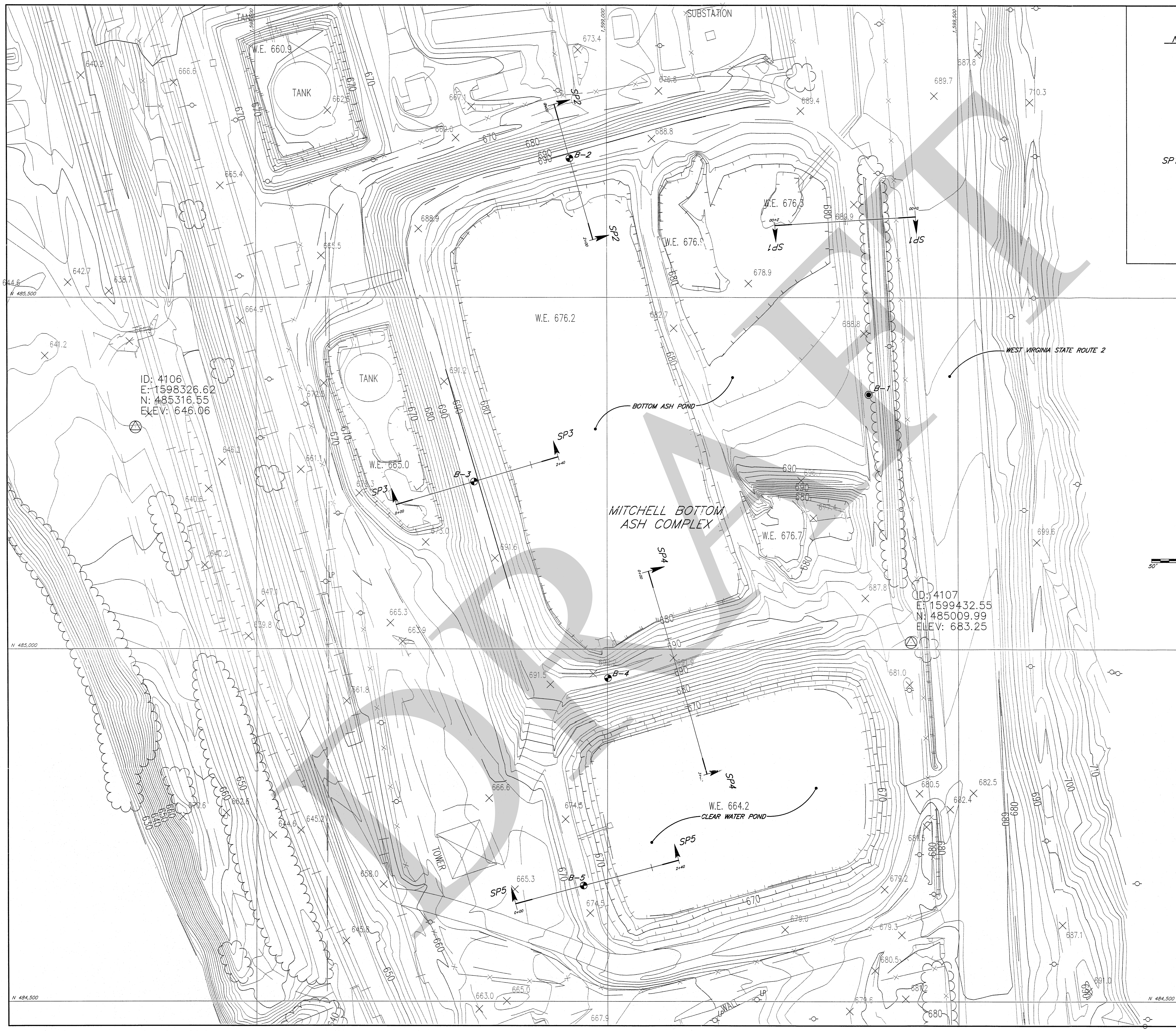
PREPARED BY:

GA Geo/Environmental Associates, Inc.
3502 OVERLOOK CIRCLE • KNOXVILLE, TENNESSEE 37909 • (865) 584-0344

PROJ: 01-2691 | DATE: 3-16-09 | SHEET 2 OF 2

DRAFT

US EPA ARCHIVE DOCUMENT



DRAFT

NOTES

1. PLAN ADAPTED FROM DRAWINGS PROVIDED BY AEPSC, DATED 4-13-01
2. BOREHOLE LOCATIONS AND ELEVATIONS PROVIDED BY AEPSC, SURVEYED 3-5-09.

LEGEND

SP1 — SP1 (0+00) PROFILE LIMITS

B-1 SAMPLED BOREHOLE LOCATION

B-2 SAMPLED BOREHOLE LOCATION WITH PIEZOMETER

ROGER W. CECIL REGISTERED 14367 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 3/18/09

"I, the undersigned, hereby certify that this map is correct and shows, to the best of my knowledge and belief, all the information required by the surface mining laws of the State of West Virginia."

ROGER W. CECIL, R.P.E. No. 14367

State of Tennessee, County of Knox, taken, subscribed, and sworn to before me this 18th day of March, 2009.

Notary Public

My Commission Expires 9/8/09

C. ELAINE AILEY STATE OF TENNESSEE NOTARY PUBLIC KNOX COUNTY

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DATE	REVISIONS	BY

PLAN VIEW

WVDWWM ORDER RESPONSES (ITEM 2) MITCHELL BOTTOM ASH COMPLEX

MARSHALL COUNTY, WEST VIRGINIA

SCALE: AS SHOWN | DR RWC | CHK SWF | REV RWC

PREPARED FOR:

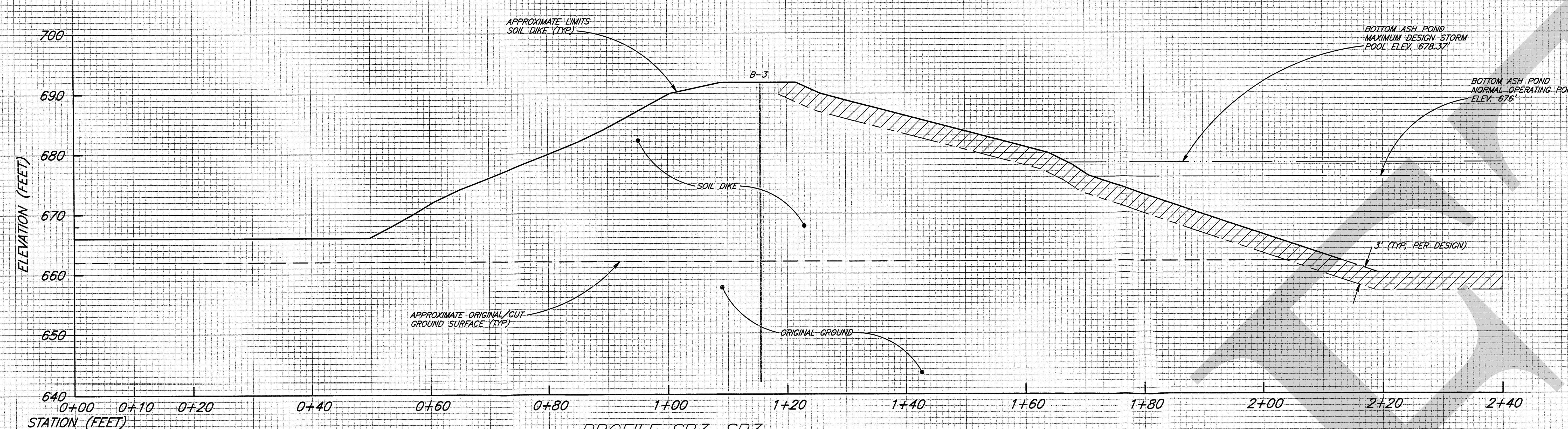
AEP SERVICE CORPORATION

PREPARED BY:

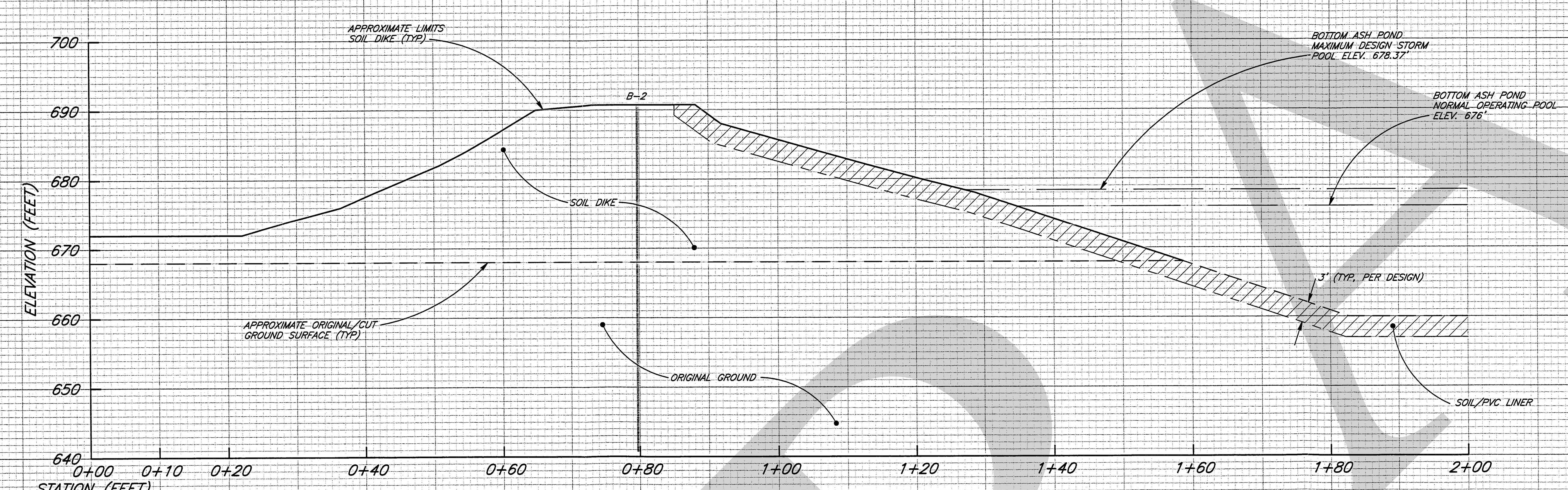
GA Geo/Environmental Associates, Inc.
3502 OVERLOOK CIRCLE • KNOXVILLE, TENNESSEE 37909 • (865) 584-0344

PROJ: 09-379 | DATE: 3-18-09 | SHEET 1 OF 3

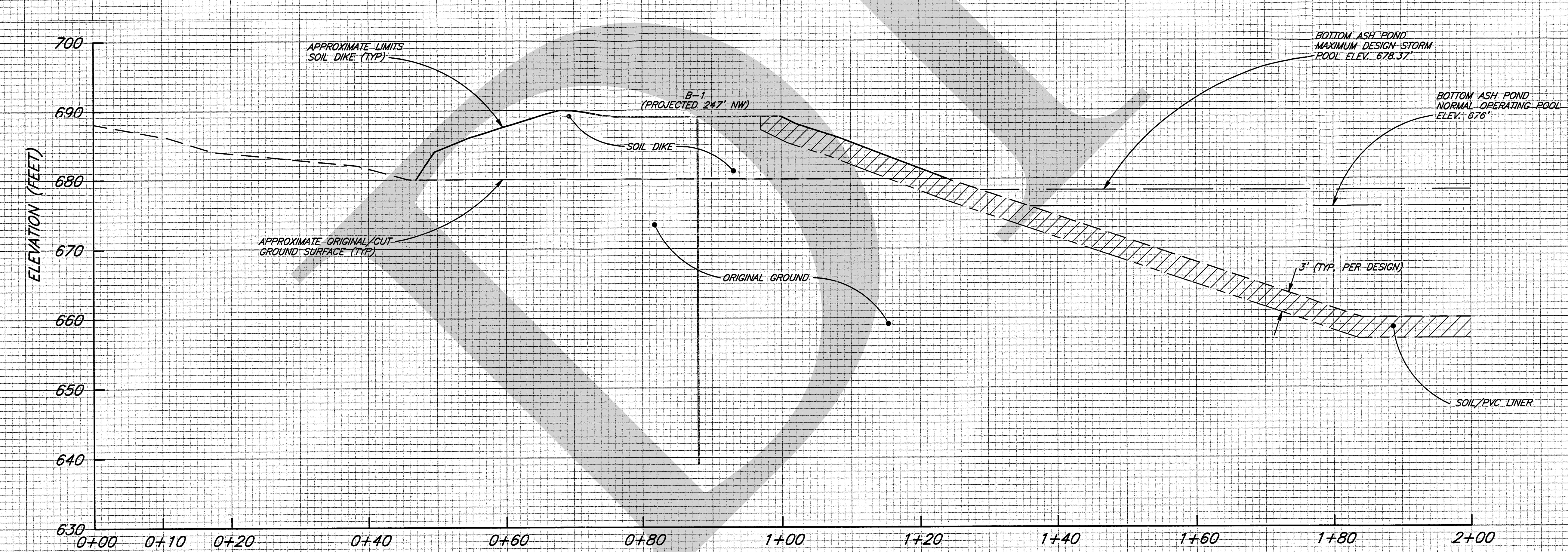
US EPA ARCHIVE DOCUMENT



PROFILE SP3-SP3



PROFILE SP2-SP2



PROFILE SP1-SP1

NOTES

1. PROFILES ADAPTED FROM PLAN VIEW DRAWING PROVIDED BY AEPSC, DATED 4-13-01, AND FROM ORIGINAL DESIGN DETAILS.
2. BORING LOCATIONS AND ELEVATIONS PROVIDED BY AEPSC, SURVEYED 3-5-09.
3. NORMAL OPERATING POOL LEVELS BASED ON INFORMATION PROVIDED BY AEPSC. MAXIMUM DESIGN STORM POOL LEVELS BASED ON 1/2 OF THE 6-HOUR PMP EVENT.
4. SOIL DIKE AND ORIGINAL/CUT GROUND SURFACE BASED ON ORIGINAL DESIGN DETAILS AND BOREHOLES B-1 THROUGH B-5 DATA.

ROGER W. CECIL REGISTERED 14367 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

3/18/09

"I, the undersigned, hereby certify that this map is correct and shows, to the best of my knowledge and belief, all the information required by the surface mining laws of the State of West Virginia."

Roger W Cecil

ROGER W. CECIL, R.P.E. No. 14367

C. ELAINE AILEY STATE OF TENNESSEE NOTARY PUBLIC KNOX COUNTY

State of Tennessee, County of Knox, taken, subscribed, and sworn to before me this 18th day of March, 2009.

C Elaine Ailey

Notary Public

My Commission Expires 9/8/09

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DATE	REVISIONS	BY

PROFILES SP1, SP2, & SP3

WVDWWM ORDER RESPONSES (ITEM 2)
MITCHELL BOTTOM ASH COMPLEX

MARSHALL COUNTY, WEST VIRGINIA

SCALE: AS SHOWN | DR RWC | CHK SWF | REV RWC

PREPARED FOR:

AEP SERVICE CORPORATION

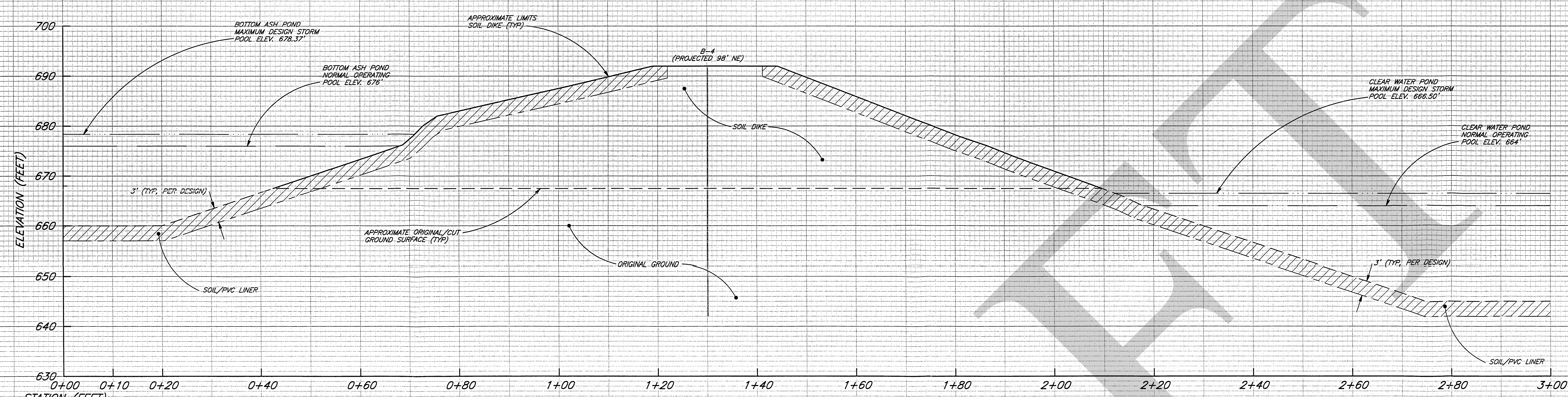
PREPARED BY:

GA Geo/Environmental Associates, Inc.
3502 OVERLOOK CIRCLE • KNOXVILLE, TENNESSEE 37909 • (865) 584-0344

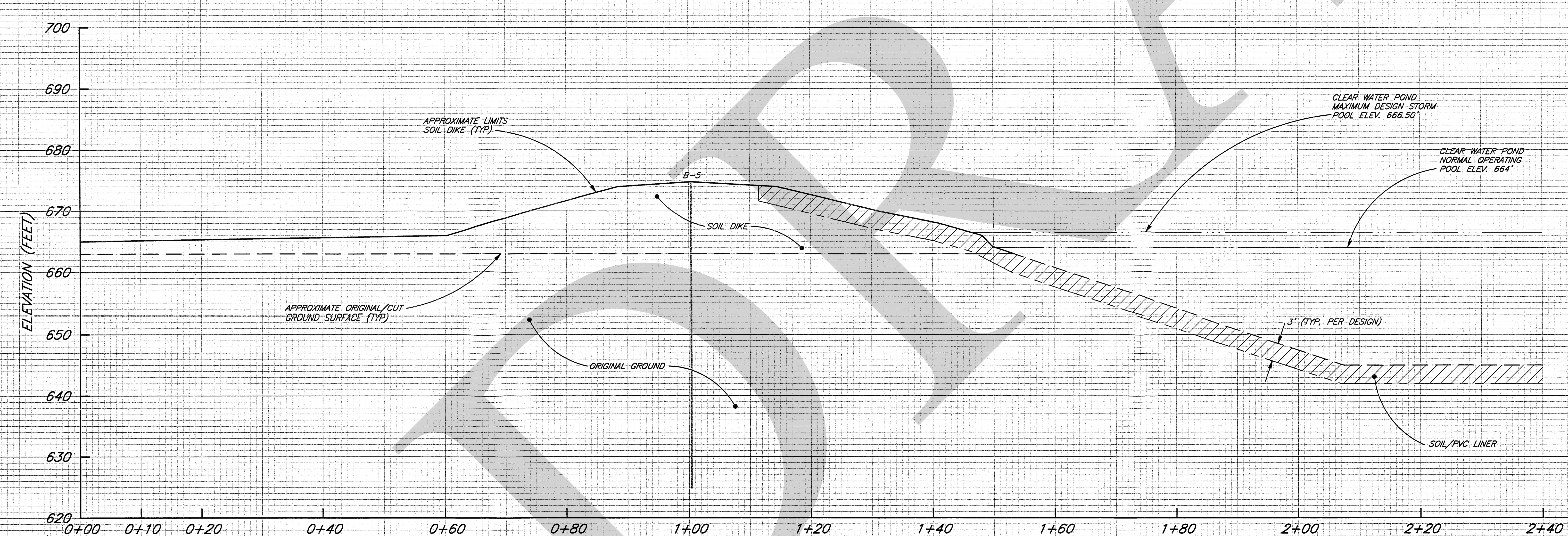
PROJ: 09-379 | DATE: 3-18-09 | SHEET 2 OF 3

DRAFT

US EPA ARCHIVE DOCUMENT



PROFILE SP4-SP4



PROFILE SP5-SP5

DRAFT

NOTES

1. PROFILES ADAPTED FROM PLAN VIEW DRAWING PROVIDED BY AEPSC, DATED 4-13-01, AND FROM ORIGINAL DESIGN DETAILS.
2. BORING LOCATIONS AND ELEVATIONS PROVIDED BY AEPSC, SURVEYED 3-5-09.
3. NORMAL OPERATING POOL LEVELS BASED ON INFORMATION PROVIDED BY AEPSC. MAXIMUM DESIGN STORM POOL LEVELS BASED ON 1/2 OF THE 6-HOUR PMP EVENT.
4. SOIL DIKE AND ORIGINAL/CUT GROUND SURFACE BASED ON ORIGINAL DESIGN DETAILS AND BOREHOLES B-1 THROUGH B-5 DATA.

ROGER W. CECIL REGISTERED 14367 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

Roger W Cecil 3/18/09

"I, the undersigned, hereby certify that this map is correct and shows, to the best of my knowledge and belief, all the information required by the surface mining laws of the State of West Virginia."

Roger W Cecil
ROGER W. CECIL, R.P.E. No. 14367

C. ELAINE AILEY STATE OF TENNESSEE NOTARY PUBLIC KNOX COUNTY

State of Tennessee, County of Knox, taken, subscribed, and sworn to before me this 18th day of March, 2009.

C Elaine Ailey
Notary Public

My Commission Expires 9/8/09

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DATE	REVISIONS	BY

PROFILES SP4 & SP5

WVDWWM ORDER RESPONSES (ITEM 2)
MITCHELL BOTTOM ASH COMPLEX

MARSHALL COUNTY, WEST VIRGINIA

SCALE: AS SHOWN	DR RWC	CHK SWF	REV RWC

PREPARED FOR:

AEP SERVICE CORPORATION

PREPARED BY:

GA Geo/Environmental Associates, Inc.
3502 OVERLOOK CIRCLE • KNOXVILLE, TENNESSEE 37909 • (865) 584-0344

PROJ: 09-379	DATE: 3-18-09	SHEET 3 OF 3

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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APPENDIX B

FIELD INSPECTION CHECKLISTS

Coal Combustion Dam Inspection Checklist Form

US Environmental
Protection Agency

Site Name:	Mitchell Power Station	Date:	09-03-2009
Unit Name:	Conner Run Fly Ash Pond	Operator's Name:	American Electric Power
Unit I.D.:	NA	Hazard Potential Classification:	High ☒ Significant ☐ Low ☐
Inspector's Name:	John Osterle / Kevin Cass		

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Weekly		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	968.5 ft		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	968± ft		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	NA		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	1000 ft		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	X		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?	X		21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	X		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		X	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments

#1. Inspection performed weekly by construction personnel, monthly by Plant personnel, and yearly by American Electric Power Engineering staff (also includes that of the West Virginia Department of Environmental Protection (WVDEP)). Yearly inspection performed by the Mine Safety & Health Administration (MSHA). Site was recently inspected by an independent consultant.

#21. Downstream slope of the dam is covered by an approximately 800 foot wide benched berm constructed from mine gob. Therefore, the original toe of the dam can not be inspected.

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US EPA ARCHIVE DOCUMENT

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW) Impoundment Inspection

Impoundment NPDES Permit # NWVD0005304 INSPECTOR John Osterle / Kevin Cass

Date 09-03-2009

Impoundment Name Conner Run Dam

Impoundment Company American Electric Power (AEP)

EPA Region III

State Agency (Field Office) Addresss 601 57th Street S.E.
Charleston, WV 25304

Name of Impoundment ____________

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ________ Update X

	Yes	No
Is impoundment currently under construction?	X	
Is water or ccw currently being pumped into the impoundment?	X	

IMPOUNDMENT FUNCTION: Primary: Settlement of fly ash for permanent disposal
Secondary: Consol Energy, disposal of coal preparation plant solids

Nearest Downstream Town : Name Clarington, WV

Distance from the impoundment about 4 miles downstream

Impoundment Location: Longitude 39 Degrees 49 Minutes 36 Seconds
Latitude 80 Degrees 48 Minutes 15 Seconds
State WV County Marshall

Does a state agency regulate this impoundment? YES X NO ______

If So Which State Agency? West Virginia DEP, Division of Water and Waste Management, EE/Dam Safety Section

This dam is also regulated by the US Department of Labor, Mine Safety & Health Administration (MSHA).

US EPA ARCHIVE DOCUMENT
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HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

______ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

______ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

______ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

__X__ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

The dam is classified as high hazard by the WVDEP Division of Water and Waste Management. Refer to section22-14-3 of the West Virginia Dam Control & Safety Act of (1973).

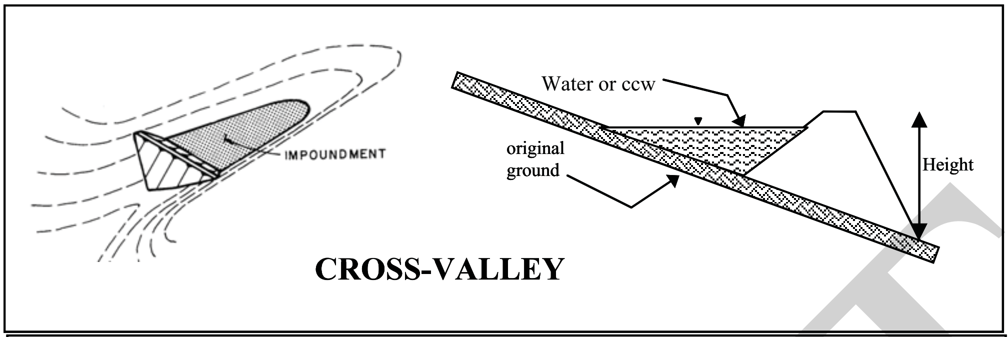
DRAFT

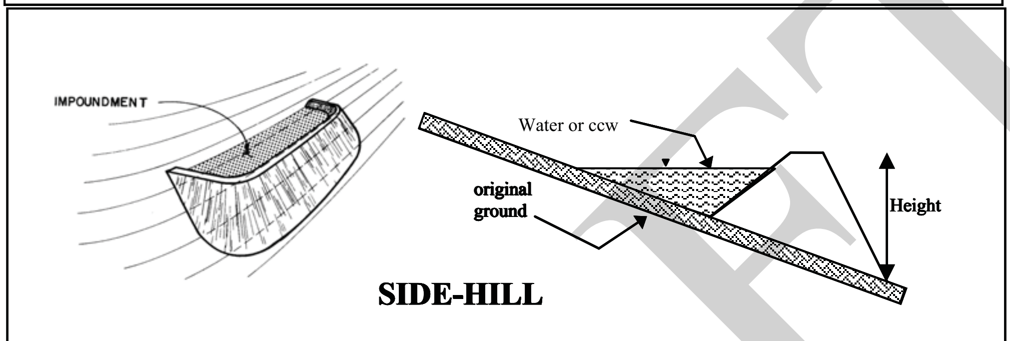
US EPA ARCHIVE DOCUMENT

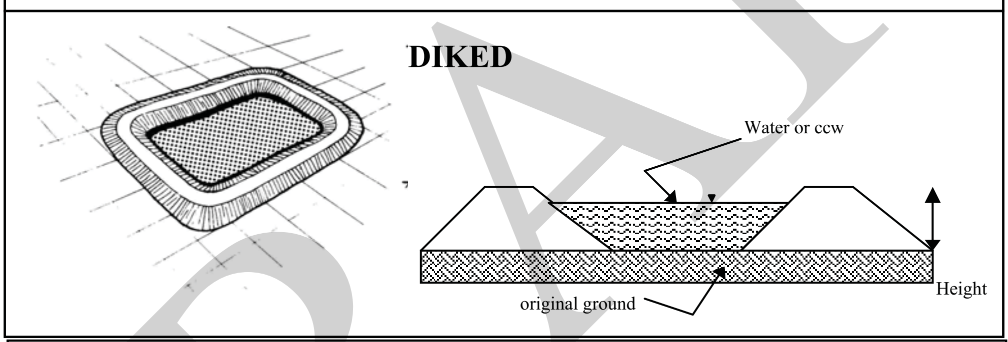
US EPA ARCHIVE DOCUMENT

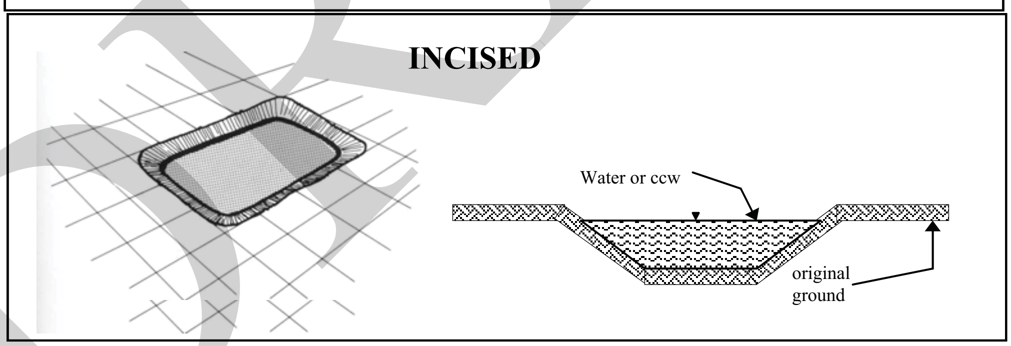
DRAFT

CONFIGURATION:









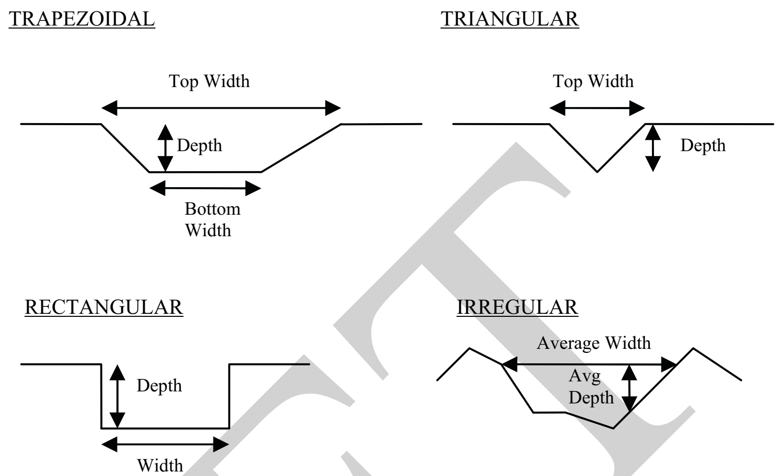
__X__ Cross-Valley
______ Side-Hill
______ Diked
______ Incised (form completion optional)
______ Combination Incised/Diked

Embankment Height 355 feet
Pool Area 71 acres
Current Freeboard 31.5 feet
Embankment Material zones of clay, granular material, & mine gob
Liner NA
Liner Permeability NA

TYPE OF OUTLET (Mark all that apply)

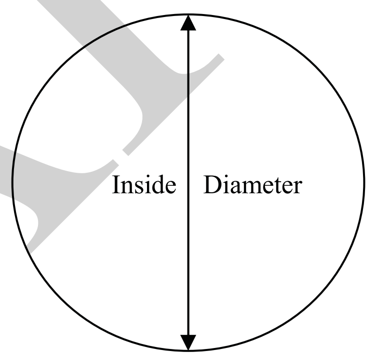
_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width



X **Outlet**

72 in inside diameter



Material
_____ corrugated metal
X welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify) _____________________

Is water flowing through the outlet? YES X NO _______

_____ **No Outlet**

_____ **Other Type of Outlet** (specify) _______________________________

The Impoundment was Designed By Original dam designed by AEP w/ review by Cassagrande Associates. Raised berm designed by AEP with review by Geo/Environmental Associates, inc.

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Has there ever been a failure at this site? YES __________ NO ____X____

If So When? ____________________________

If So Please Describe : ____

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Has there ever been significant seepages at this site? YES _______ NO ___X___

If So When? ____________________________

IF So Please Describe: ____

Controlled seepage through chimney drain is collected in sedimentation pond at downstream end. Seepage is monitored weekly. There is also seepage through a rock fracture upstream of the reservoir, and is not part of the dam structure.

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US EPA ARCHIVE DOCUMENT

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES ________NO ___X___

If so, which method (e.g., piezometers, gw pumping,...)? ____________________

If so Please Describe : ____

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US EPA ARCHIVE DOCUMENT

MITCHELL POWER STATION – MOUNDSVILLE, WV – CONNER RUN ASH POND

Concerning the embankment foundation, was the embankment construction built over wet ash, slag, or other unsuitable materials? If there is no information just note that.

No, but a small portion of the upstream shell is built on ash.

Did the dam assessor meet with, or have documentation from, the design Engineer-of-Record concerning the foundation preparation?

Yes.

From the site visit or from photographic documentation, was there evidence of prior releases, failures, or patchwork on the dikes?

No.

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US EPA ARCHIVE DOCUMENT

Coal Combustion Dam Inspection Checklist Form

US Environmental
Protection Agency

Site Name: Mitchell Power Station		Date: 09-03-2009	
Unit Name: Bottom Ash Complex (Bottom Ash Pond)		Operator's Name: American Electric Power	
Unit I.D.: NA		Hazard Potential Classification: High☐ Significant☒ Low☐	
Inspector's Name: John Osterle / Kevin Cass			

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Monthly		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	676± ft		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	675.7± ft		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	NA		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	690		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	X		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)	X		At isolated points on embankment slopes?	X	
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	X		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		X	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments

#1. Inspection performed monthly by Plant personnel, and yearly by American Electric Power Engineering staff and the West Virginia Department of Environmental Protection (WVDEP).

#6. Piezometers recently installed in embankment.

#9. Trees exist along the outside slope of the east embankment only. This slope exists well above the normal pool elevation and the trees do not pose a hazard to the safety of the impoundment.

#18. Uneven surface and rain ruts exist along the downstream slope.

#21. A small wet area was found at the toe of the North West corner of the impoundment. This could be ponded surface water.

US EPA ARCHIVE DOCUMENT

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US EPA ARCHIVE DOCUMENT

U. S. Environmental Protection Agency

DRAFT

Coal Combustion Waste (CCW) Impoundment Inspection

Impoundment NPDES Permit # NWVD0005304 INSPECTOR John Osterle / Kevin Cass
Date 09-03-2009

Impoundment Name Bottom Ash Pond
Impoundment Company American Electric Power (AEP)
EPA Region III
State Agency (Field Office) Addresss 601 57th Street S.E.
Charleston, WV 25304

Name of Impoundment ______
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ______ Update X

	Yes	No
Is impoundment currently under construction?		X
Is water or ccw currently being pumped into the impoundment?	X	

IMPOUNDMENT FUNCTION: settlement pond for bottom ash and waste water

Nearest Downstream Town : Name Clarington, WV
Distance from the impoundment about 3.8 miles downstream
Impoundment
Location: Longitude 39 Degrees 49 Minutes 30 Seconds
Latitude 80 Degrees 48 Minutes 56 Seconds
State WV County Marshall

Does a state agency regulate this impoundment? YES X NO ______

If So Which State Agency? West Virginia DEP, Division of Water and Waste Management, EE/Dam Safety Section

US EPA ARCHIVE DOCUMENT

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HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

______ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

______ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

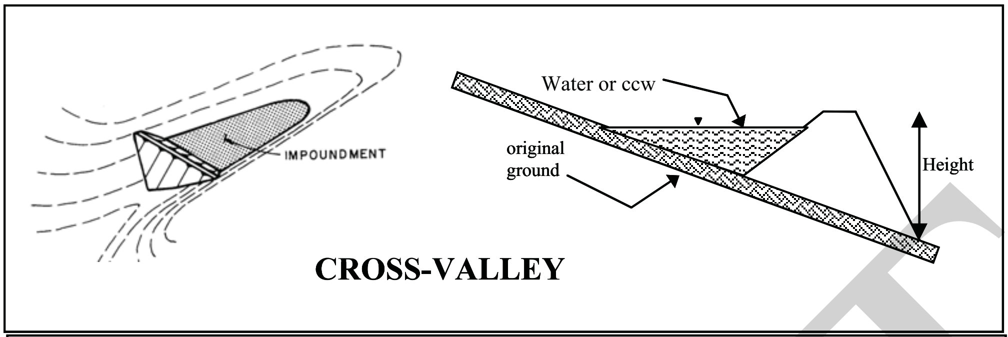
__x___ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

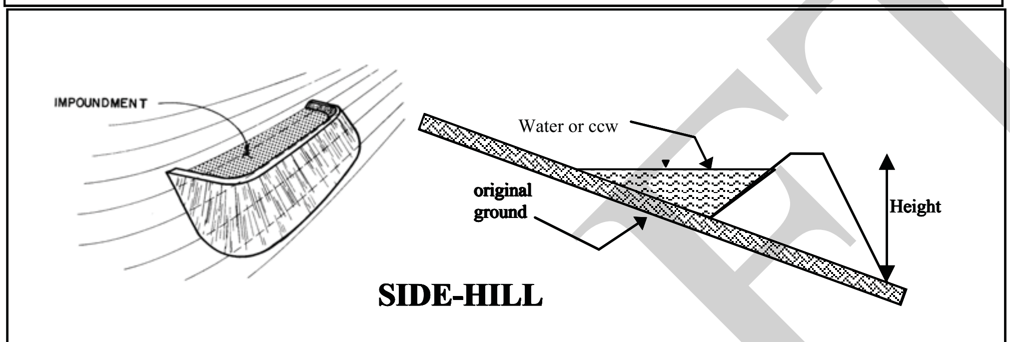
______ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

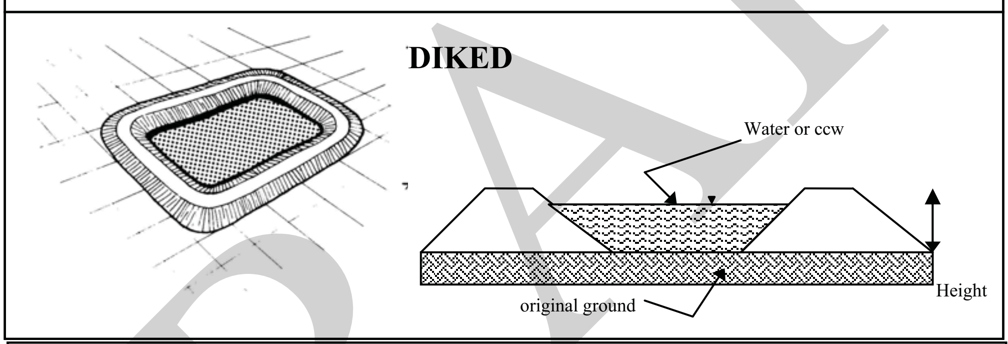
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

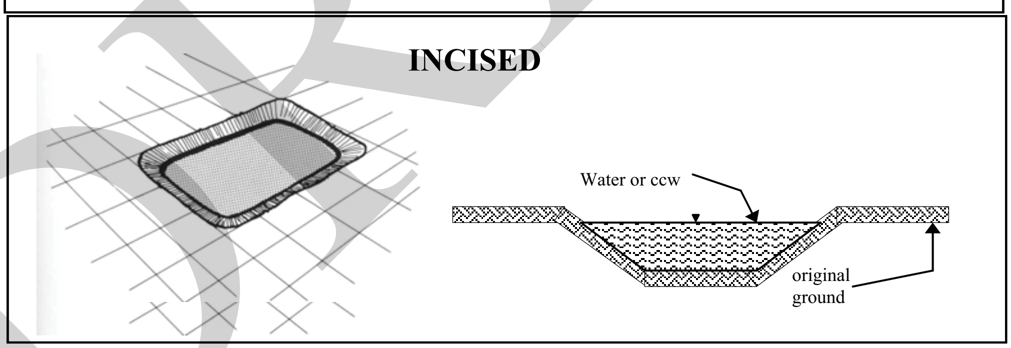
The dam is classified as significant hazard by the WVDEP Division of Water and Waste Management. Refer to section22-14-3 of the West Virginia Dam Control & Safety Act of (1973).

CONFIGURATION:









______ Cross-Valley
______ Side-Hill
__X__ Diked
______ Incised (form completion optional)
______ Combination Incised/Diked

Embankment Height ___28___ feet Embankment Material ___soil (sand and gravel)___
Pool Area ___10.2±___ acres Liner ___PVC (located 2 ft below surface)___
Current Freeboard ___14___ feet Liner Permeability ___10^-7 cm/s (estimated)___

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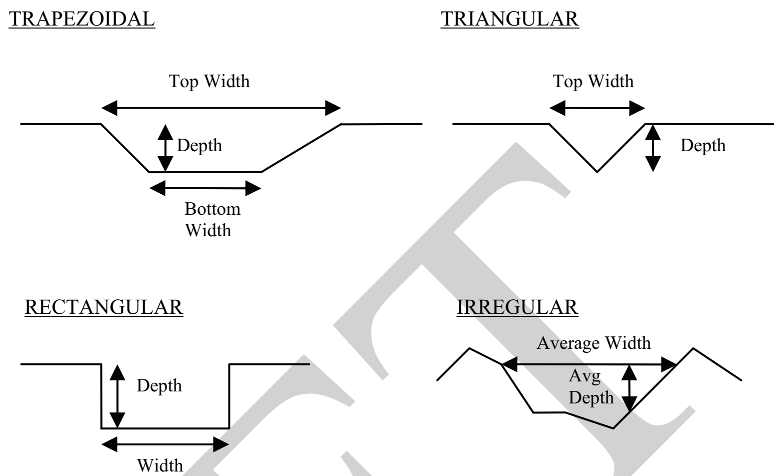
TYPE OF OUTLET (Mark all that apply)

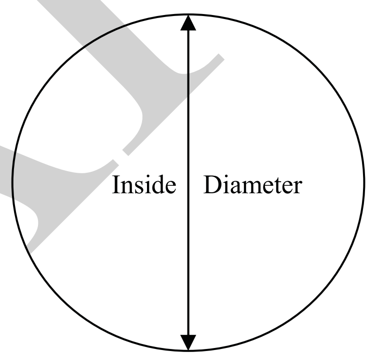
_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width



X **Outlet**

30 in inside diameter



Material
X corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify) ____________________

Is water flowing through the outlet? YES X NO _______

_____ **No Outlet**

_____ **Other Type of Outlet** (specify) ______________________________

The Impoundment was Designed By Designed by AEP w/ review by Cassagrande Associates.

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Has there ever been a failure at this site? YES __________ NO ____X____

If So When? ____________________________

If So Please Describe : ____

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US EPA ARCHIVE DOCUMENT

Has there ever been significant seepages at this site? YES ___X___ NO _______

If So When? 1978

IF So Please Describe:

Seepage was found at the North West toe of the impoundment and existed for about 2 years. A french drain was installed.

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Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES ________NO ___x___

If so, which method (e.g., piezometers, gw pumping,...)? ____________________

If so Please Describe : ____

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US EPA ARCHIVE DOCUMENT

MITCHELL POWER STATION – MOUNDSVILLE, WV
BOTTOM ASH POND

Concerning the embankment foundation, was the embankment construction built over wet ash, slag, or other unsuitable materials? If there is no information just note that.

No.

Did the dam assessor meet with, or have documentation from, the design Engineer-of-Record concerning the foundation preparation?

No, but owner indicated that they have construction documentation.

From the site visit or from photographic documentation, was there evidence of prior releases, failures, or patchwork on the dikes?

No.

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US EPA ARCHIVE DOCUMENT

Coal Combustion Dam Inspection Checklist Form

US Environmental
Protection Agency

Site Name: Mitchell Power Station	Date: 09-03-2009
Unit Name: Bottom Ash Complex (Clear Water Pond)	Operator's Name: American Electric Power
Unit I.D.: NA	Hazard Potential Classification: High☐ Significant☒ Low☐
Inspector's Name: John Osterle / Kevin Cass	

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Monthly		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	664.2± ft		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	655 ft		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	NA		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	675 ft		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	X		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	X		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		X	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments

#1. Inspection performed monthly by Plant personnel, and yearly by American Electric Power Engineering staff and the West Virginia Department of Environmental Protection (WVDEP).

#6. Piezometers recently installed in embankment.

#18. Uneven surface and rain ruts exist along the downstream slope.

#19. An animal borrow was found along the west upstream embankment about 5 feet form the waterline.

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Coal Combustion Waste (CCW)
Impoundment Inspection

DRAFT

Impoundment NPDES Permit # NWVD0005304 INSPECTOR John Osterle / Kevin Cass

Date 09-03-2009

Impoundment Name Clear Water Pond

Impoundment Company American Electric Power (AEP)

EPA Region III

State Agency (Field Office) Addresss 601 57th Street S.E.
Charleston, WV 25304

Name of Impoundment ____________________

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ________ Update X

	Yes	No
Is impoundment currently under construction?		X
Is water or ccw currently being pumped into the impoundment?	X	

IMPOUNDMENT FUNCTION: waste water pond

Nearest Downstream Town : Name Clarington, WV

Distance from the impoundment about 3.8 miles downstream

Impoundment Location:

Longitude	39	Degrees	49	Minutes	25	Seconds
Latitude	80	Degrees	48	Minutes	54	Seconds
State	WV	County	Marshall			

Does a state agency regulate this impoundment? YES X NO ______

If So Which State Agency? West Virginia DEP, Division of Water and Waste Management, EE/Dam Safety Section

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HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

______ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

______ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

__x__ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

______ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

The dam is classified as significant hazard by the WVDEP Division of Water and Waste Management. Refer to section22-14-3 of the West Virginia Dam Control & Safety Act of (1973).

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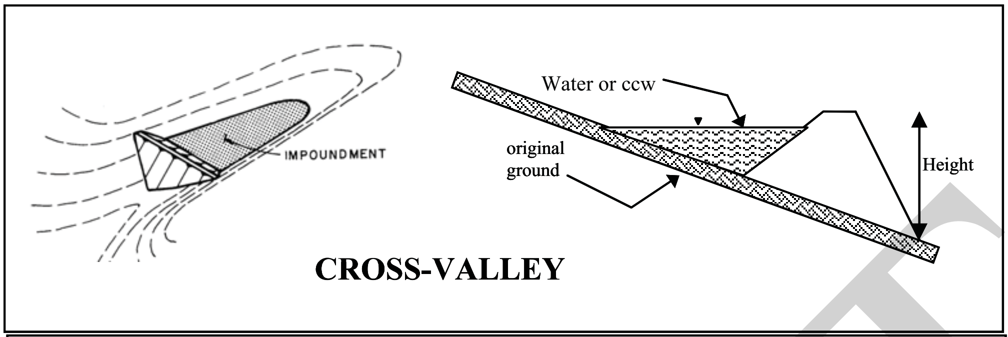
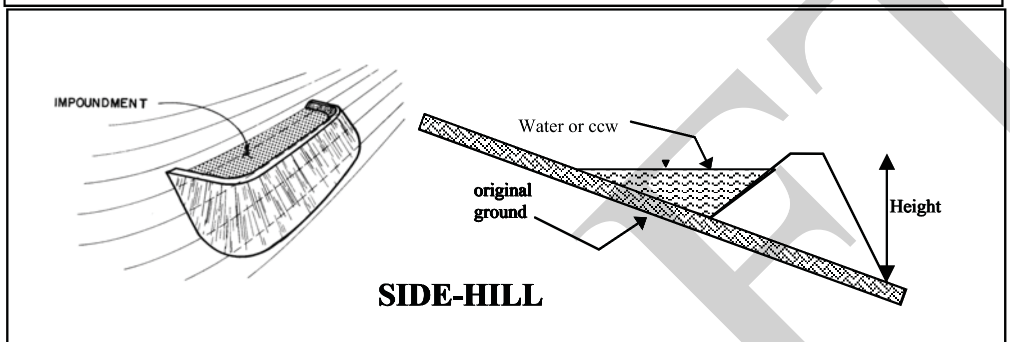
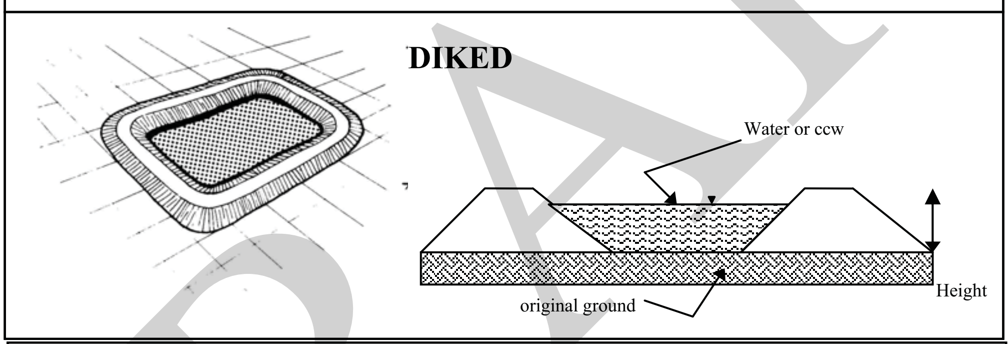
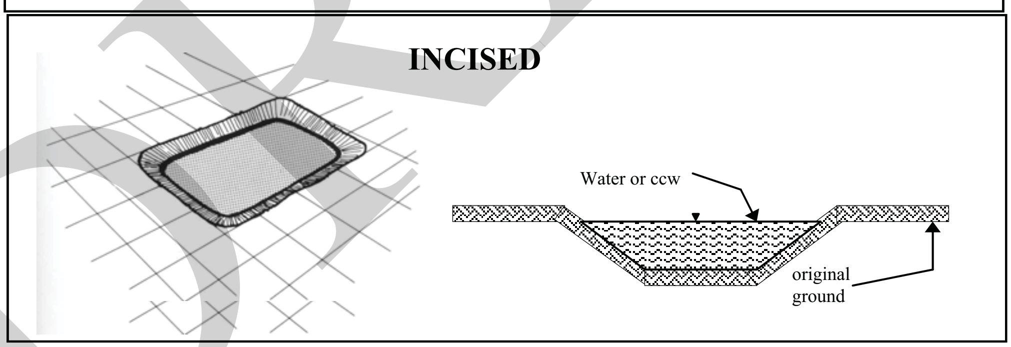
CONFIGURATION:









______ Cross-Valley
__X__ Side-Hill
______ Diked
______ Incised (form completion optional)
______ Combination Incised/Diked

Embankment Height ___10___ feet Embankment Material _soil (sand and gravel)_
Pool Area ___6.8±___ acres Liner _PVC (located 2 ft below surface)_
Current Freeboard ___10.8___ feet Liner Permeability _10^-7 cm/s (estimated)_

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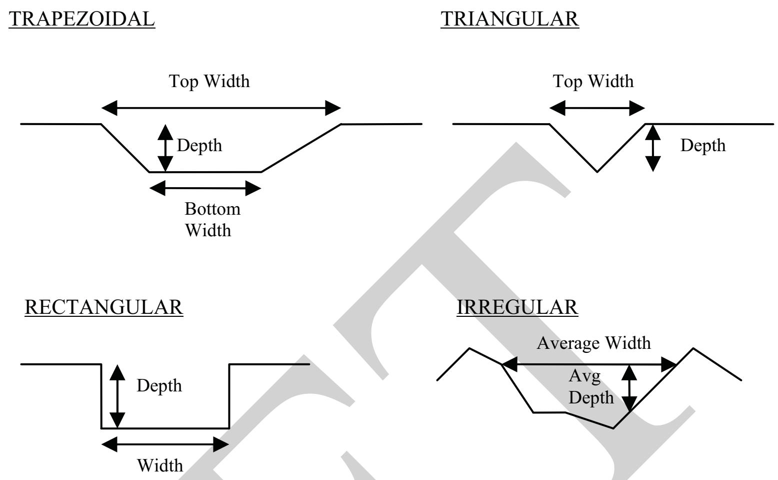
TYPE OF OUTLET (Mark all that apply)

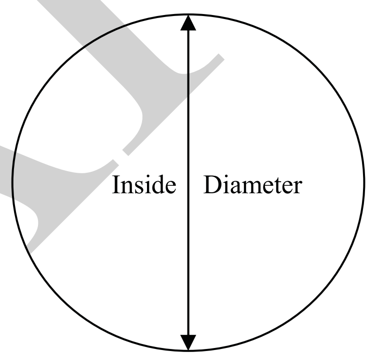
_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width



_X_ **Outlet**

_36 in_ inside diameter



Material
_X_ corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_X_ other (specify) plastic observed at outfall

Is water flowing through the outlet? YES _X_ NO _____

_____ **No Outlet**

_____ **Other Type of Outlet** (specify) __________

The Impoundment was Designed By Designed by AEP w/ review by Cassagrande Associates.

Has there ever been a failure at this site? YES __________ NO ____X____

If So When? ____________________________

If So Please Describe : ____

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Has there ever been significant seepages at this site? YES _______ NO ___X___

If So When? ____________________________

IF So Please Describe: ____

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Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES ________NO ___x___

If so, which method (e.g., piezometers, gw pumping,...)? ____________________

If so Please Describe : ____________________

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US EPA ARCHIVE DOCUMENT

MITCHELL POWER STATION – MOUNDSVILLE, WV
CLEAR WATER POND

Concerning the embankment foundation, was the embankment construction built over wet ash, slag, or other unsuitable materials? If there is no information just note that.

No.

Did the dam assessor meet with, or have documentation from, the design Engineer-of-Record concerning the foundation preparation?

No, but owner indicated that they have construction documentation.

From the site visit or from photographic documentation, was there evidence of prior releases, failures, or patchwork on the dikes?

No.

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APPENDIX C

MITCHELL POWER PLANT
PHOTO LOG

PHOTO 1: FLY ASH IMPOUNDMENT FROM CONNER RUN DAM

PHOTO 2: UPSTREAM SLOPE OF CONNER RUN FROM SOUTH END

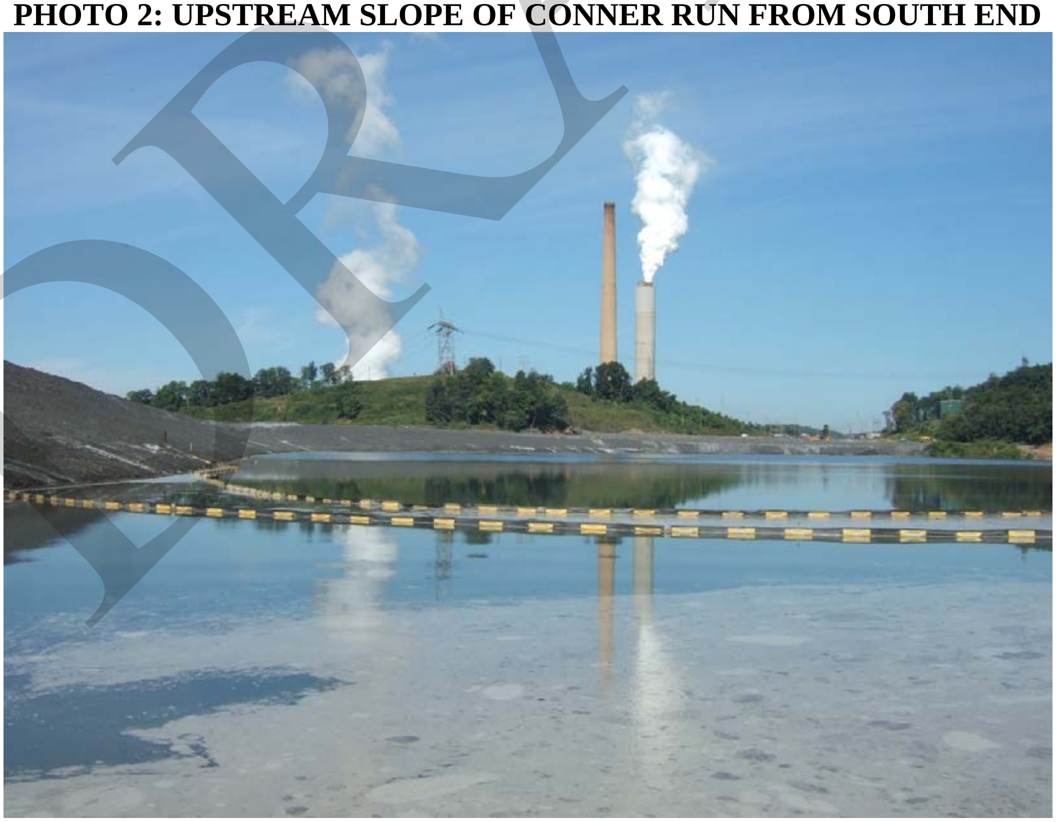

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PHOTO 3: UPSTREAM SLOPE OF CONNER RUN DAM

PHOTO 4: CONNER RUN DAM CREST FROM NORTH END

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PHOTO 5: CLAY CORE ALONG CREST OF CONNER RUN DAM

PHOTO 6: OVERFLOW SPILLWAY INLET FOR CONNER RUN

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PHOTO 7: PIEZOMETER IN UPTREAM SLOPE OF CONNER RUN DAM

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PHOTO 8: DOWNSTREAM COURSE REFUSE BERM FROM CREST

PHOTO 9: DOWNSTREAM COURSE REFUSE BERM FROM SOUTH END

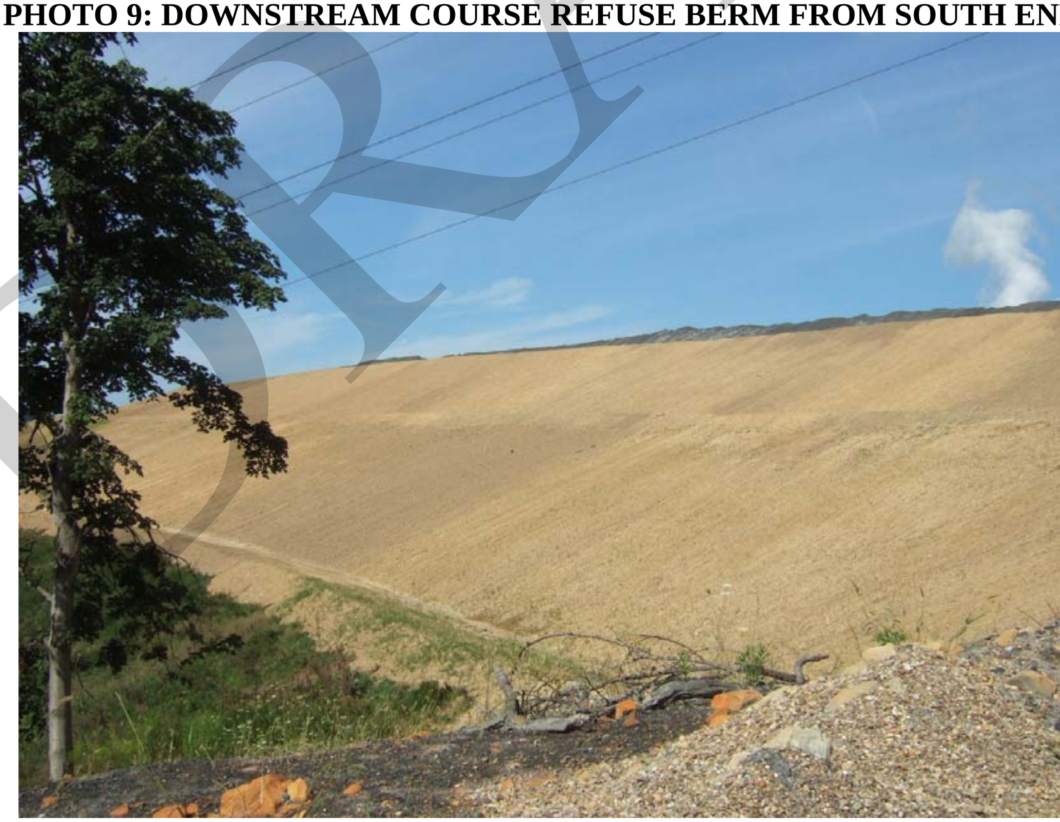

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PHOTO 10: OUTLETWORK TAIL WALL

PHOTO 11: GROUTED RIPRAP DISCHARGE CHANNEL

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PHOTO 12: CONTROLLED SEEPAGE OUTLET INTO CHANNEL

PHOTO 13: VEGETATED DOWNSTREAM COURSE REFUSE BERM

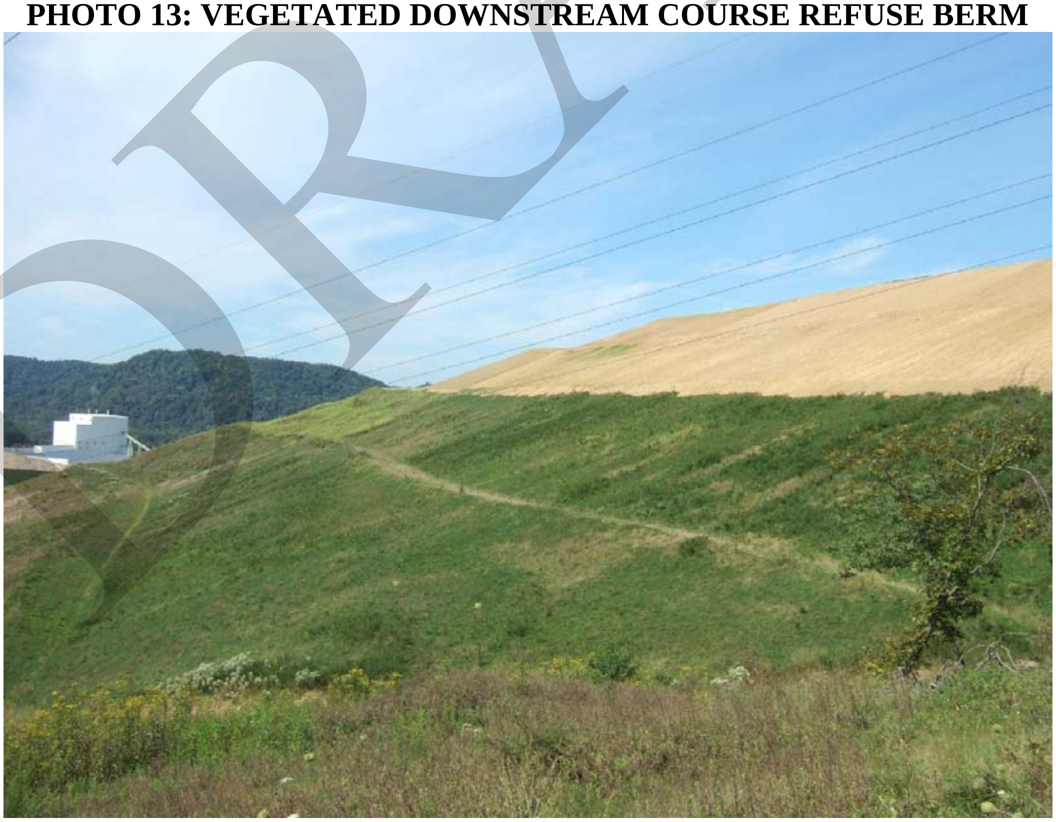

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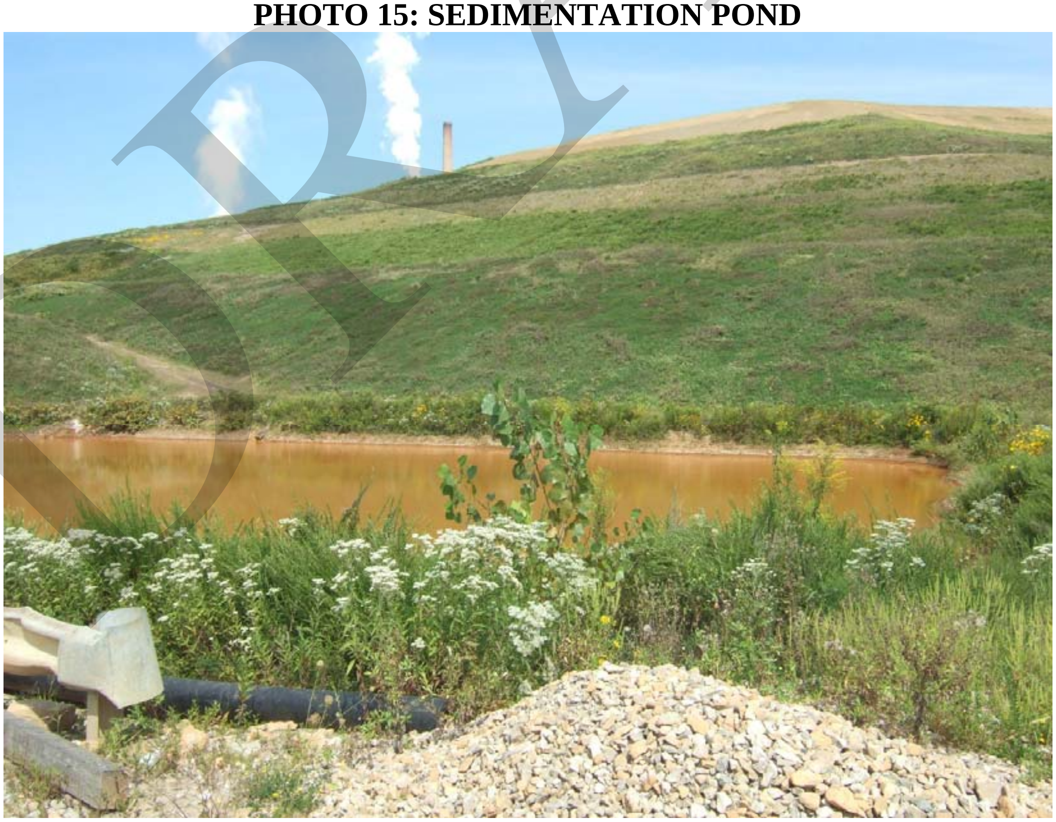
PHOTO 14: IMPACT BASIN

PHOTO 15: SEDIMENTATION POND



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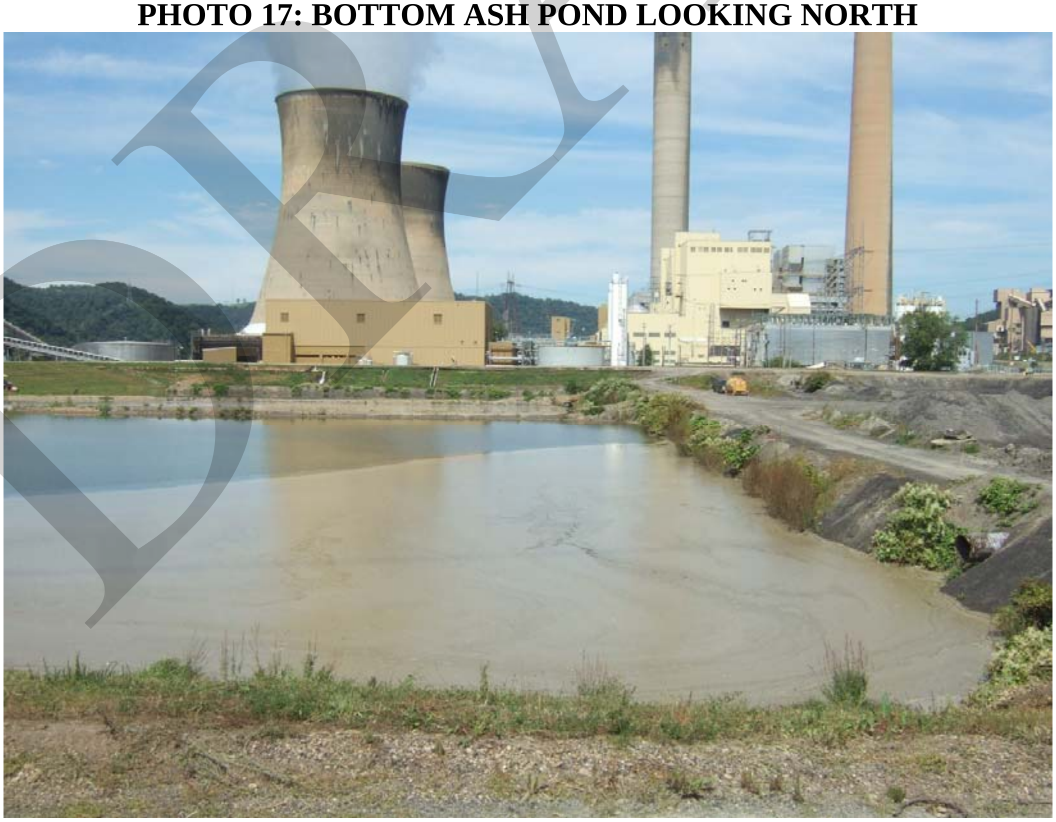
US EPA ARCHIVE DOCUMENT

PHOTO 16: BOTTOMASH POND CENTER BERM LOOKING NORTH

PHOTO 17: BOTTOM ASH POND LOOKING NORTH



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US EPA ARCHIVE DOCUMENT

PHOTO 18: BOTTOM ASH HAULING AREA

PHOTO 19: TREE LINE ALONG EAST CREST OF BOTTOM ASH POND

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PHOTO 20: EAST UPSRTREAM SLOPE OF BOTTOM ASH POND

PHOTO 21: REMOVAL OF BOTTOM ASH

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US EPA ARCHIVE DOCUMENT

PHOTO 22: NORTH DOWNSTREAM SLOPE OF BOTTOM ASH POND

PHOTO 23: NORTH CREST OF BOTTOM ASH POND LOOKING WEST

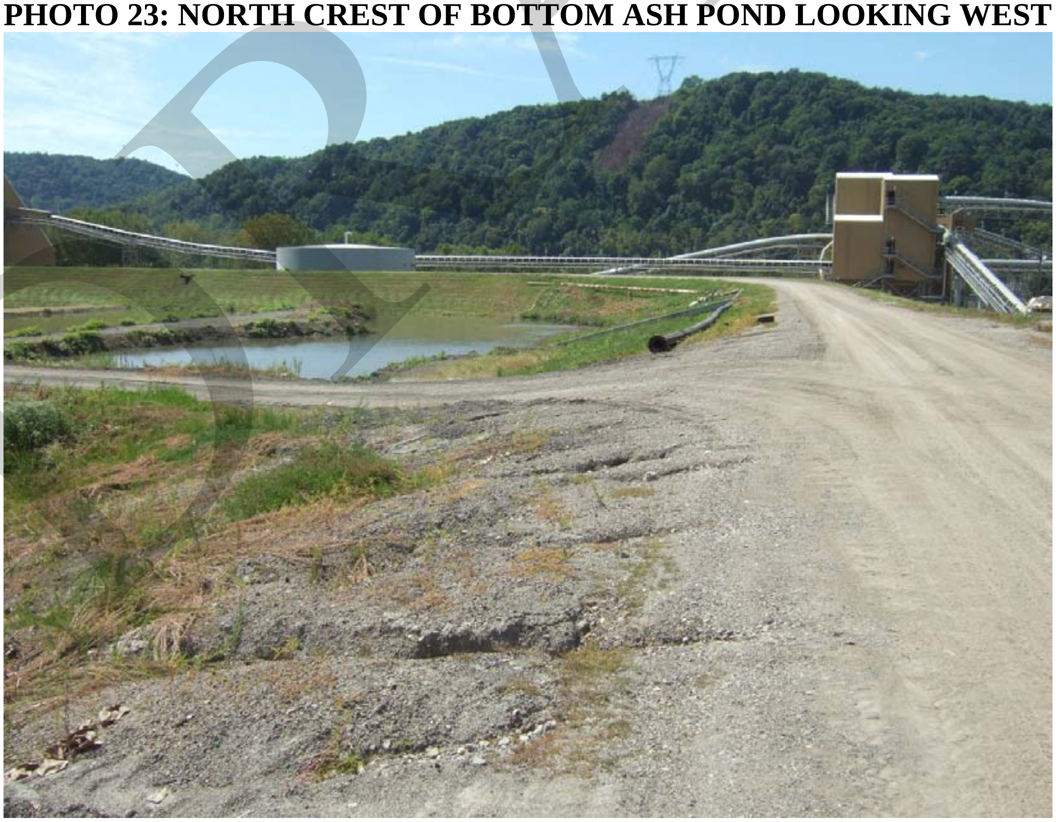

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PHOTO 24: BOTTOM ASH POND LOOKING SOUTHWEST

PHOTO 25: NORTHWEST CORNER OF BOTTOM ASH POND

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PHOTO 26: INLET INTO BOTTOM ASH POND

PHOTO 27: WEST DOWNSTREAM SLOPE OF BOTTOM ASH POND

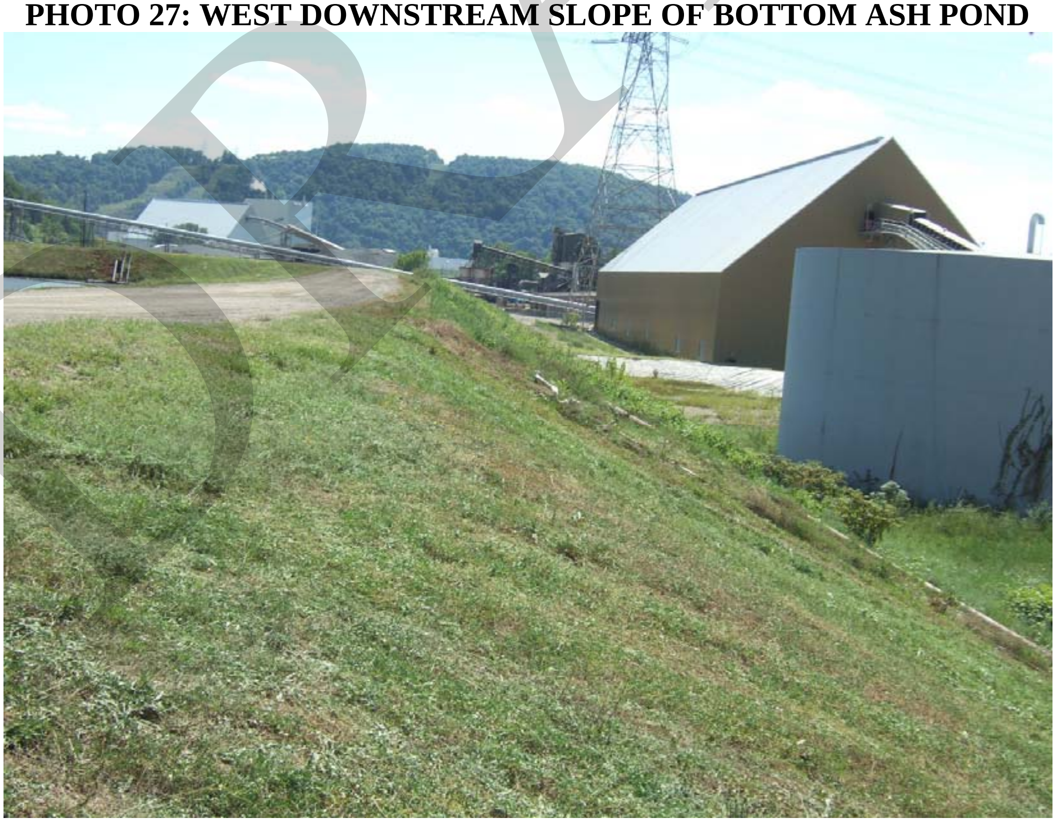

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PHOTO 28: WET AREA AT NORTHWEST TOE OF BOTTOM ASH POND

PHOTO 29: WET AREA AT NORTHWEST TOE OF BOTTOM ASH POND

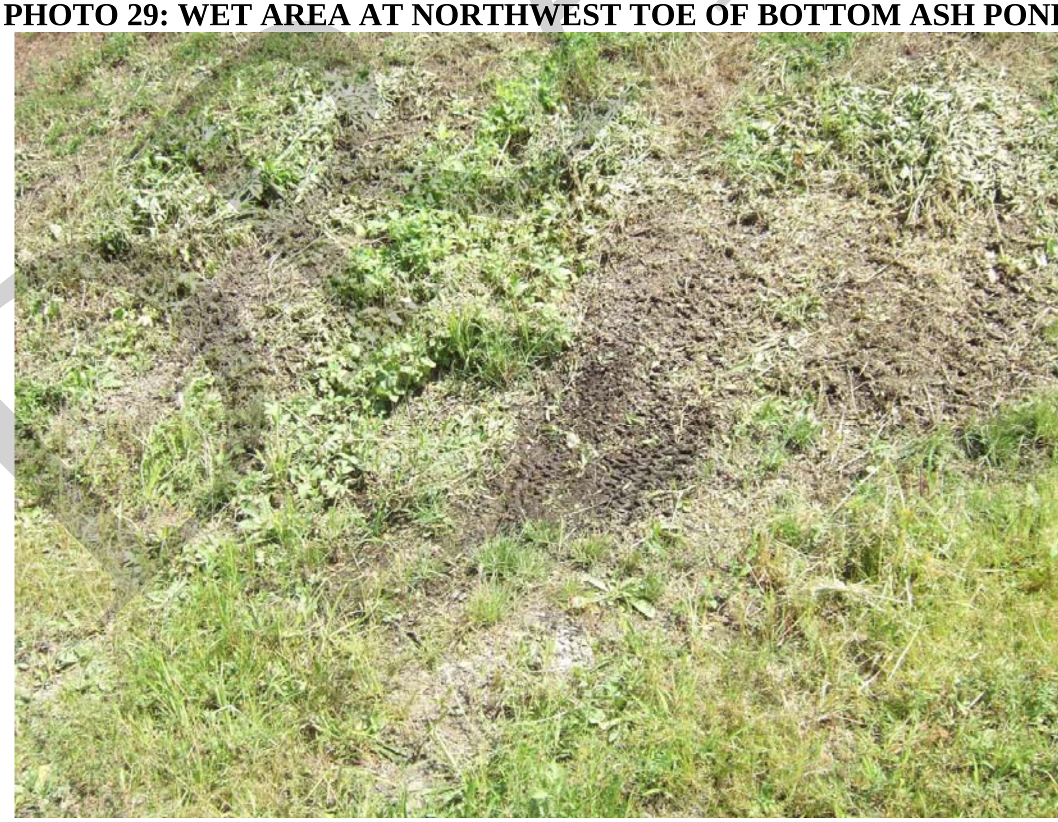

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PHOTO 30: METAL CLEAN TANK CONTAINMENT BASIN

PHOTO 31: BOTTOM ASH POD FROM WEST CREST

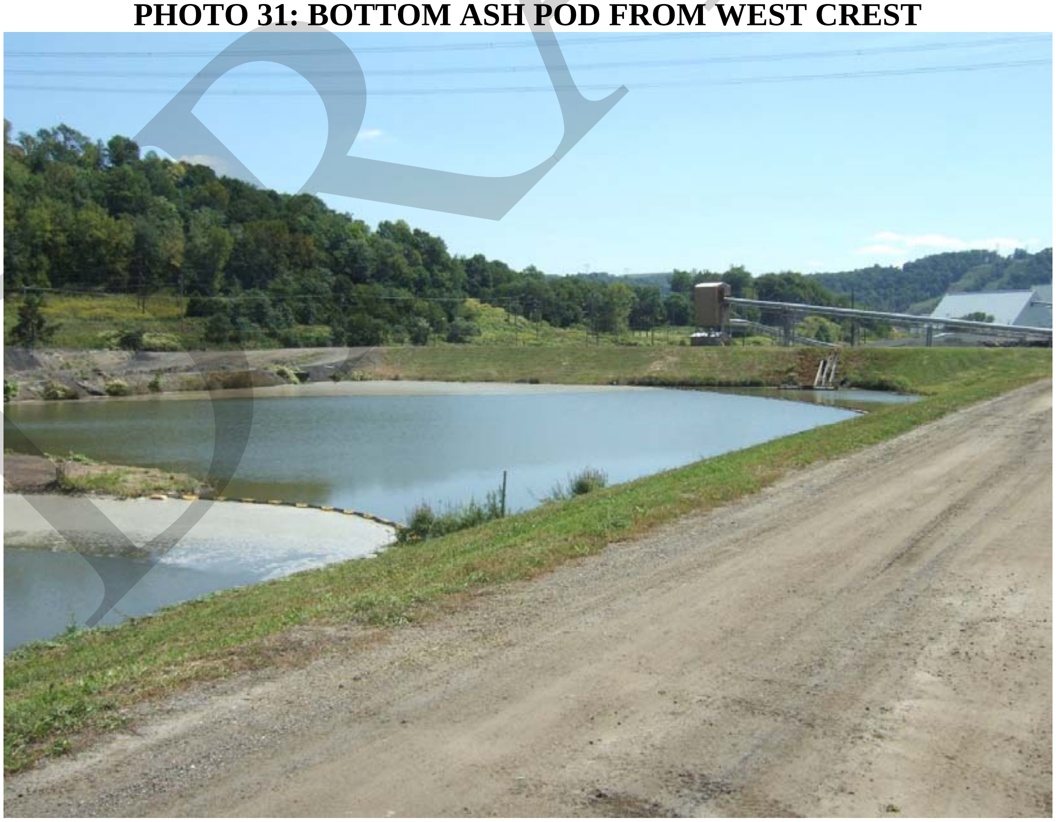

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PHOTO 32: WEST UPSTREAM SLOPE OF BOTTOM ASH POND

PHOTO 33: BOTTOM ASH OVERFLOW STRUCTURE

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PHOTO 34: CLEAR WATER POND LOOKING SOUTHEAST

PHOTO 35: NORTH UPSTREAM SLOPE OF CLEAR WATER POND

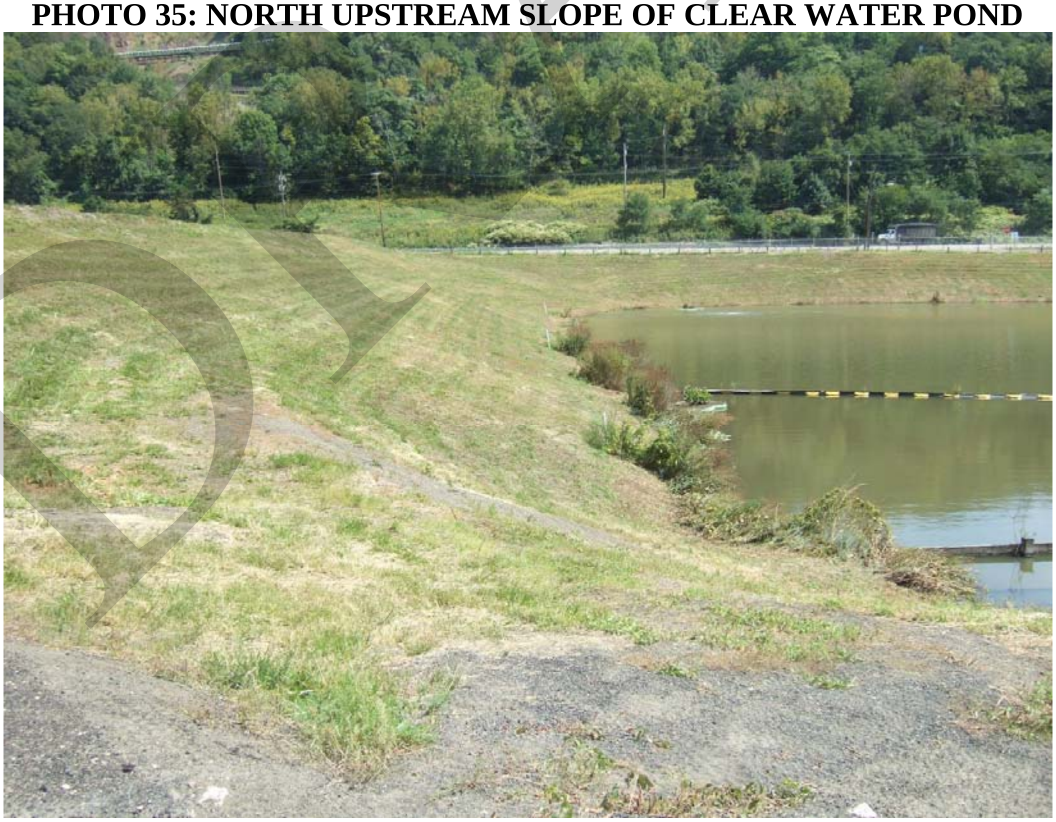

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PHOTO 36: CLEAR WATER POND LOOKING SOUTH

PHOTO 37: NORTH WEST CORNER OF CLEAR WATER POND

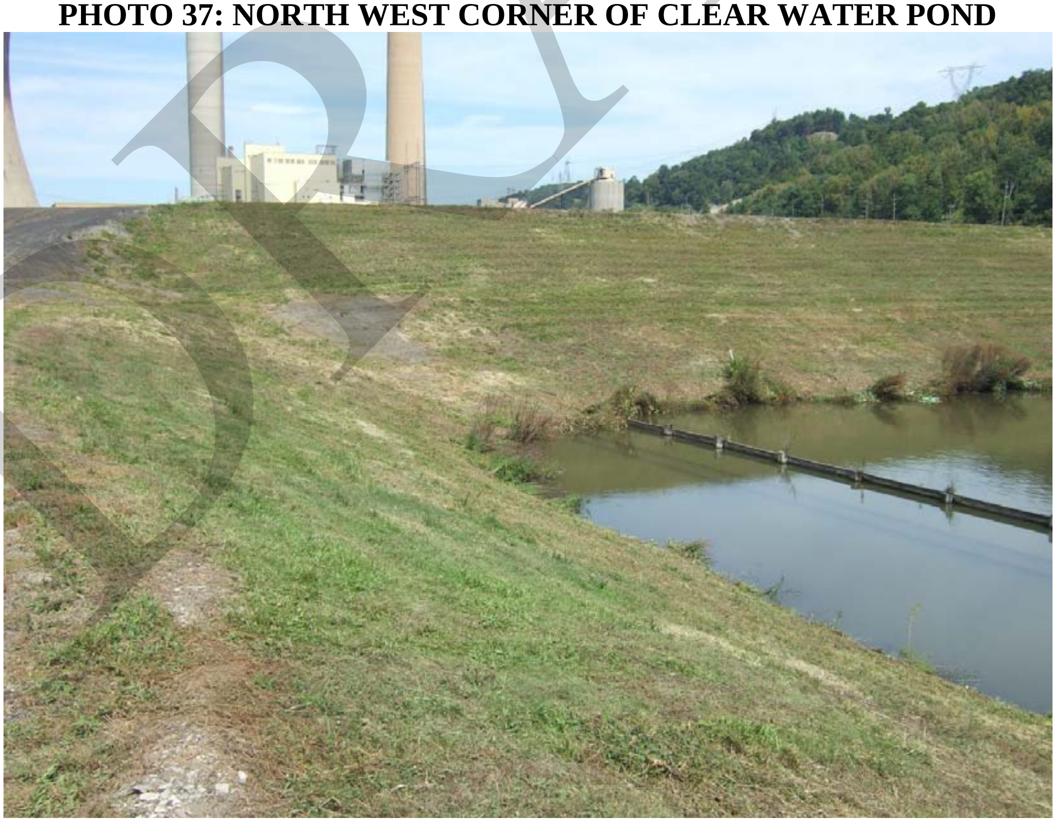

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PHOTO 38: SOUTH CREST OF CLEAR WATER POND

PHOTO 39: ANIMAL BURROW ALONG WEST UPSTREAM SLOPE

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PHOTO 40: OVERFLOW STRUCTURE FOR CLEAR WATER POND

PHOTO 41: PIEZOMETER ALONG SHARED NORTH/SOUTH BERM

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PHOTO 42: OUTFLOW FROM CLEAR WATER POND TO OHIO RIVER

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APPENDIX D

STABILITY ANALYSIS RESULTS

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US EPA ARCHIVE DOCUMENT

CONNER RUN DAM
2009 Slope Stability Analysis

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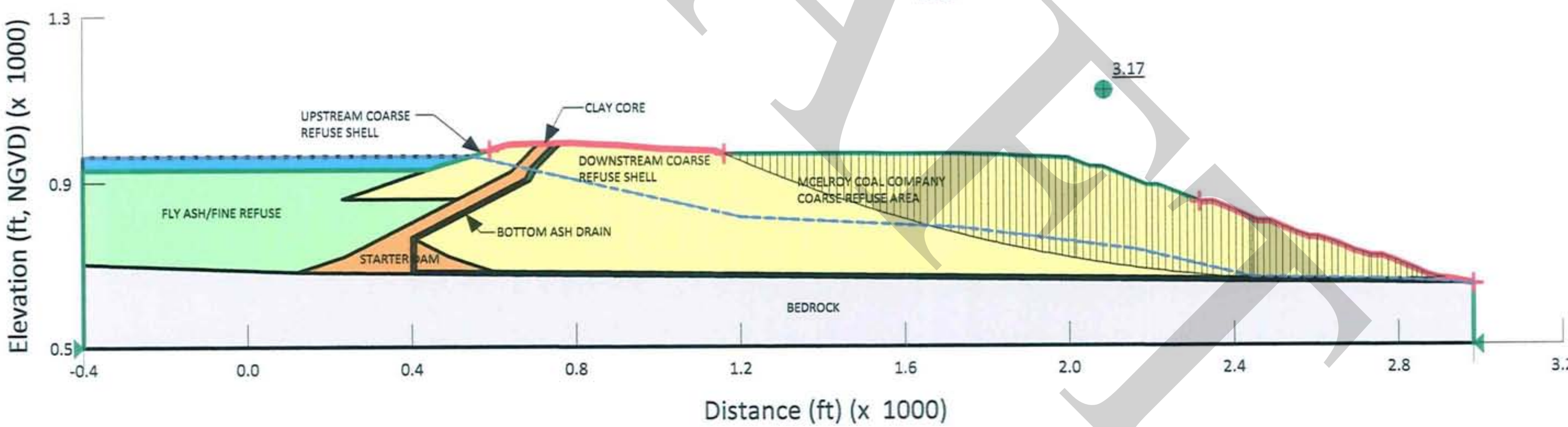
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM - AS-BUILT STABILITY ANALYSIS
Comments: MAIN EMBANKMENT PROFILE AA - DOWNSTREAM STATIC
Name: CRD_PROFILEA-A_DOWNSTREAM STATIC.gsz
Date: 3/15/2009
Horz Seismic Load: 0

Description: COARSE REFUSE
Wt: 120
Cohesion: 0
Phi: 32
Unit Wt. Above WT: 115
Description: Fly Ash / Fine Refuse
Wt: 90
Cohesion: 0
Phi: 28
Unit Wt. Above WT: 85
Description: Clay Fill
Wt: 128
Cohesion: 600
Phi: 15
Unit Wt. Above WT: 123
Description: Clay Foundation
Wt: 128
Cohesion: 200
Phi: 20
Unit Wt. Above WT: 123
Description: Bottom Ash Drain
Wt: 110
Cohesion: 0
Phi: 36
Description: Bedrock
Wt: 168
Cohesion: 10000
Phi: 39

NOTES:
1. THE PHREATIC LEVEL USED IN THE ANALYSES IS BASED ON 3-10-09 PIEZOMETER READINGS PROVIDED BY AEPSC AND CONSOL.
2. POOL LEVEL = 964.2 FEET, NGVD IS BASED ON 3-10-09 LEVEL PROVIDED BY AEPSC.
3. APPROXIMATE CONNER RUN DAM GROUND SURFACE AND FLY ASH LEVELS BASED ON 12-08 TOPOGRAPHIC MAPPING FROM CONSOL AND 5-08 HYDRO SURVEY MAPPING FROM AEPSC.
4. MATERIAL PARAMETERS BASED ON PARAMETERS DEVELOPED IN APPROVED DESIGN REPORT.
5. DRAWING SCALE: 1" = 400'



DRAFT

US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM - AS-BUILT STABILITY ANALYSIS
Comments: PROFILE AA - DOWNSTREAM STATIC THROUGH MCELROY REFUSE AREA
Name: CRD_PROFILEA-A_DOWNSTREAM STATIC_MCELROY RA.gsz
Date: 3/15/2009
Horz Seismic Load: 0

Description: COARSE REFUSE
Wt: 120
Cohesion: 0
Phi: 32
Unit Wt. Above WT: 115
Description: Fly Ash / Fine Refuse
Wt: 90
Cohesion: 0
Phi: 28
Unit Wt. Above WT: 85
Description: Clay Fill
Wt: 128
Cohesion: 600
Phi: 15
Unit Wt. Above WT: 123
Description: Clay Foundation
Wt: 128
Cohesion: 200
Phi: 20
Unit Wt. Above WT: 123
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Wt: 110
Cohesion: 0
Phi: 36
Description: Bedrock
Wt: 168
Cohesion: 10000
Phi: 39

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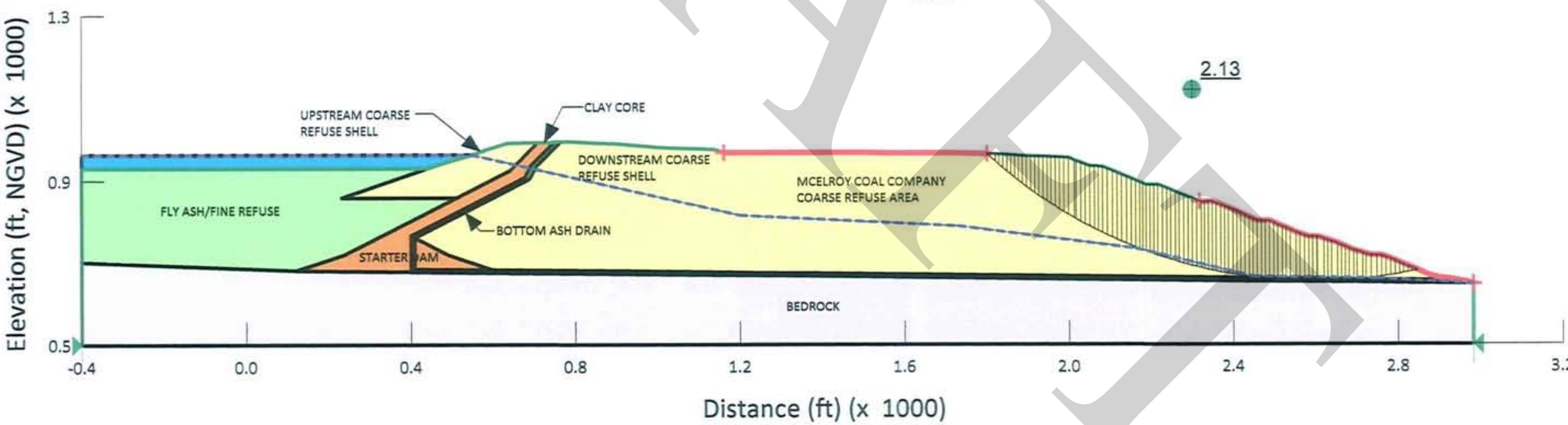
4. MATERIAL PARAMETERS BASED ON PARAMETERS DEVELOPED IN APPROVED DESIGN REPORT.
5. DRAWING SCALE: 1" = 400'



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US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM - AS-BUILT STABILITY ANALYSIS
Comments: MAIN EMBANKMENT PROFILE AA - DOWNSTREAM DYNAMIC
Name: CRD_PROFILEA-A_DOWNSTREAM DYNAMIC.gsz
Date: 3/15/2009
Horz Seismic Load: 5.e-002

Description: COARSE REFUSE
Wt: 120
Cohesion: 0
Phi: 32
Unit Wt. Above WT: 115
Description: Fly Ash / Fine Refuse
Wt: 90
Cohesion: 0
Phi: 28
Unit Wt. Above WT: 85
Description: Clay Fill
Wt: 128
Cohesion: 600
Phi: 15
Unit Wt. Above WT: 123
Description: Clay Foundation
Wt: 128
Cohesion: 200
Phi: 20
Unit Wt. Above WT: 123
Description: Bottom Ash Drain
Wt: 110
Cohesion: 0
Phi: 36
Description: Bedrock
Wt: 168
Cohesion: 10000
Phi: 39

NOTES:
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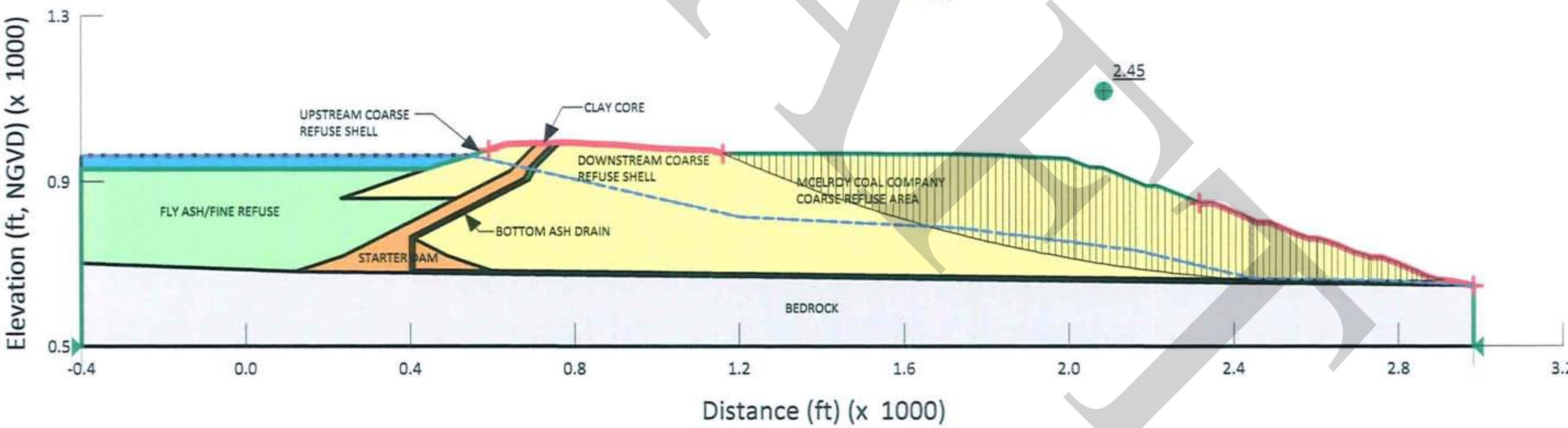
5. DRAWING SCALE: 1" = 400'



DRAFT

US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM - AS-BUILT STABILITY ANALYSIS
Comments: PROFILE AA - DOWNSTREAM DYNAMIC THROUGH MCELROY REFUSE AREA
Name: CRD_PROFILEA-A_DOWNSTREAM DYNAMIC_MCELROY RA.gsz
Date: 3/15/2009
Horz Seismic Load: 5.e-002

Description: COARSE REFUSE
Wt: 120
Cohesion: 0
Phi: 32
Unit Wt. Above WT: 115
Description: Fly Ash / Fine Refuse
Wt: 90
Cohesion: 0
Phi: 28
Unit Wt. Above WT: 85
Description: Clay Fill
Wt: 128
Cohesion: 600
Phi: 15
Unit Wt. Above WT: 123
Description: Clay Foundation
Wt: 128
Cohesion: 200
Phi: 20
Unit Wt. Above WT: 123
Description: Bottom Ash Drain
Wt: 110
Cohesion: 0
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Description: Bedrock
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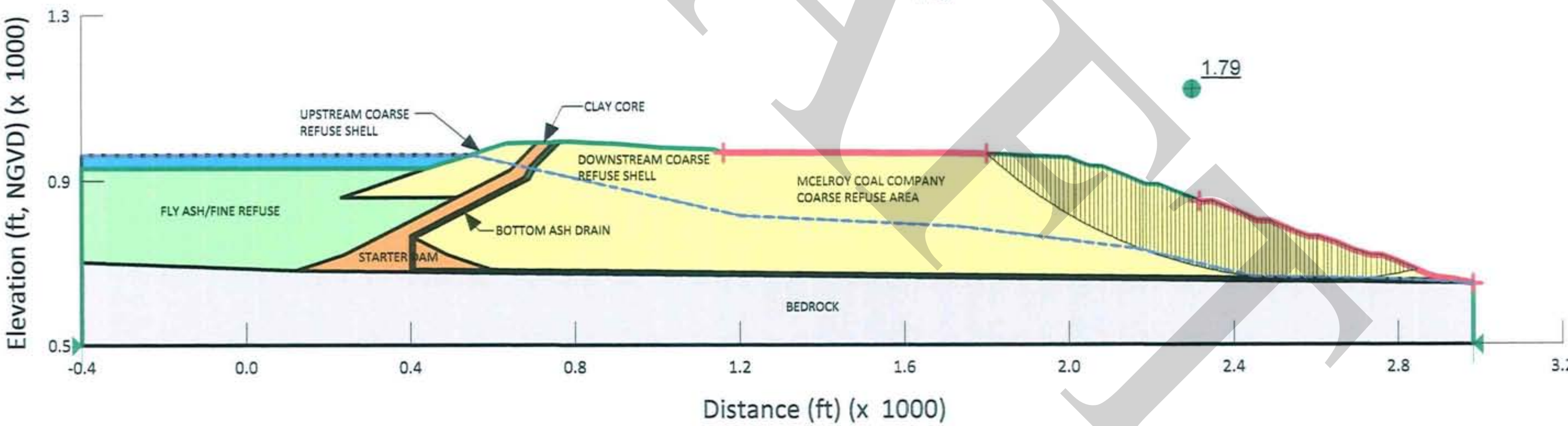
4. MATERIAL PARAMETERS BASED ON PARAMETERS DEVELOPED IN APPROVED DESIGN REPORT.
5. DRAWING SCALE: 1" = 400'



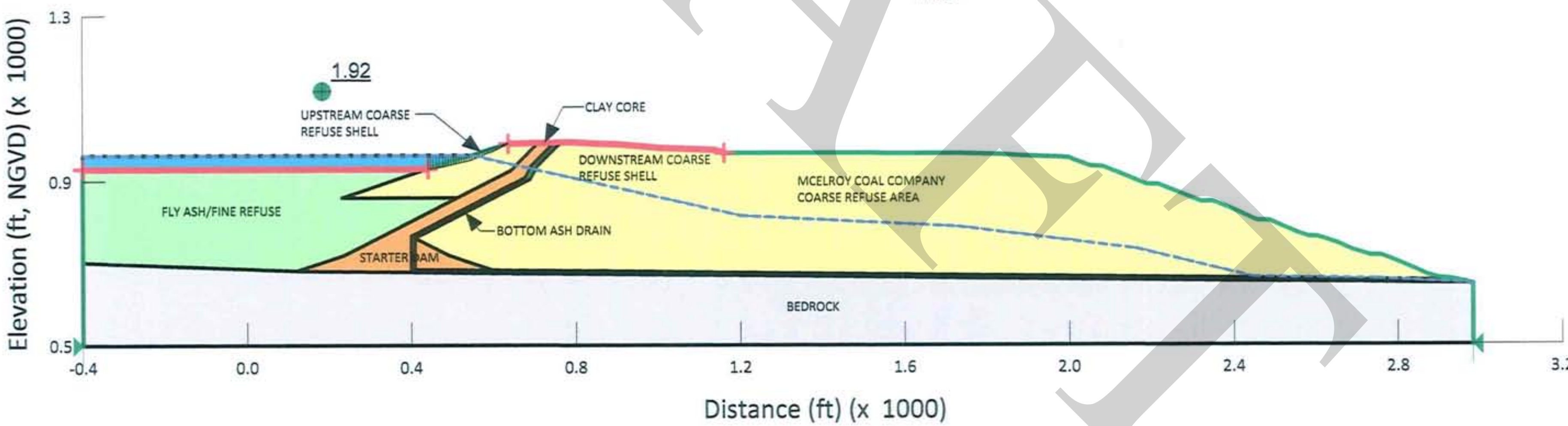
DRAFT

US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM - AS-BUILT STABILITY ANALYSIS
Comments: MAIN EMBANKMENT PROFILE AA - UPSTREAM STATIC
Name: CRD_PROFILEA-A_UPSTREAM STATIC.gsz
Date: 3/15/2009
Horz Seismic Load: 0

Description: COARSE REFUSE
Wt: 120
Cohesion: 0
Phi: 32
Unit Wt. Above WT: 115
Description: Fly Ash / Fine Refuse
Wt: 90
Cohesion: 0
Phi: 28
Unit Wt. Above WT: 85
Description: Clay Fill
Wt: 128
Cohesion: 600
Phi: 15
Unit Wt. Above WT: 123
Description: Clay Foundation
Wt: 128
Cohesion: 200
Phi: 20
Unit Wt. Above WT: 123
Description: Bottom Ash Drain
Wt: 110
Cohesion: 0
Phi: 36
Description: Bedrock
Wt: 168
Cohesion: 10000
Phi: 39

NOTES:
1. THE PHREATIC LEVEL USED IN THE ANALYSES IS BASED ON 3-10-09 PIEZOMETER READINGS PROVIDED BY AEPSC AND CONSOL.
2. POOL LEVEL = 964.2 FEET, NGVD IS BASED ON 3-10-09 LEVEL PROVIDED BY AEPSC.
3. APPROXIMATE CONNER RUN DAM GROUND SURFACE AND FLY ASH LEVELS BASED ON 12-08 TOPOGRAPHIC MAPPING FROM CONSOL AND 5-08 HYDRO SURVEY MAPPING FROM AEPSC.
4. MATERIAL PARAMETERS BASED ON PARAMETERS DEVELOPED IN APPROVED DESIGN REPORT.
5. DRAWING SCALE: 1" = 400'



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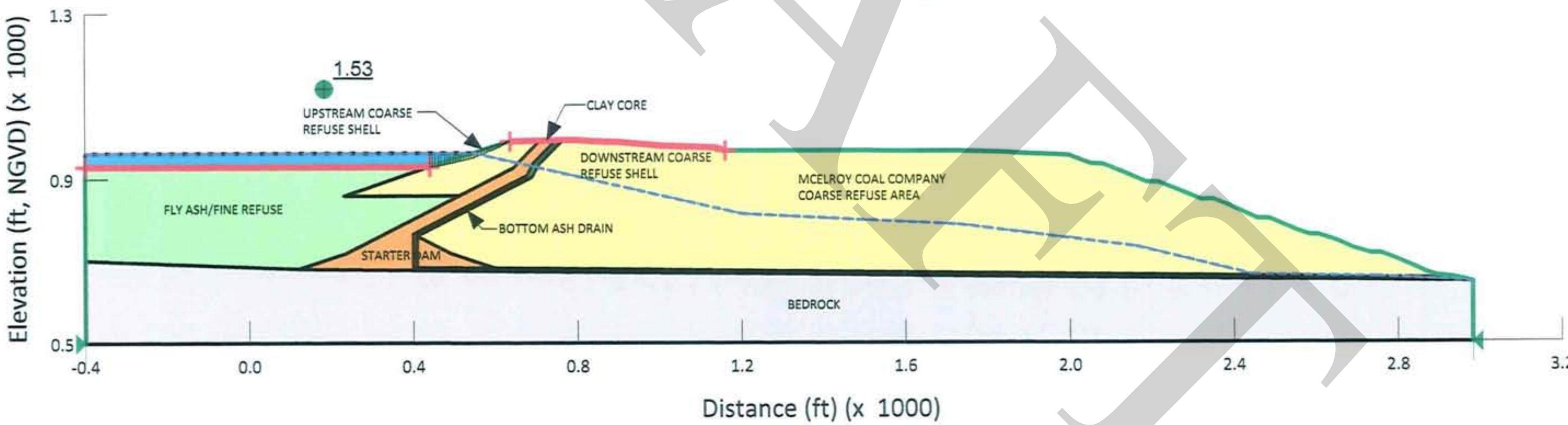
US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM - AS-BUILT STABILITY ANALYSIS
Comments: MAIN EMBANKMENT PROFILE AA - UPSTREAM DYNAMIC
Name: CRD_PROFILEA-A_UPSTREAM DYNAMIC.gsz
Date: 3/15/2009
Horz Seismic Load: 5.e-002

Description: COARSE REFUSE
Wt: 120
Cohesion: 0
Phi: 32
Unit Wt. Above WT: 115
Description: Fly Ash / Fine Refuse
Wt: 90
Cohesion: 0
Phi: 28
Unit Wt. Above WT: 85
Description: Clay Fill
Wt: 128
Cohesion: 600
Phi: 15
Unit Wt. Above WT: 123
Description: Clay Foundation
Wt: 128
Cohesion: 200
Phi: 20
Unit Wt. Above WT: 123
Description: Bottom Ash Drain
Wt: 110
Cohesion: 0
Phi: 36
Description: Bedrock
Wt: 168
Cohesion: 10000
Phi: 39

NOTES:
1. THE PHREATIC LEVEL USED IN THE ANALYSES IS BASED ON 3-10-09 PIEZOMETER READINGS PROVIDED BY AEPSC AND CONSOL.
2. POOL LEVEL = 964.2 FEET, NGVD IS BASED ON 3-10-09 LEVEL PROVIDED BY AEPSC.
3. APPROXIMATE CONNER RUN DAM GROUND SURFACE AND FLY ASH LEVELS BASED ON 12-08 TOPOGRAPHIC MAPPING FROM CONSOL AND 5-08 HYDRO SURVEY MAPPING FROM AEPSC.
4. MATERIAL PARAMETERS BASED ON PARAMETERS DEVELOPED IN APPROVED DESIGN REPORT.
5. DRAWING SCALE: 1" = 400'



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CONNER RUN DAM
2006 Slope Stability Analysis

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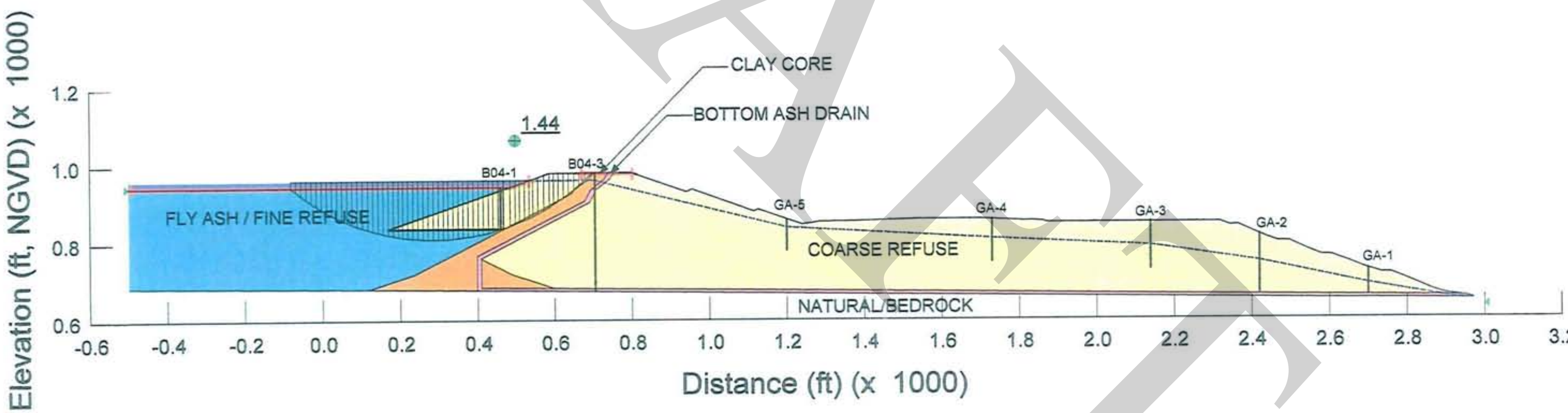
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM / McELROY REFUSE AREA
Comments: STAGE 9B - UPSTREAM RESIDUAL STRENGTH STABILITY - POOL @ 962', FINES/ASH @ 945'
Name: Conner Run Stage 9B Profile A-A Upstream Residual Strength Stability.gsz
Date: 3/8/2006
Method: Morgenstern-Price
Horz Seismic Load: 0



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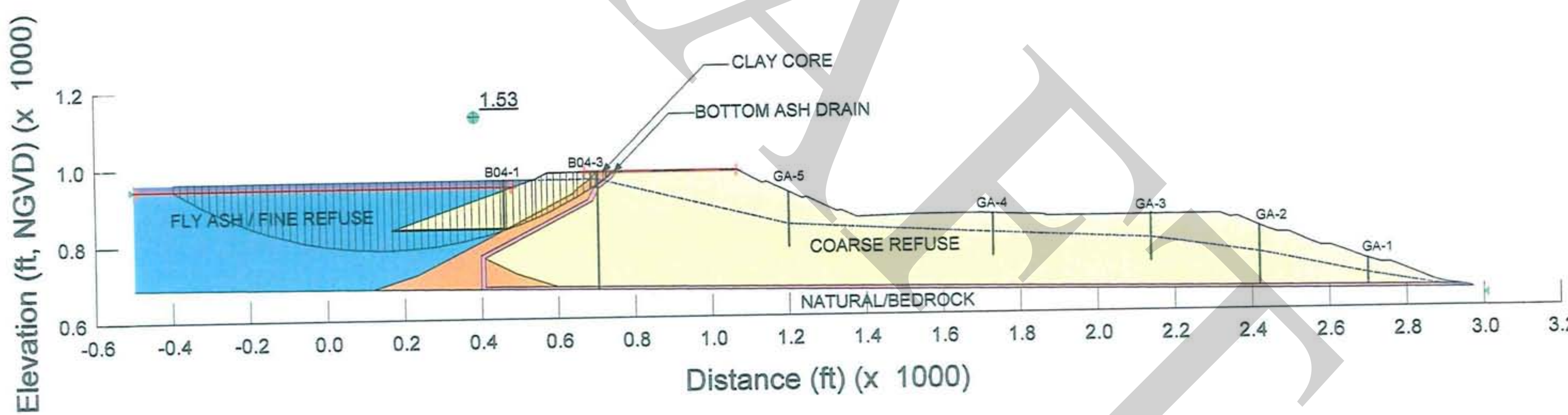
US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM / McELROY REFUSE AREA
Comments: STAGE 9C - UPSTREAM RESIDUAL STRENGTH STABILITY - POOL @ 962', FINES/ASH @ 945'
Name: Conner Run Stage 9C Profile A-A Upstream Residual Strength Stability.gsz
Date: 3/7/2006
Method: Morgenstern-Price
Horz Seismic Load: 0



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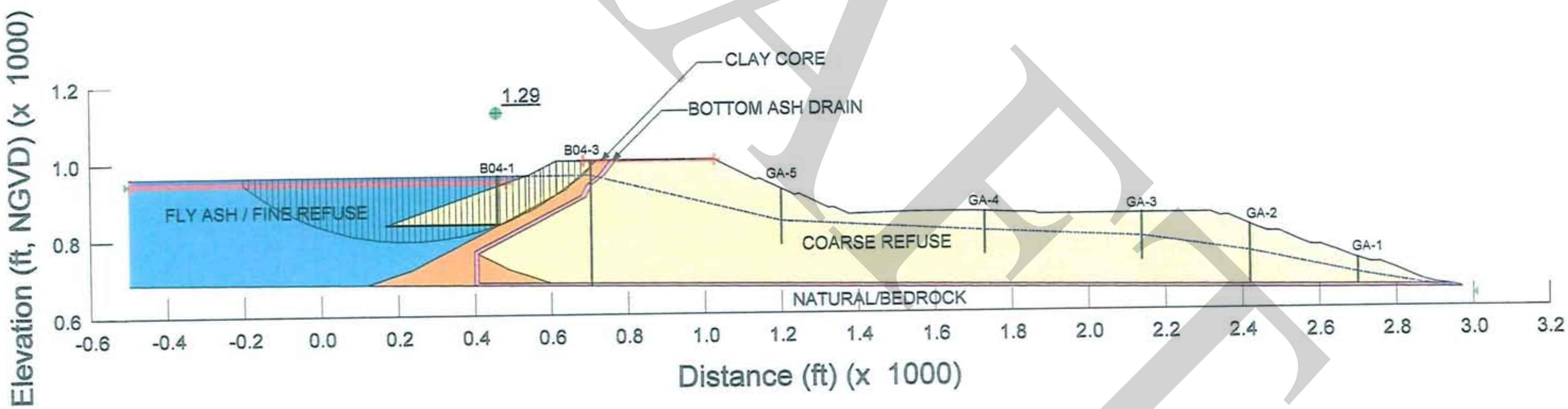
US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM / McELROY REFUSE AREA
Comments: STAGE 9D - UPSTREAM RESIDUAL STRENGTH STABILITY - POOL @ 962', FINES/ASH @ 945'
Name: Conner Run Stage 9D Profile A-A Upstream Residual Strength Stability.gsz
Date: 3/7/2006
Method: Morgenstern-Price
Horz Seismic Load: 0



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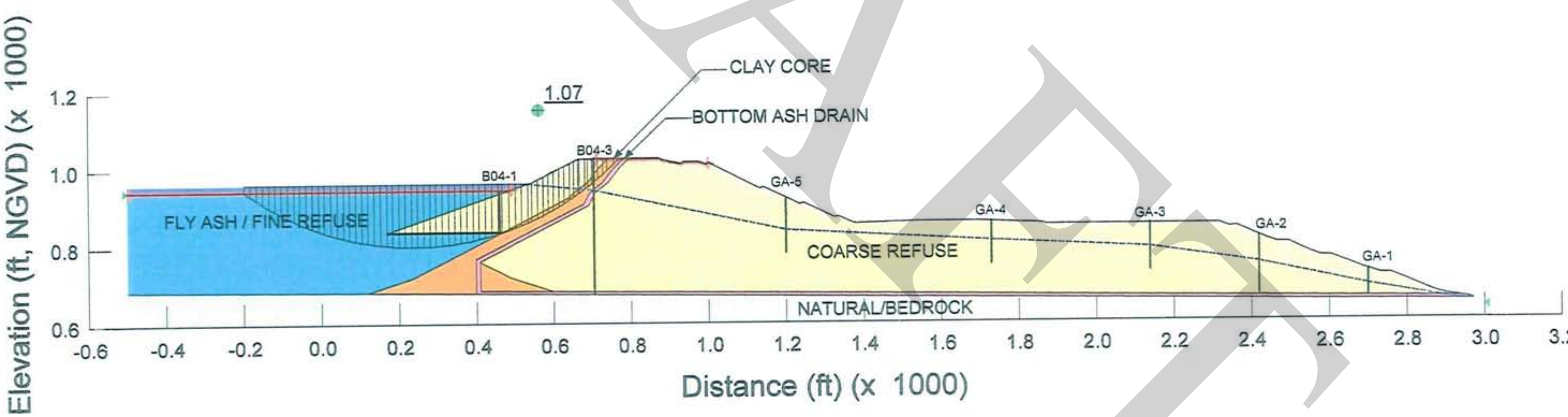
US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM / McELROY REFUSE AREA
Comments: STAGE 9E - UPSTREAM RESIDUAL STRENGTH STABILITY - POOL @ 962', FINES/ASH @ 945'
Name: Conner Run Stage 9E Profile A-A Upstream Residual Strength Stability.gsz
Date: 3/7/2006
Method: Morgenstern-Price
Horz Seismic Load: 0



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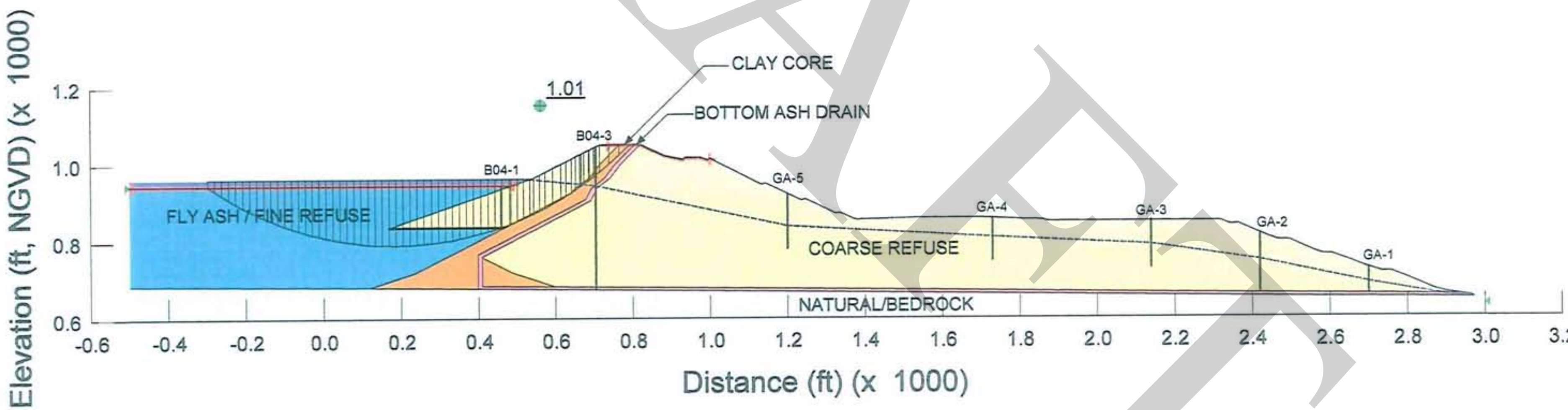
US EPA ARCHIVE DOCUMENT

Title: CONNER RUN DAM / McELROY REFUSE AREA
Comments: STAGE 9F - UPSTREAM RESIDUAL STRENGTH STABILITY - POOL @ 962', FINES/ASH @ 945'
Name: Conner Run Stage 9F Profile A-A Upstream Residual Strength Stability.gsz
Date: 3/7/2006
Method: Morgenstern-Price
Horz Seismic Load: 0



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BOTTOM ASH COMPLEX
2009 Slope Stability Analysis

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US EPA ARCHIVE DOCUMENT

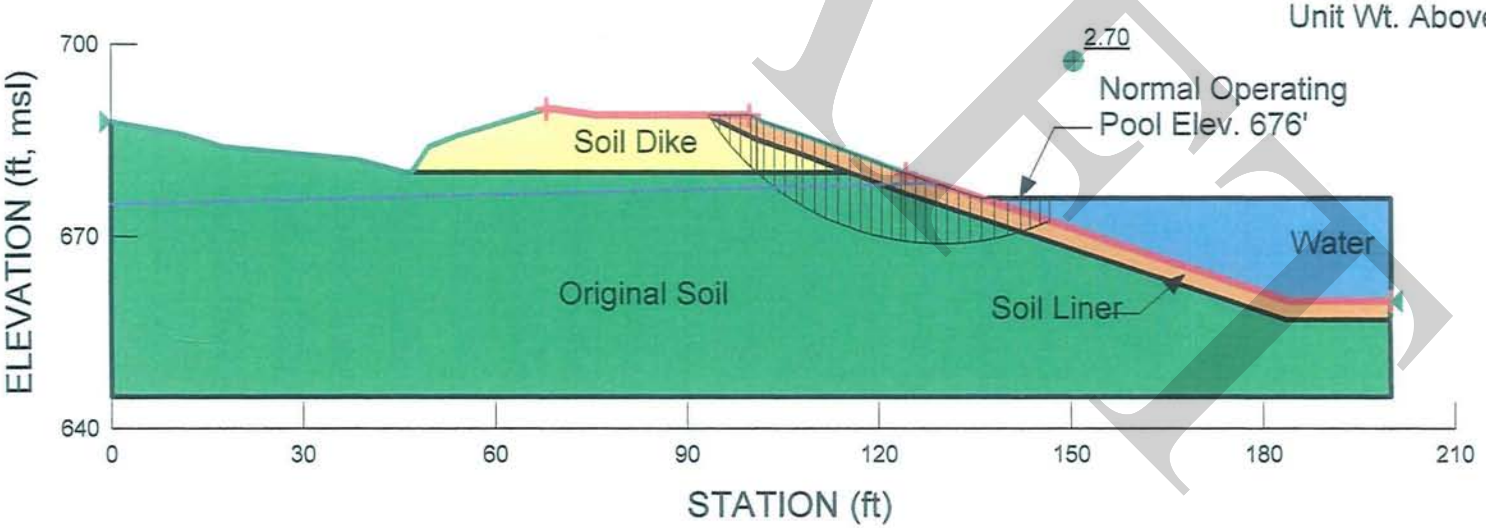
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP1-SP1 Upstream Static Stability Analysis
Name: MBAP_SP1_US Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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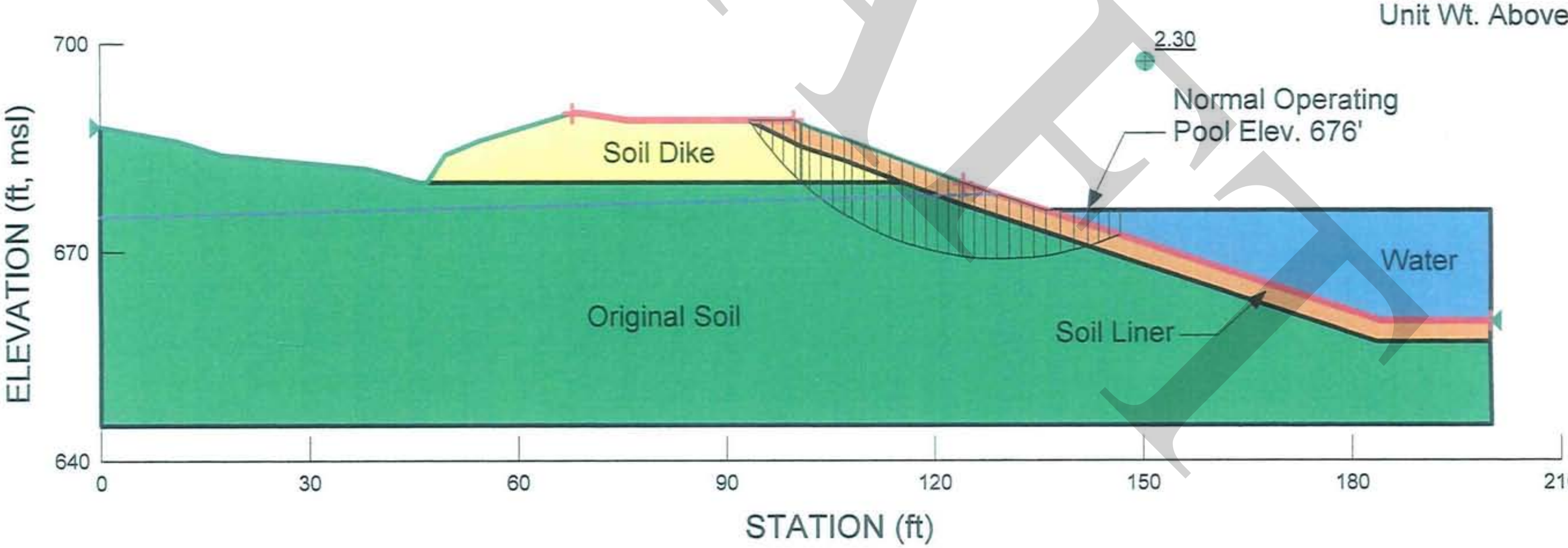
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP1-SP1 Upstream Dynamic Stability Analysis
Name: MBAP_SP1_UD Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price
Horz Seismic Load: 5.e-002

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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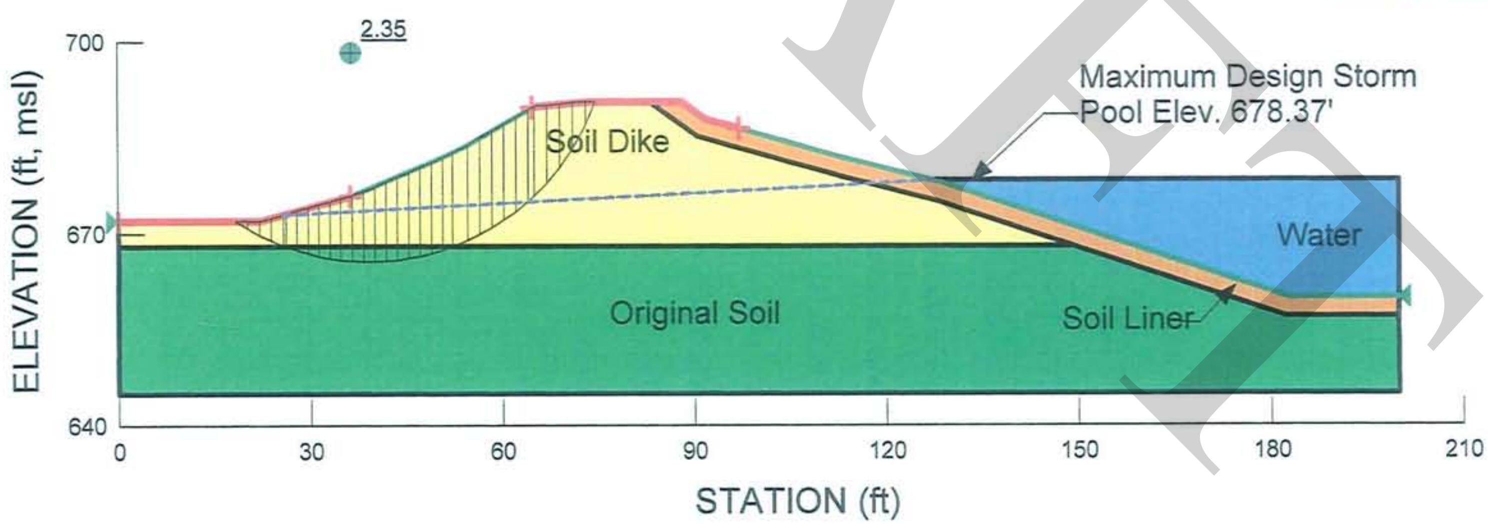
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP2-SP2 Downstream Static Stability Analysis
Name: MBAP_SP2_DS Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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US EPA ARCHIVE DOCUMENT

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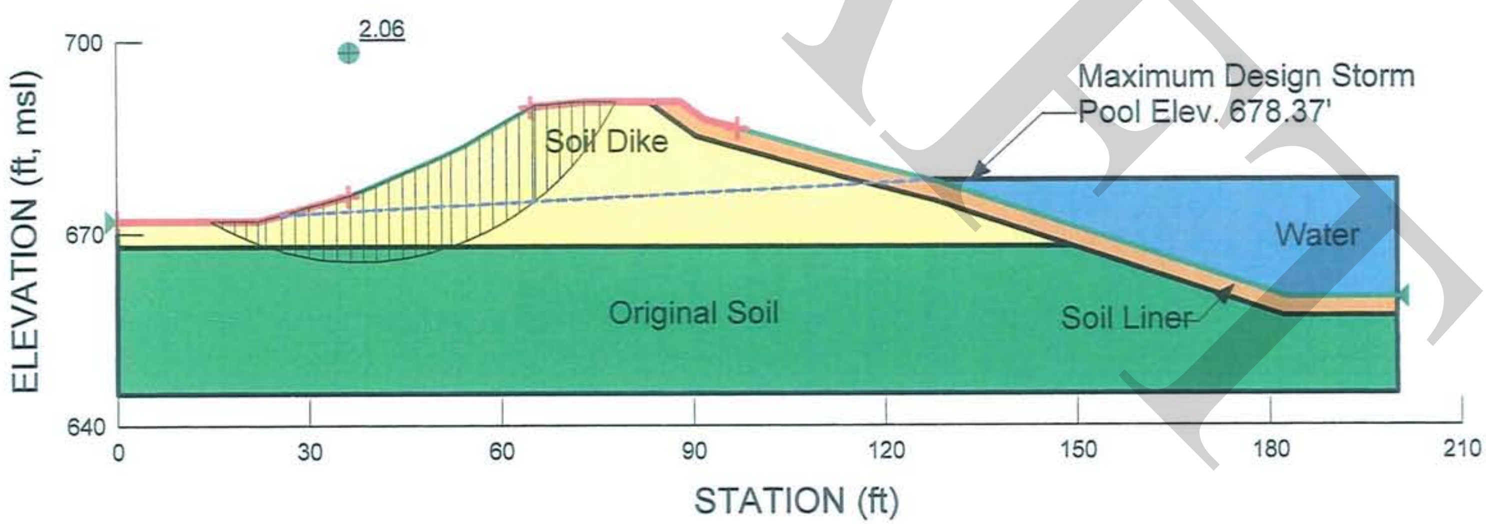
Title: Mitchell Bottom Ash Pond
Comments: Profile SP2-SP2 Downstream Dynamic Stability Analysis
Name: MBAP_SP2_DD Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price
Horz Seismic Load: 5.e-002

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



US EPA ARCHIVE DOCUMENT

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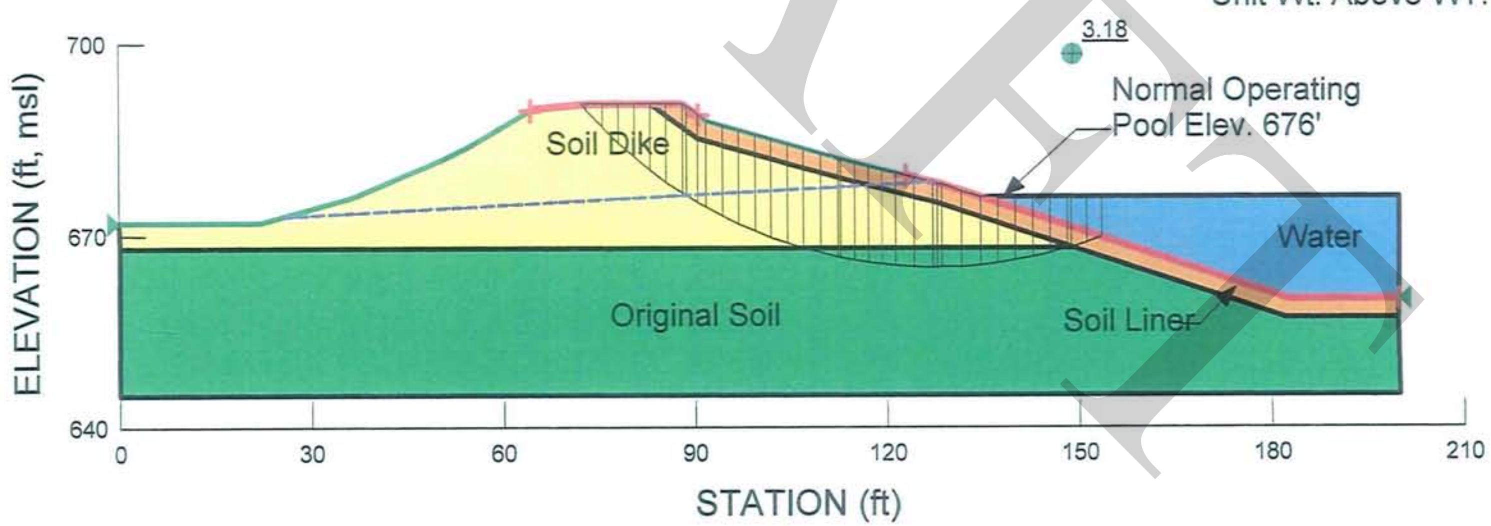
Title: Mitchell Bottom Ash Pond
Comments: Profile SP2-SP2 Upstream Static Stability Analysis
Name: MBAP_SP2_US Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



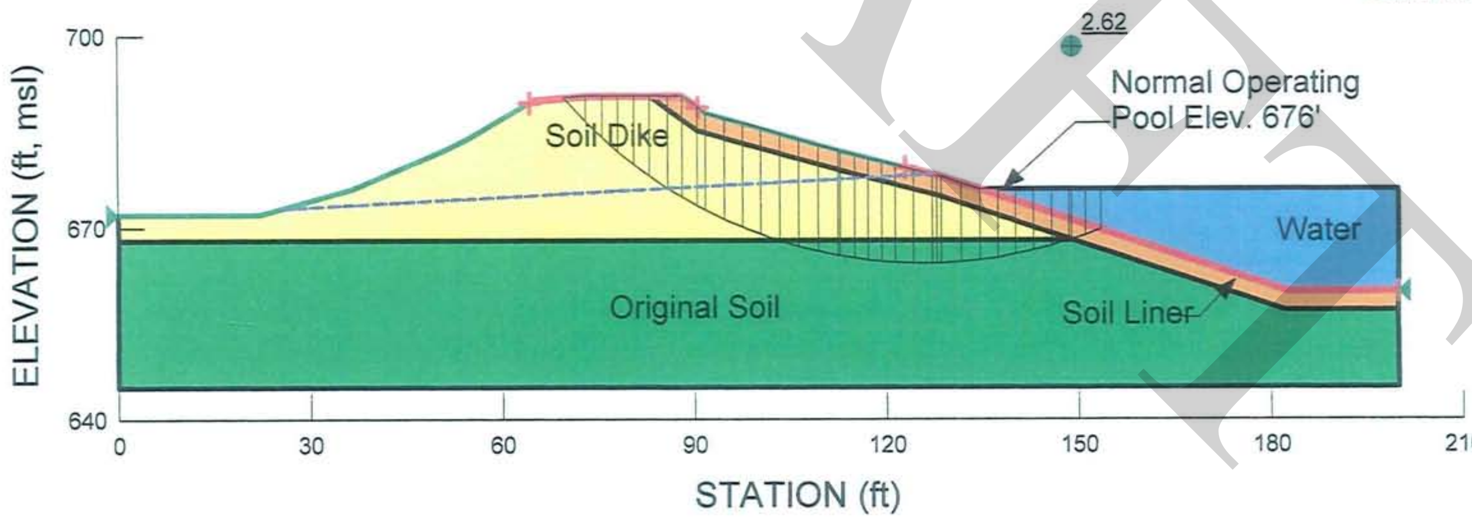
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP2-SP2 Upstream Dynamic Stability Analysis
Name: MBAP_SP2_UD Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price
Horz Seismic Load: 5.e-002

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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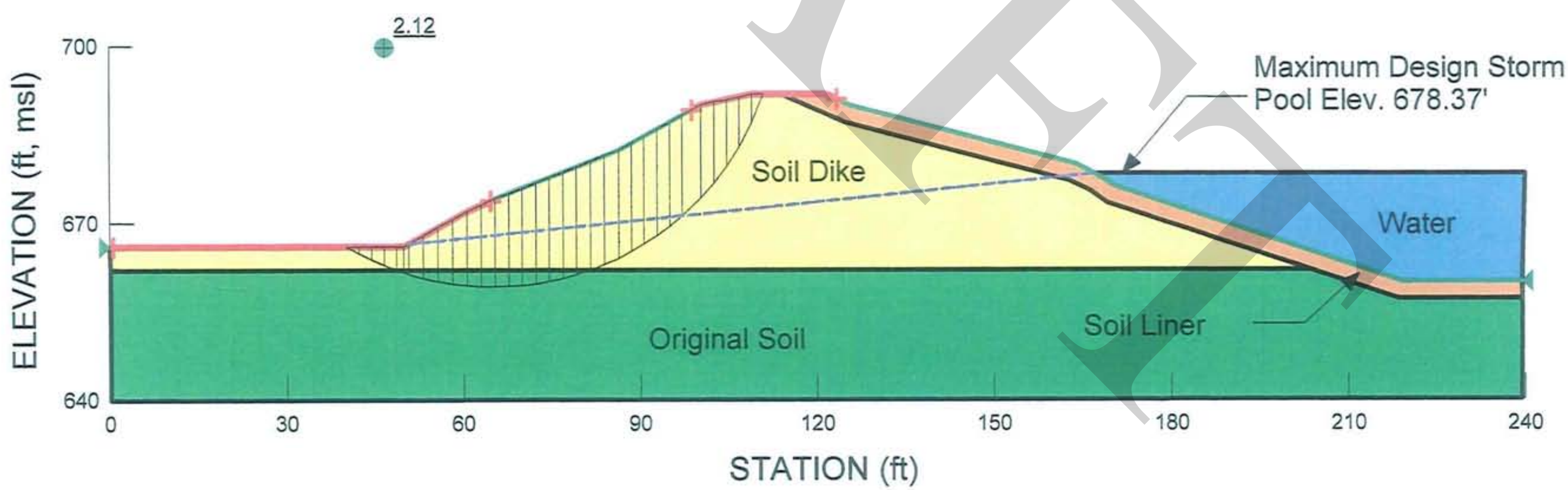
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP3-SP3 Downstream Static Stability Analysis
Name: MBAP_SP3_DS Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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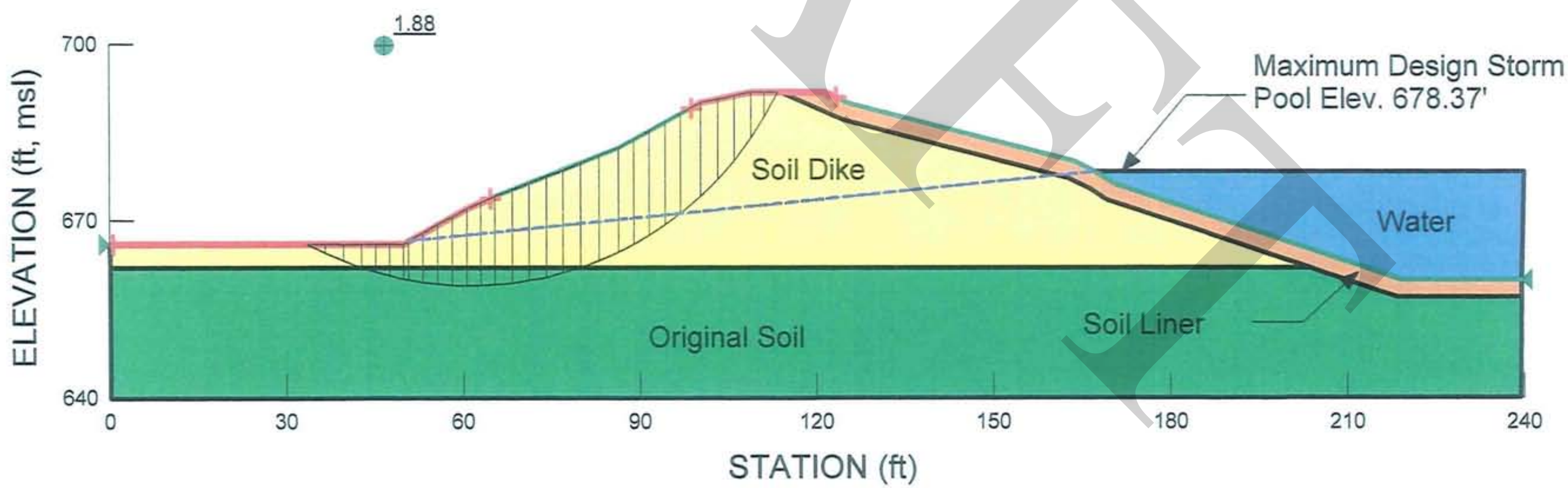
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP3-SP3 Downstream Dynamic Stability Analysis
Name: MBAP_SP3_DD Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price
Horz Seismic Load: 5.e-002

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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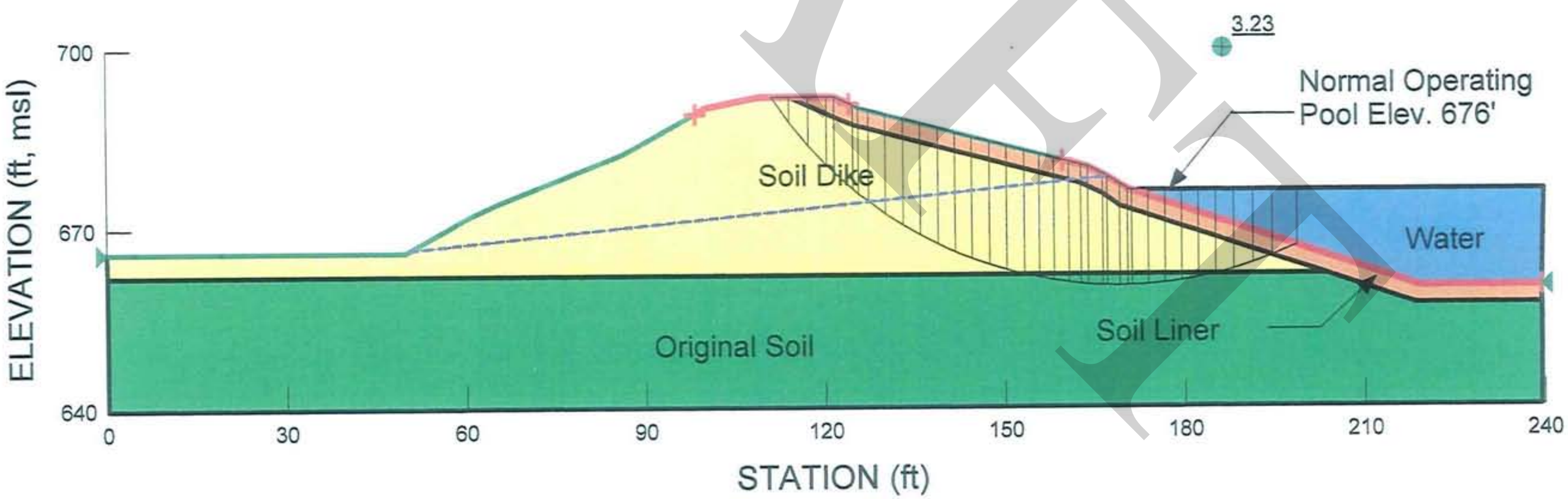
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP3-SP3 Upstream Static Stability Analysis
Name: MBAP_SP3_US Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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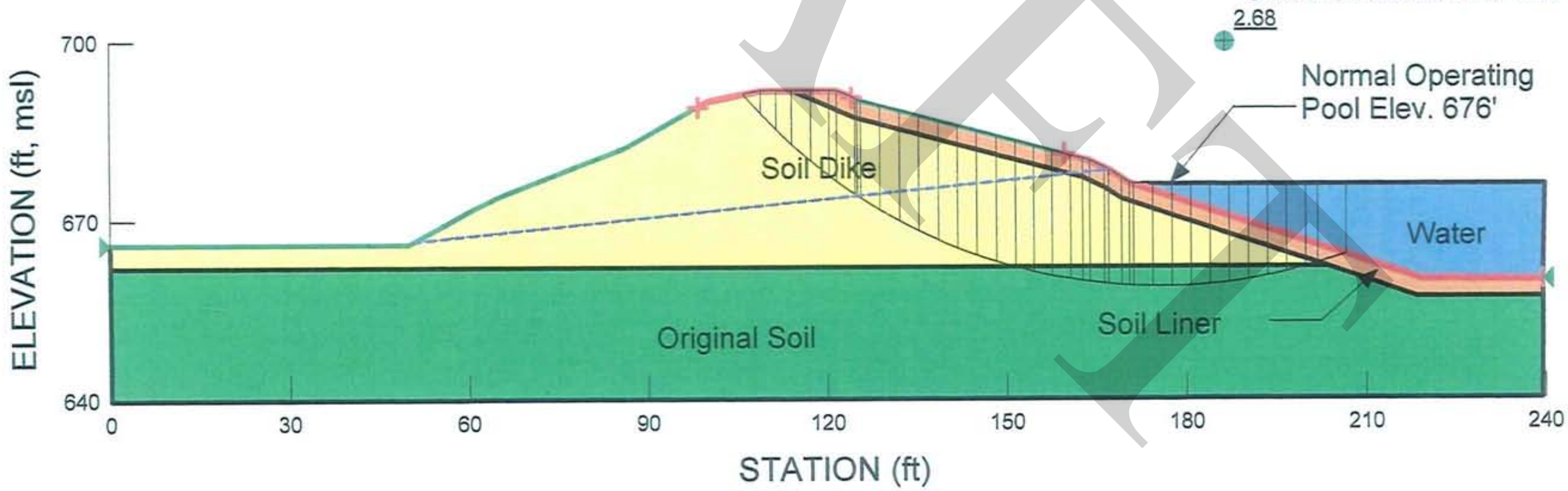
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP3-SP3 Upstream Dynamic Stability Analysis
Name: MBAP_SP3_UD Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price
Horz Seismic Load: 5.e-002

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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US EPA ARCHIVE DOCUMENT

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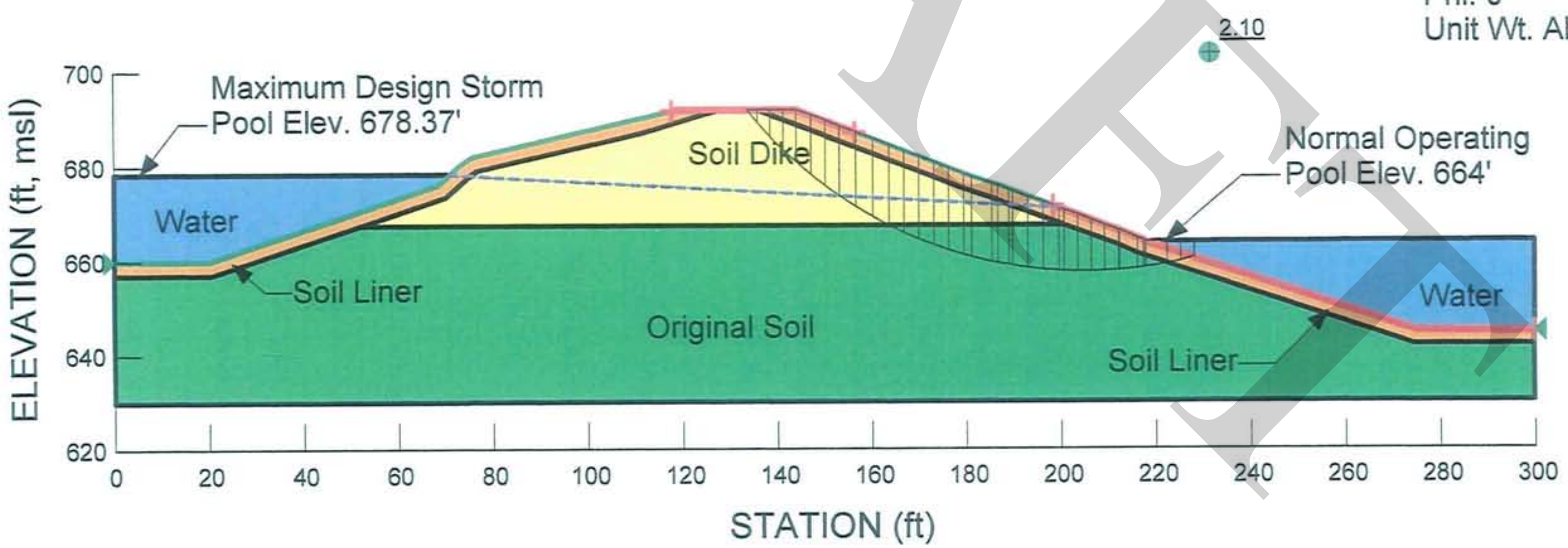
Title: Mitchell Bottom Ash Pond
Comments: Profile SP4-SP4 Downstream Static Stability Analysis
Name: MBAP_SP4_DS Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



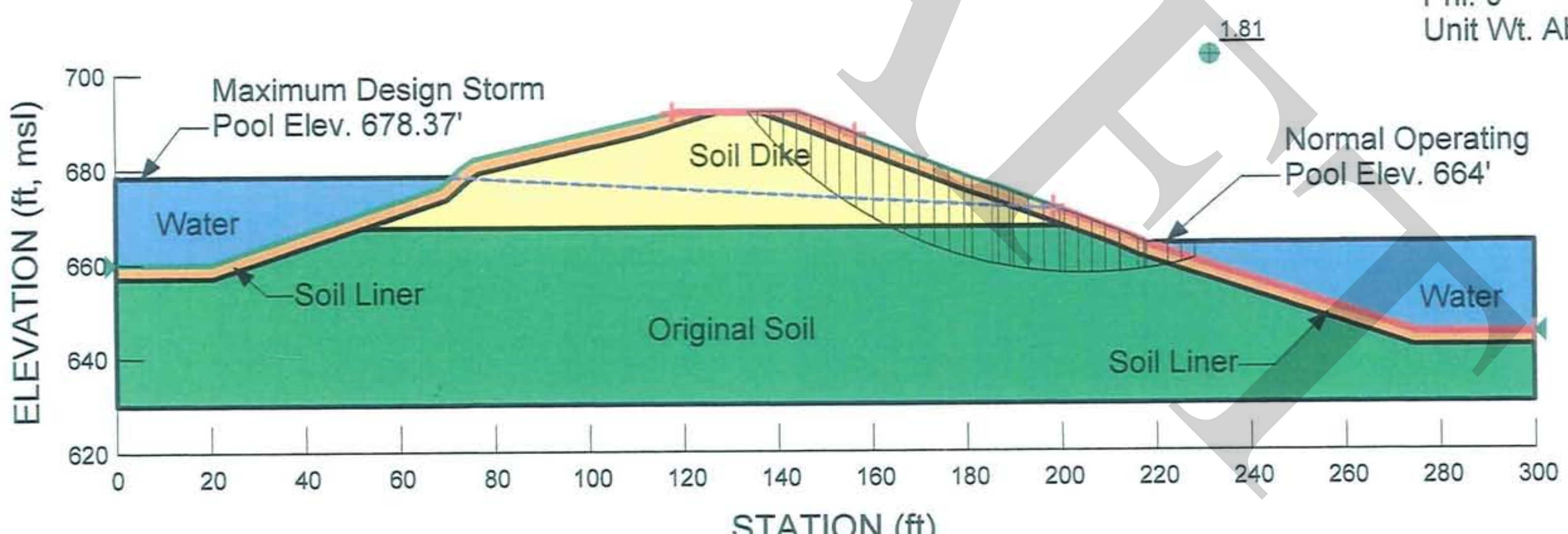
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP4-SP4 Downstream Dynamic Stability Analysis
Name: MBAP_SP4_DD Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price
Horz Seismic Load: 5.e-002

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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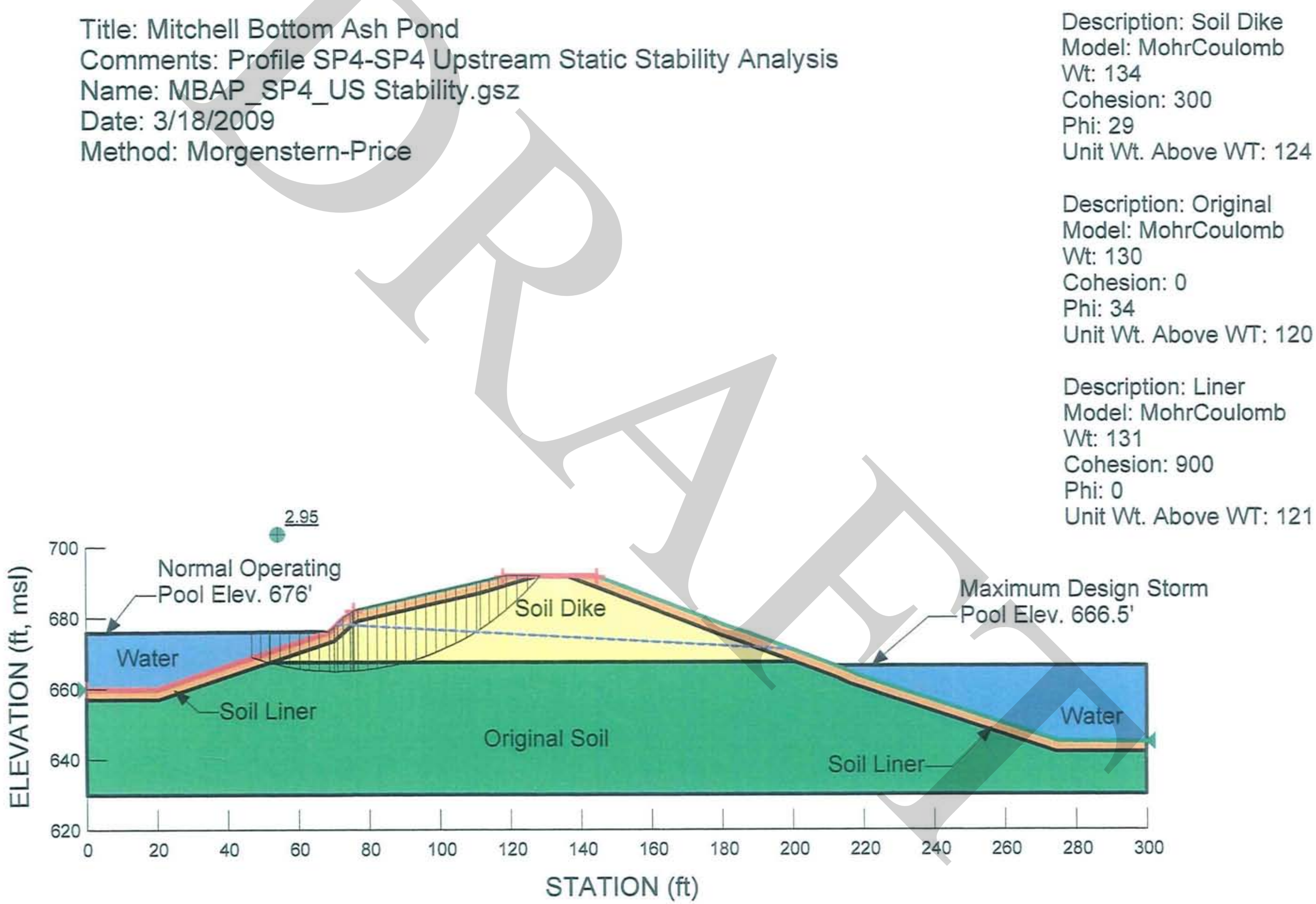
US EPA ARCHIVE DOCUMENT



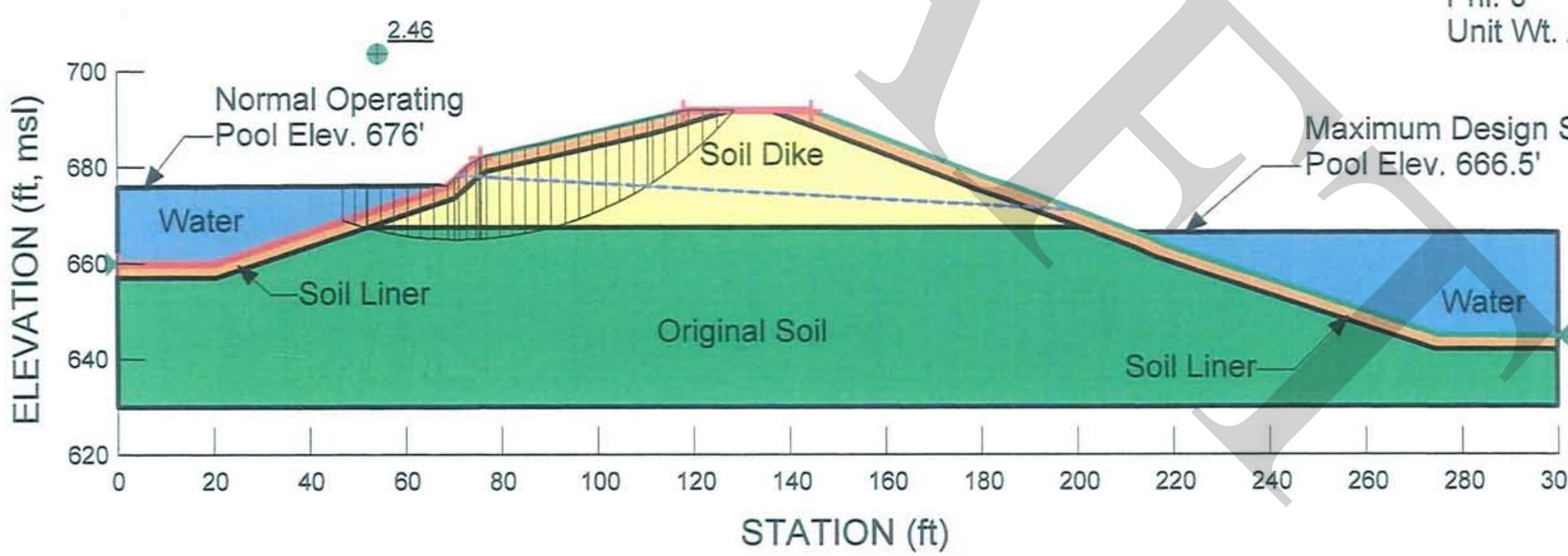
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP4-SP4 Upstream Dynamic Stability Analysis
Name: MBAP_SP4_UD Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price
Horz Seismic Load: 5.e-002

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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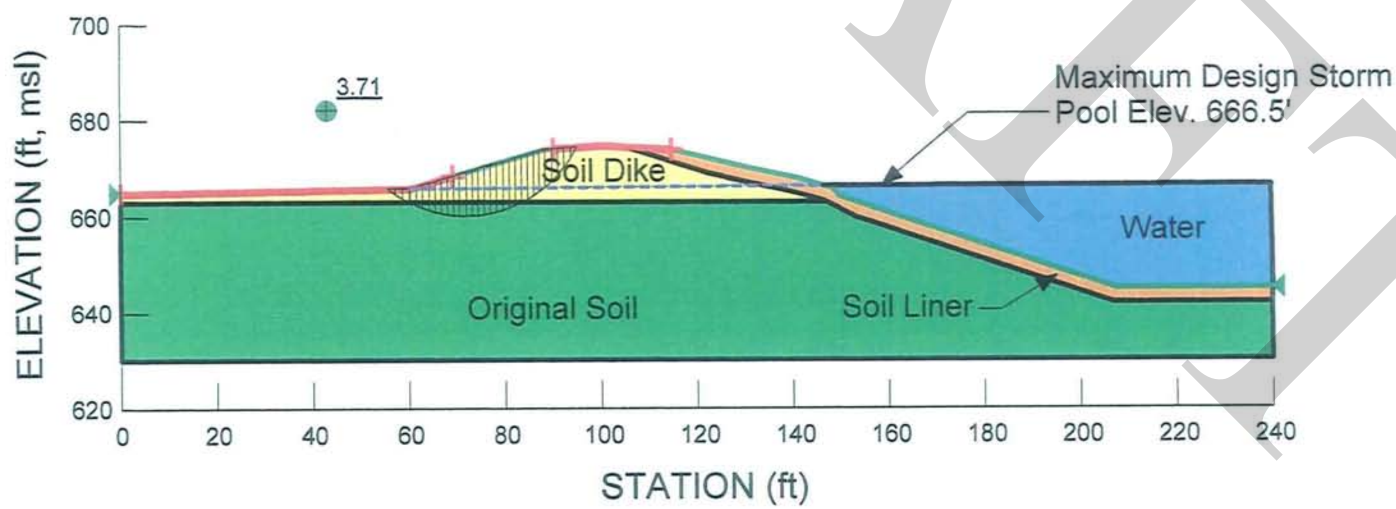
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP5-SP5 Downstream Static Analysis
Name: MBAP_SP5_DS Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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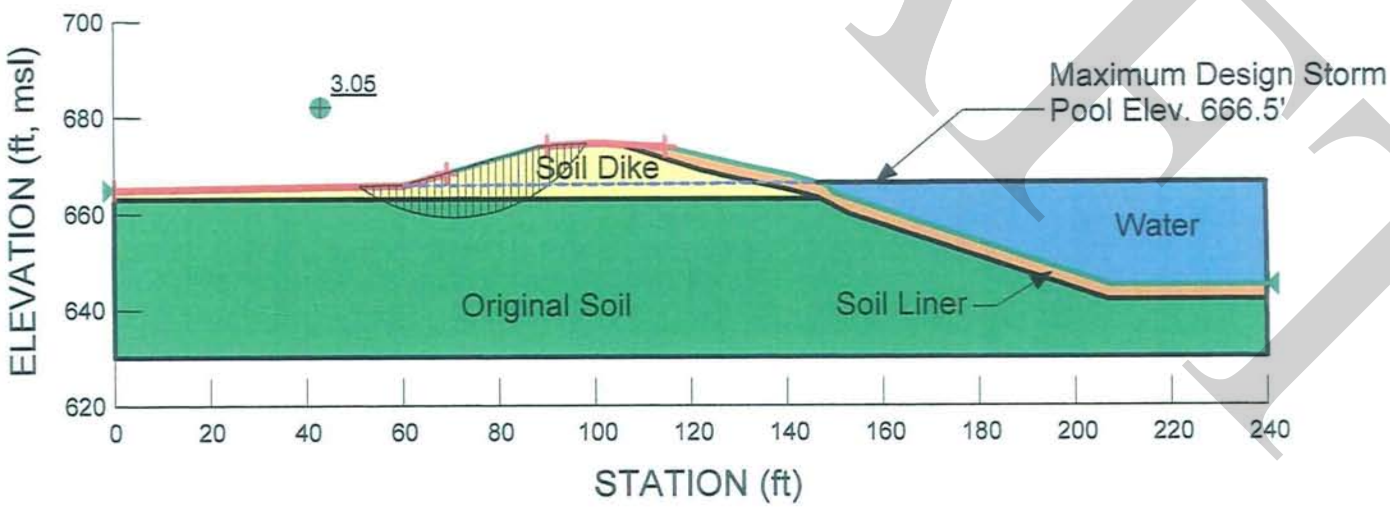
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP5-SP5 Downstream Dynamic Analysis
Name: MBAP_SP5_DD Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price
Horz Seismic Load: 5.e-002

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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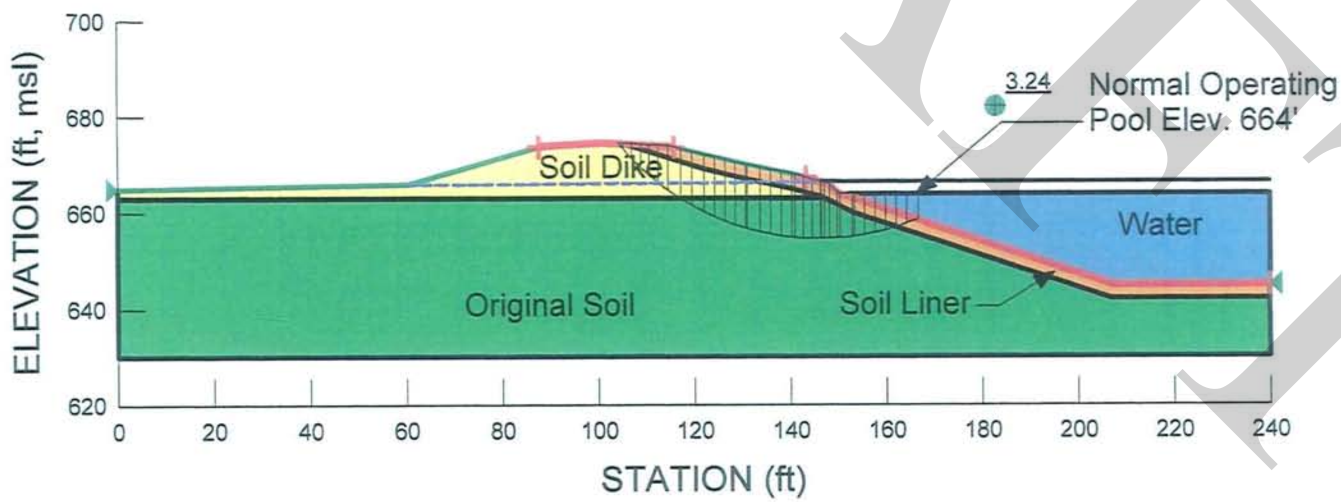
US EPA ARCHIVE DOCUMENT

Title: Mitchell Bottom Ash Pond
Comments: Profile SP5-SP5 Upstream Static Analysis
Name: MBAP_SP5_US Stability.gsz
Date: 3/18/2009
Method: Morgenstern-Price

Description: Soil Dike
Model: MohrCoulomb
Wt: 134
Cohesion: 300
Phi: 29
Unit Wt. Above WT: 124

Description: Original
Model: MohrCoulomb
Wt: 130
Cohesion: 0
Phi: 34
Unit Wt. Above WT: 120

Description: Liner
Model: MohrCoulomb
Wt: 131
Cohesion: 900
Phi: 0
Unit Wt. Above WT: 121



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US EPA ARCHIVE DOCUMENT

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APPENDIX E

INSTRUMENTATION DATA

PIEZOMETER DATA AND GRAPHS

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US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Geo/Environmental Associates, Inc.

Instrumentation Data Sheet

Project: Conner Run Dam
GA Job No.: 05-357
Title: Piezometer Data: B04-1, B04-2, B04-3, P-101, P-105, P-107, P-114
Performed By: SWF
Date: 3/11/09

Transducer Elevations:
B04-1 (pneumatic) 831.8 ft, NGVD (Transducer)
BOH-2 (pneumatic) 851.3 ft, NGVD (Transducer)

B04-3 (standpipe
B-101 (standpipe
B-105 (standpipe
B-107 (standpipe
B-114 (standpipe

See Sheet - "Top of Pipe Elev"

DATE	Pool Level	Pneumatic Piezometer B04-1		Pneumatic Piezometer B04-2		Standpipe Piezometer B04-3		Standpipe Piezometer P-101		Standpipe Piezometer P-105		Standpipe Piezometer P-107		Standpipe Piezometer P-114	
		Reading (psi)	Piezometric Level (ft, msl)	Reading (psi)	Piezometric Level (ft, msl)	Reading (psi)	Piezometric Level (ft, msl)	Reading (ft)	Piezometric Level (ft, msl)	Reading (ft)	Piezometric Level (ft, msl)	Reading (ft)	Piezometric Level (ft, msl)	Reading (ft)	Piezometric Level (ft, msl)
12-Aug-08	960.3	53.16	954.5	43.18	950.9	254.0	729.4	148.7	836.1	143.2	837.7	173.7	812.1	188.2	791.8
19-Aug-08	960.4	53.16	954.5	43.20	951.0	253.8	729.6	148.7	836.1	143.0	837.9	173.8	812.0	187.3	792.7
26-Aug-08	960.4	53.19	954.5	43.20	951.0	253.5	729.9	148.4	836.4	143.0	838.0	173.7	812.1	187.6	792.5
2-Sep-08	960.9	53.40	955.0	43.36	951.3	253.3	730.1	148.3	836.5	142.9	838.0	173.6	812.2	187.5	792.6
9-Sep-08	960.4	53.18	954.5	43.16	950.9	253.1	730.3	148.3	836.5	142.9	838.1	173.5	812.3	187.7	792.3
16-Sep-08	961.8	53.76	955.9	43.74	952.2	253.1	730.3	148.2	836.6	142.9	838.1	173.4	812.4	187.9	792.1
23-Sep-08	962	53.85	956.1	43.85	952.5	253.0	730.5	148.0	836.8	142.6	838.4	173.0	812.8	186.5	793.5
30-Sep-08	962	53.89	956.2	43.88	952.5	252.4	731.0	147.8	837.0	142.3	838.6	172.3	813.5	186.6	793.4
7-Oct-08	962	53.93	956.2	43.88	952.5	257.4	731.1	147.7	837.1	142.4	838.5	172.6	813.2	187.1	793.0
14-Oct-08	962.1	53.91	956.2	43.89	952.6	257.0	731.4	152.6	837.2	142.3	838.7	171.9	813.9	192.6	792.4
21-Oct-08	962	53.92	956.2	43.90	952.6	261.7	731.7	157.3	837.5	142.5	838.5	172.0	813.8	192.8	792.2
28-Oct-08	962	53.84	956.0	43.88	952.5	261.5	732.0	157.1	837.7	142.5	838.5	171.9	813.9	193.0	792.0
4-Nov-08	961.9	53.85	956.1	43.93	952.6	261.3	732.2	162.1	838.1	142.1	838.9	176.7	814.1	193.2	791.9
11-Nov-08	961.7	53.85	956.1	43.88	952.5	266.3	732.2	162.3	837.8	142.7	838.2	177.1	813.7	193.7	791.4
18-Nov-08	962	53.85	956.1	43.90	952.6	266.0	732.4	162.2	837.9	142.7	838.2	176.9	813.9	193.8	791.2
25-Nov-08	962.1	53.86	956.1	44.06	952.9	265.3	733.1	161.8	838.3	142.5	838.5	176.5	814.3	193.5	791.5
2-Dec-08	962.1	53.80	955.9	44.04	952.9	265.4	733.1	162.1	838.0	142.8	838.2	176.9	813.9	194.0	791.0
9-Dec-08	962.1	53.80	955.9	44.01	952.8	265.5	732.9	161.9	838.2	142.7	838.2	176.7	814.1	193.9	791.1
16-Dec-08	962.75	53.98	956.4	44.15	953.2	265.5	732.9	161.9	838.3	142.8	838.2	177.3	813.5	194.0	791.0
23-Dec-08	964.2	54.69	958.0	44.96	955.0	265.3	733.1	161.3	838.8	142.5	838.4	177.1	813.7	194.0	791.1
30-Dec-08	964.2	54.75	958.1	45.00	955.1	264.7	733.8	161.3	838.8	142.1	838.8	176.7	814.1	193.8	791.3
6-Jan-09	964.2	54.75	958.1	44.96	955.0	264.0	734.4	161.1	839.0	142.0	839.0	176.3	814.5	193.6	791.4
13-Jan-09	964.2	54.8	958.1	45.00	955.1	264.1	734.4	161.1	839.0			176.3	814.5	193.0	792.0
20-Jan-09	964	54.6	957.7	44.81	954.7	263.4	735.1	161.2	839.0	142.1	838.8	176.4	814.4	193.8	791.2
27-Jan-09	964.2	54.7	958.1	44.90	954.9	263.1	735.3	161.1	839.1	142.2	838.8	176.5	814.3	193.8	791.2
3-Feb-09	964.2	54.8	958.2	44.94	955.0	262.6	735.9	160.9	839.2	142.1	838.8	176.4	814.4	193.7	791.3
10-Feb-09	964.2	54.8	958.3	44.94	955.0	262.1	736.3	160.9	839.2	142.0	839.0	176.4	814.4	193.7	791.4
17-Feb-09	965.4	55.3	959.4	45.40	956.0	261.9	736.5	160.8	839.3	142.0	838.9	176.4	814.4	193.7	791.4
24-Feb-09	964.8	55.0	958.8	45.14	955.4	261.6	736.8	161.0	839.1	142.0	838.9	176.4	814.4	193.8	791.3

	B04-1	B04-2	B04-3	P-101	P-105	P-107	P-114
Minimum Piezometer Level:	954.5	950.9	729.4	836.1	837.7	812.0	791.0
Maximum Piezometer Level:	959.4	956.0	736.8	839.3	839.0	814.5	793.5

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Geo/Environmental Associates, Inc.

Instrumentation Data Sheet

Project: Conner Run Dam
GA Job No.: 05-357
Title: Piezometer Top of Pipe Elevations
Performed By: SWF
Date: 3/11/09

B04-3		P-101		P-105		P-107		P-114	
Top of Pipe Elev.	Dates Valid	Top of Pipe Elev.	Dates Valid	Top of Pipe Elev.	Dates Valid	Top of Pipe Elev.	Dates Valid	Top of Pipe Elev.	Dates Valid
935.1	start to 7/12/05	935	6/14/05 to 6/30/05	934.7	start to 7/12/05	941.2	start to 7/12/05	907.2	start to 7/19/05
945.9	7/19/05 to 8/9/05	945	7/5/05 to 8/9/05	943.9	7/19/05	946.1	7/19/05 to 8/16/05	910.6	7/26/05
950.68	8/16/05	950.15	8/16/05	953.9	7/26/05 to 9/21/05	971.95	5/2/06 to 7/11/06	920.6	8/2/05 to 7/11/06
955.08	8/23/05	955.08	8/23/05	968.45	9/27/05 to 10/11/05	976.95	7/18/06 to 9/19/06	925.6	7/18/06 to 7/25/06
960.33	8/30/05 to 9/21/05	960.57	8/30/05 to 10/25/05	973.67	10/18/05 to 8/15/06	981.95	9/26/06 to 10/24/06	930.6	8/1/06
965.34	9/27/05 to 10/18/05	970	11/1/05 to 815/06	975.77	8/22/06 to 9/26/06	985.79	10/31/06 10/28/08	935.6	8/8/06
970.41	10/25/05	984.79	8/22/06 to 10/7/08	980.93	10/3/06 to present	990.79	11/4/08 to present	940.6	8/15/06
969.92	11/1/05 to 6/20/06	989.79	10/14/08					947.15	8/22/06
974.69	6/27/06 to 8/15/06	994.79	10/21/08 to 10/28/08					952.15	8/29/06
979.67	8/22/06 to 10/10/06	1000.1	11/4/08 to present					957.15	9/5/06
983.45	10/17/06 to 9/30/08							962.15	9/12/06 to 9/19/06
988.45	10/7/08 to 10/14/08								
993.45	10/21/08 to 11/4/08								
998.45	11/11/08 to present							965.02	9/26/06 to 4/15/08
								970.02	4/22/08 to 4/29/08
								975.02	5/6/08 to 7/8/08
								980.02	7/15/08 to 10/7/08
								985.02	10/14/08 to present

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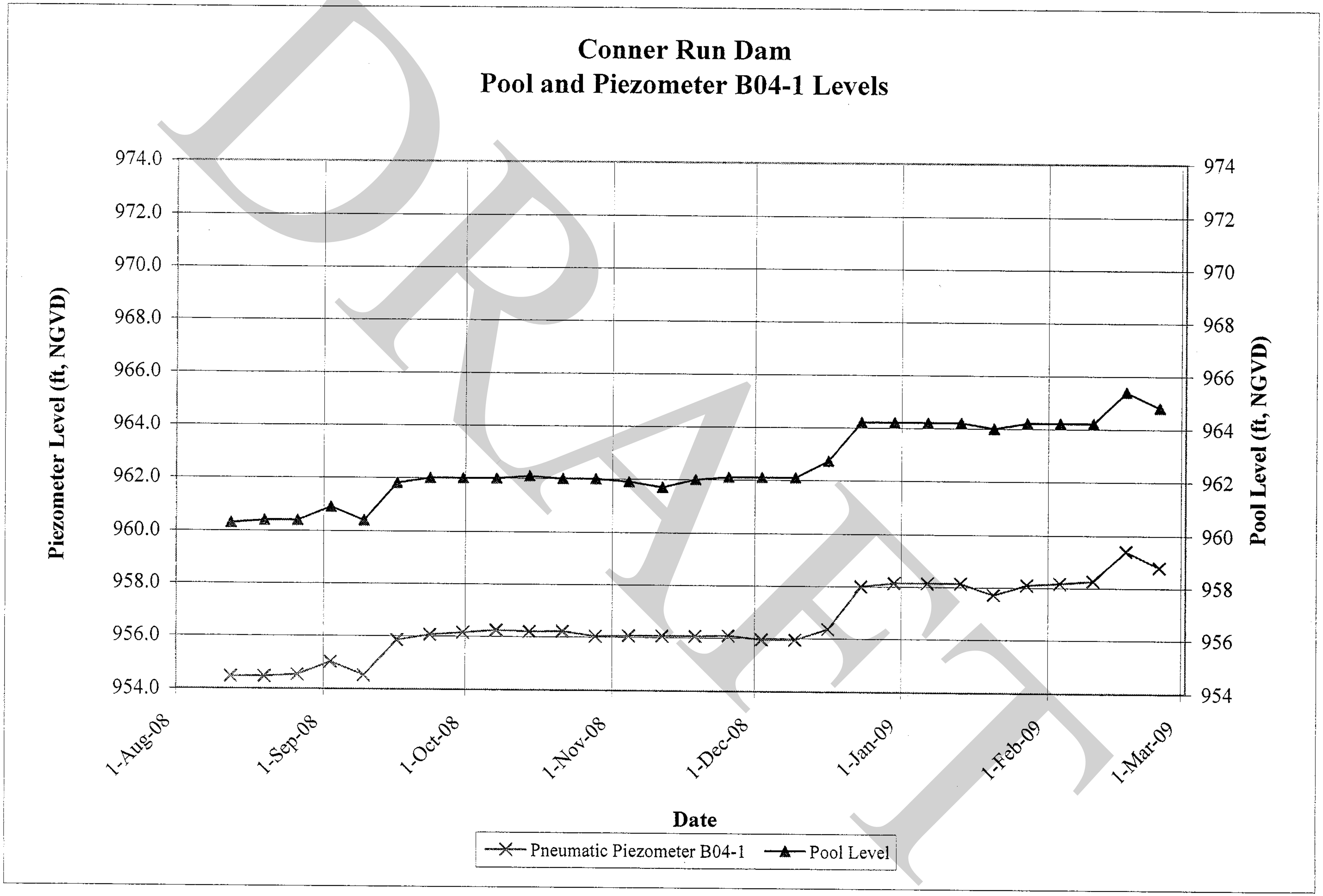

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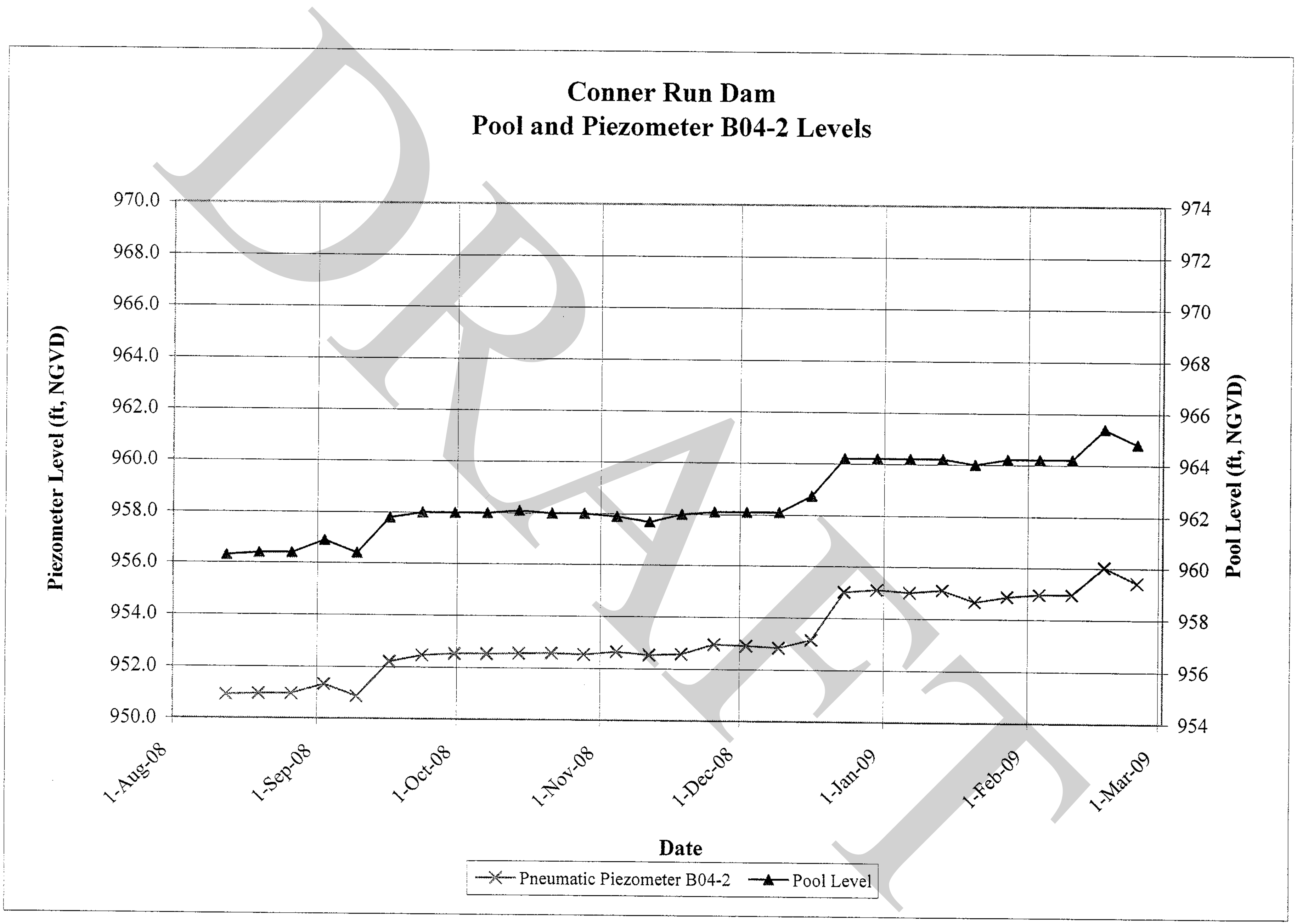

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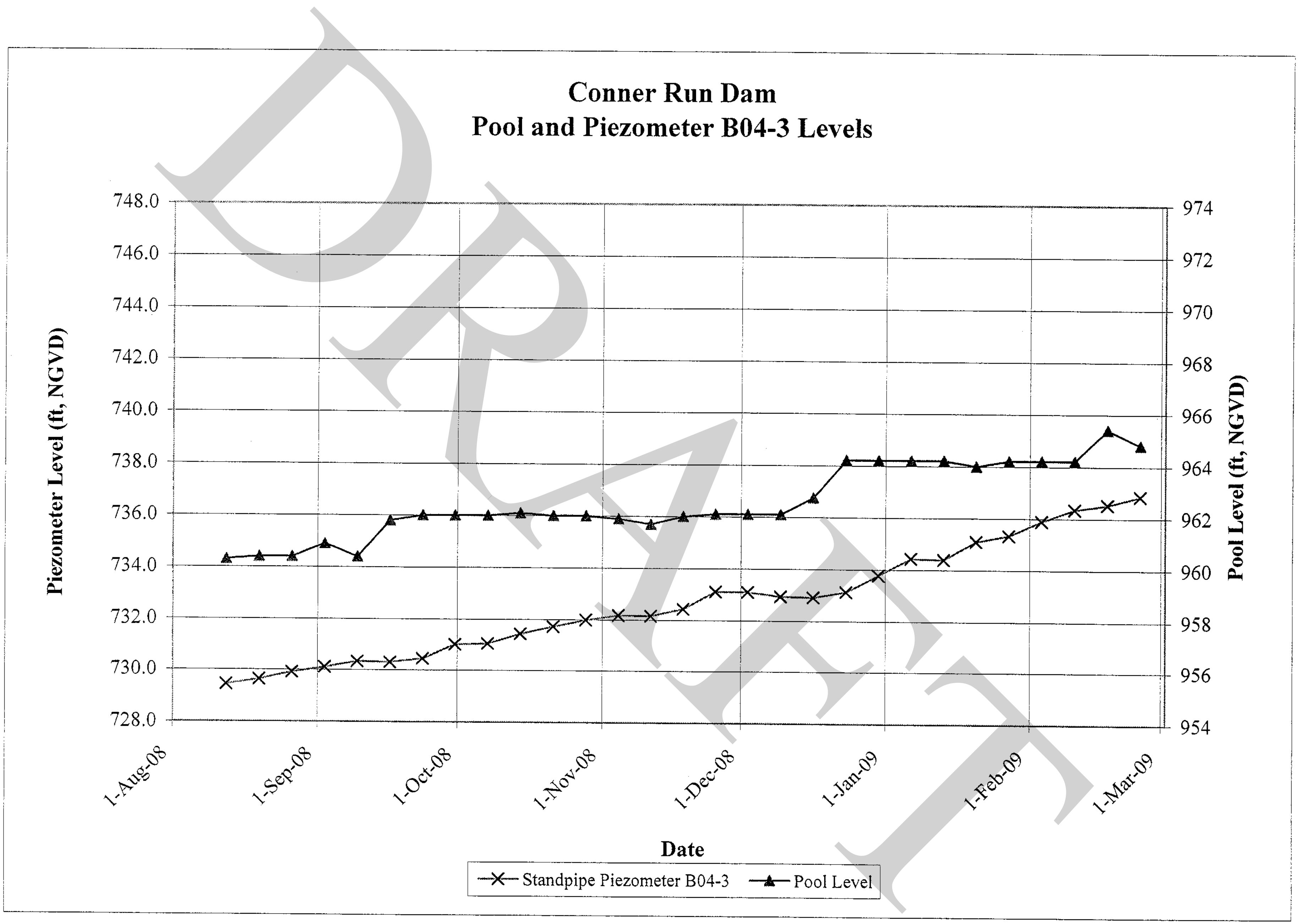

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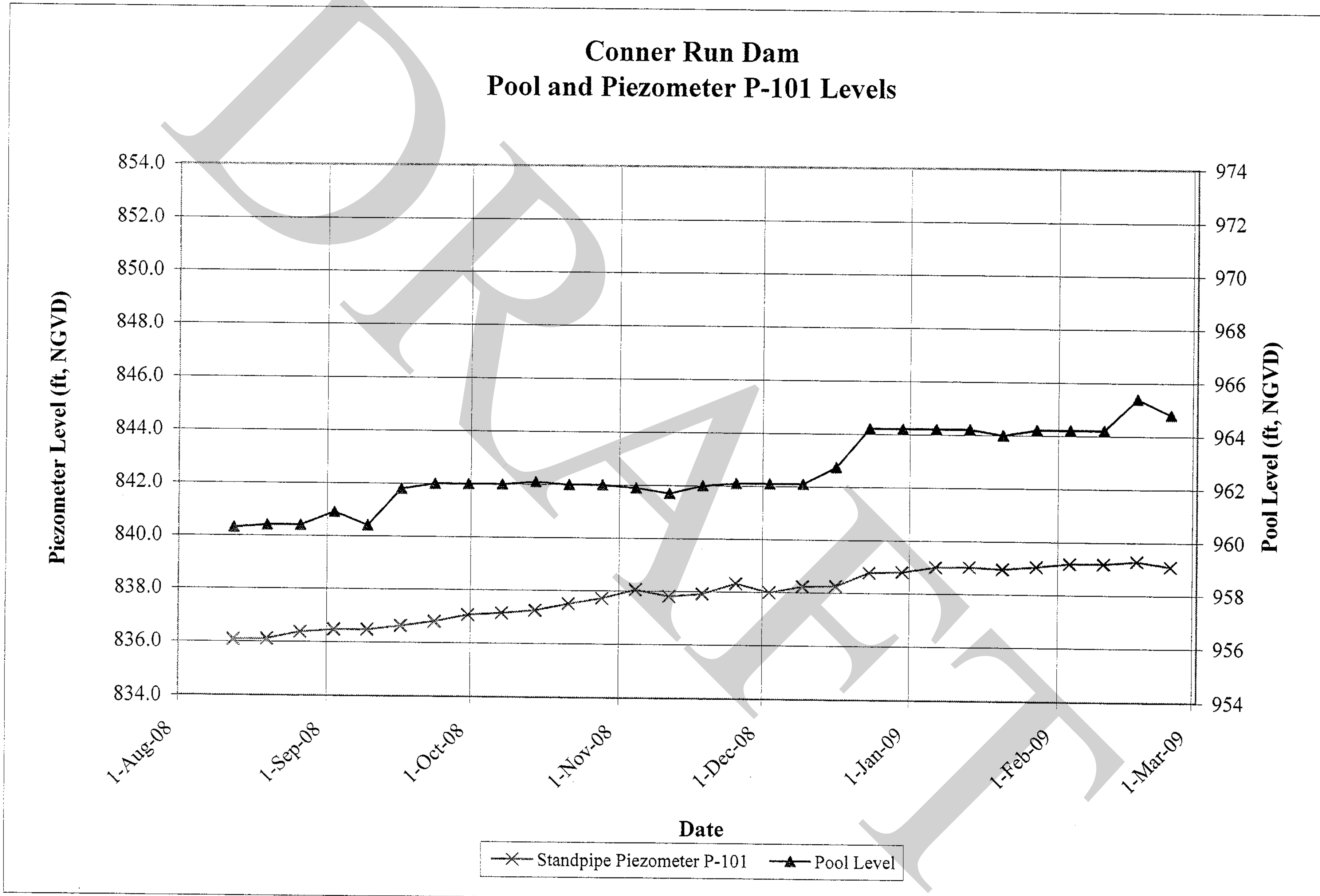

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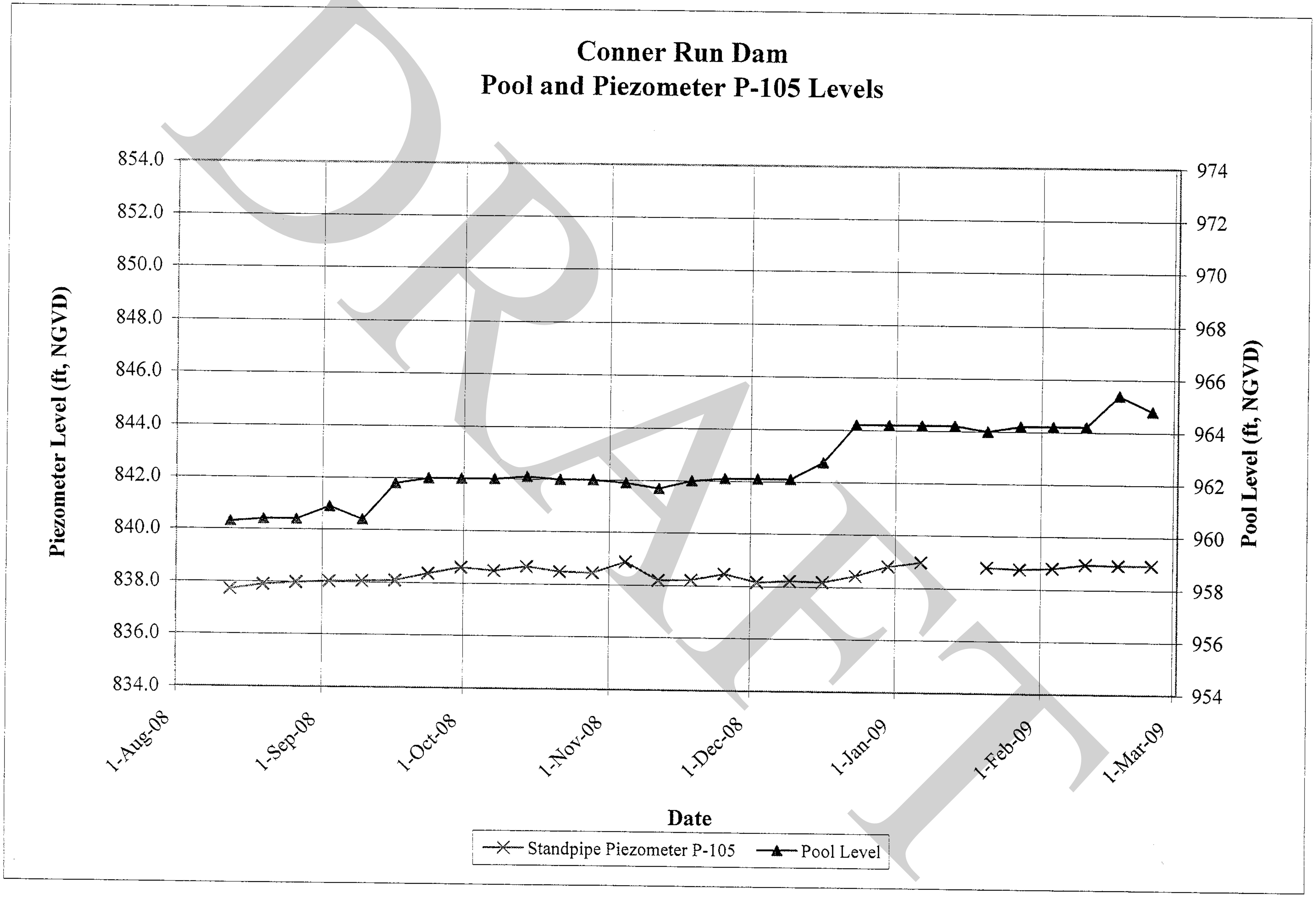

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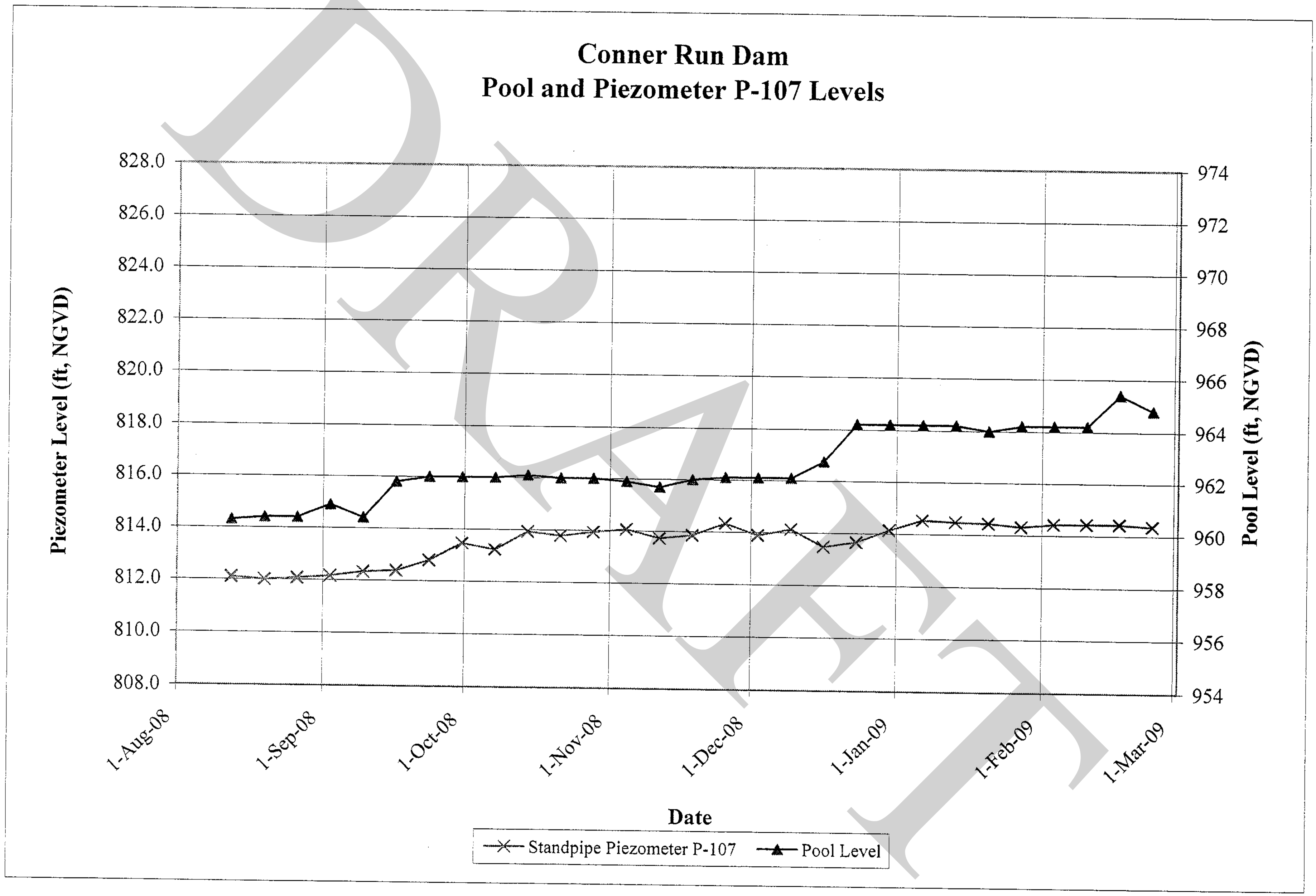

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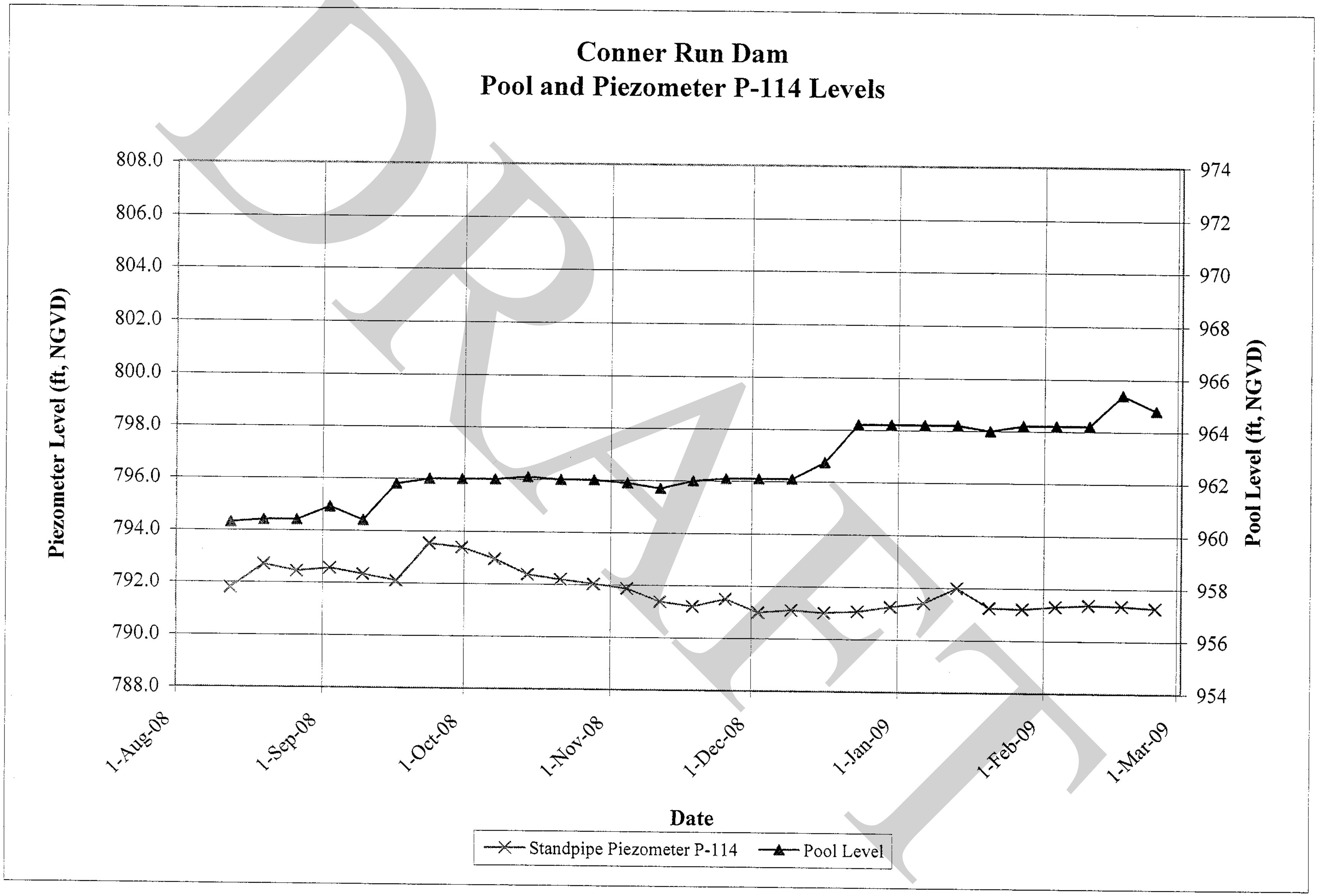

US EPA ARCHIVE DOCUMENT

Geo/Environmental Associates, Inc.

Instrumentation Data Sheet

Project: Conner Run Dam
GA Job No.: 05-357
Title: Piezometer Data: P-200, P-201, P-208, P-301
Performed By: SWF
Date: 3/11/09

PIEZOMETERS:

Standpipe Piezometer	Top of Pipe Elevation (ft, NGVD)	Screen Zone (ft, NGVD)
P-200	1049.46	879.8 - 888.8
P-201	990.71	885.3 - 894.3
P-208	1098.24	1026.1 - 1035.1
P-301	1040.78	893.8 - 904.5

P-201 New Top Elev 10/28/08 = 995.74

P-201 New Top Elev 11/11/08 = 1000.79

Date	Pool Level	P-200	P-200	P-201	P-201	P-208	P-208	P-301	P-301
		Reading (ft)	Piezometric Level (ft)	Reading (ft)	Piezometric Level (ft)	Reading (ft)	Piezometric Level (ft)	Reading (ft)	Piezometric Level (ft)
8/12/08	960.3	150.92	898.54	65.50	925.21	57.18	1041.06	106.18	934.60
8/19/08	960.4	150.94	898.52	65.55	925.16	57.75	1040.49	106.23	934.55
8/26/08	960.4	150.90	898.56	65.54	925.17	57.97	1040.27	106.21	934.57
9/2/08	960.9	150.90	898.56	65.54	925.17	57.97	1040.27	106.21	934.57
9/9/08	960.4	150.91	898.55	65.58	925.13	57.74	1040.50	106.33	934.45
9/16/08	961.8	150.97	898.49	65.25	925.46	57.87	1040.37	105.67	935.11
9/23/08	962.0	150.94	898.52	65.16	925.55	58.21	1040.03	105.54	935.24
9/30/08	962.0	150.97	898.49	65.09	925.62	58.41	1039.83	105.57	935.21
10/7/08	962.0	151.02	898.44	65.09	925.62	58.58	1039.66	105.44	935.34
10/14/08	962.1	151.05	898.41	65.09	925.62	57.65	1040.59	105.26	935.52
10/21/08	962.0	151.10	898.36	70.09	925.65	58.02	1040.22	105.28	935.50
10/28/08	962.0	151.18	898.28	70.12	925.62	56.95	1041.29	105.22	935.56
11/4/08	961.9	151.20	898.26	70.28	925.46	57.56	1040.68	104.94	935.84
11/11/08	961.7	151.25	898.21	75.34	925.45	58.04	1040.20	105.00	935.78
11/18/08	962.0	151.23	898.23	75.24	925.55	56.77	1041.47	105.02	935.76
11/25/08	962.1	151.26	898.20	75.22	925.57	56.53	1041.71	105.00	935.78
12/2/08	962.1	151.29	898.17	75.32	925.47	56.63	1041.61	105.15	935.63
12/9/08	962.1	151.28	898.18	75.31	925.48	56.75	1041.49	N/A	
12/16/08	962.8	N/A		75.20	925.59	56.02	1042.22	N/A	
12/23/08	964.2	151.18	898.28	74.62	926.17	56.04	1042.20	N/A	
12/30/08	964.2	151.10	898.36	74.58	926.21	55.91	1042.33	N/A	
1/6/09	964.2	151.23	898.23	74.62	926.17	56.26	1041.98	104.15	936.63
1/13/09	964.2	151.20	898.26	74.57	926.22	55.90	1042.34	103.85	936.93
1/20/09	964.0	151.25	898.21	74.78	926.01	55.46	1042.78	104.06	936.72
1/27/09	964.2	151.22	898.24	74.74	926.05	56.61	1041.63	103.61	937.17
2/3/09	964.2	151.19	898.27	74.65	926.14	55.91	1042.33	103.97	936.81
2/10/09	964.2	151.18	898.28	74.68	926.11	56.28	1041.96	103.94	936.84
2/17/09	965.4	151.10	898.36	74.40	926.39	56.15	1042.09	103.25	937.53
2/24/09	964.8	151.13	898.33	74.64	926.15	56.54	1041.70	103.65	937.13

	P-200	P-201	P-208	P-301
Minimum Piezometer Level:	898.17	925.13	1039.66	934.45
Maximum Piezometer Level:	898.56	926.39	1042.78	937.53

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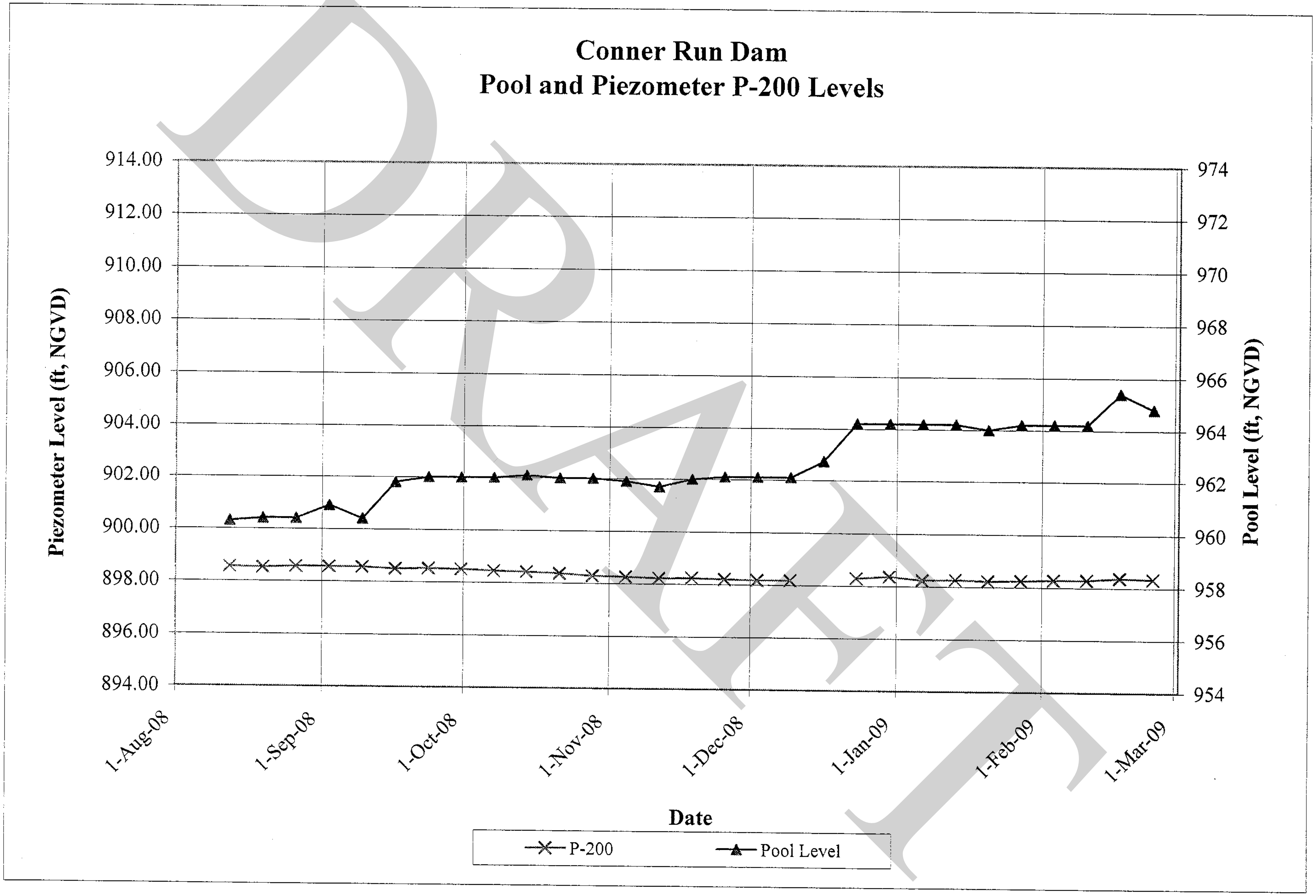

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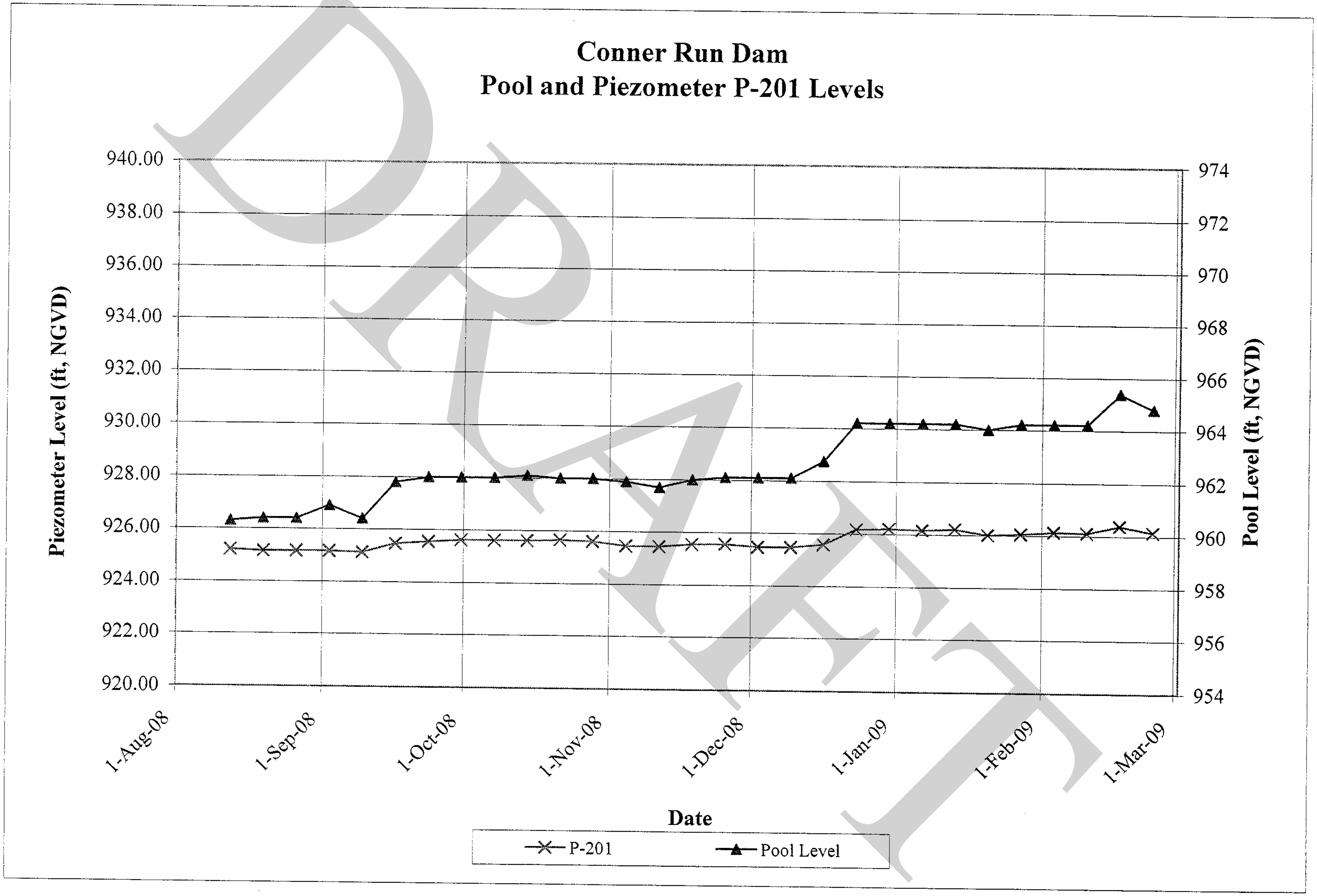

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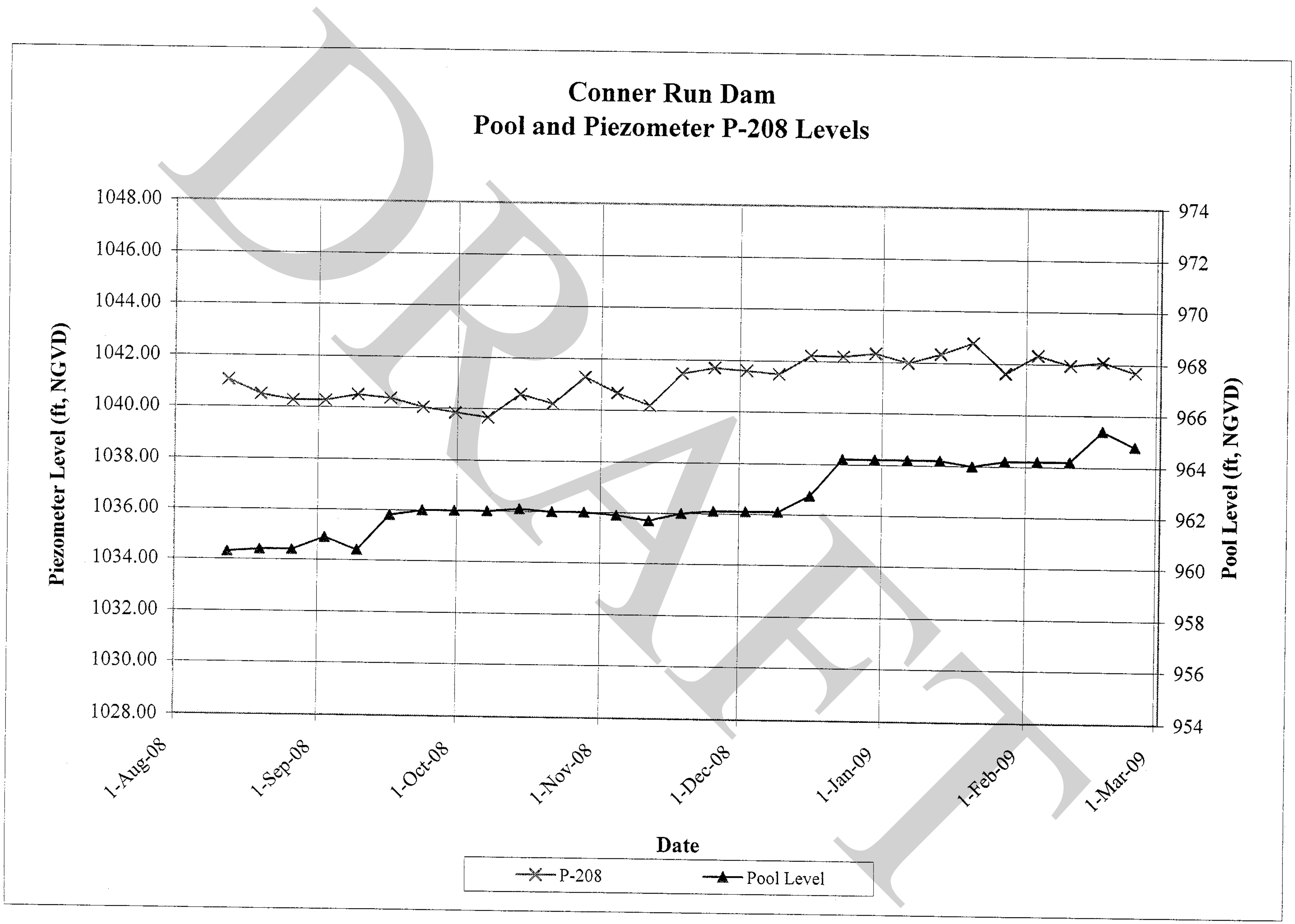

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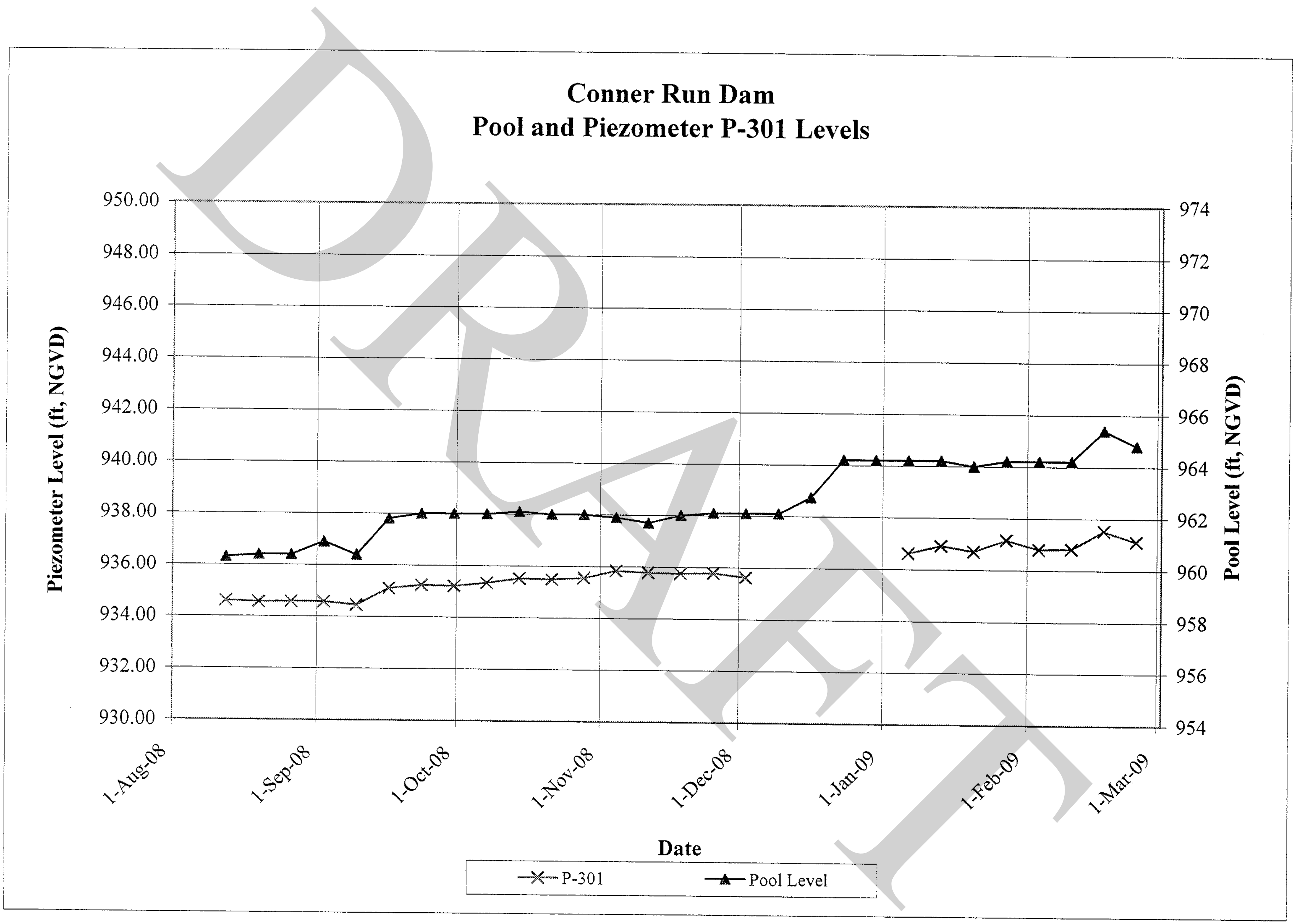

US EPA ARCHIVE DOCUMENT

Geo/Environmental Associates, Inc.

Instrumentation Data Sheet

Project: Conner Run Dam
GA Job No.: 05-357
Title: Piezometer Data: J2, H2, U2, L2
Performed By: SWF
Date: 3/11/2009

Top of Pipe Elevations:		
J2	1063.53	ft, NGVD
H2	1063.39	ft, NGVD
U2	1063.34	ft, NGVD
L2	1063.36	ft, NGVD

		J2		H2		U2		L2	
DATE	Pool Level	Reading	Piezometric Level	Reading	Piezometric Level	Reading	Piezometric Level	Reading	Piezometric Level
		(ft)	(ft, msl)	(ft)	(ft, msl)	(ft)	(ft, msl)	(ft)	(ft, msl)
12-Aug-08	960.3	68.6	995.0	109.2	954.2	176.9	886.5	186.1	877.3
19-Aug-08	960.4	68.7	994.9	109.2	954.2	176.9	886.5	186.1	877.3
26-Aug-08	960.4	68.7	994.9	109.1	954.3	176.8	886.5	186.0	877.3
2-Sep-08	960.9	68.7	994.9	109.1	954.3	176.8	886.5	186.0	877.3
9-Sep-08	960.4	68.7	994.8	109.2	954.2	176.7	886.7	185.9	877.5
16-Sep-08	961.8	68.7	994.8	109.2	954.2	176.7	886.7	185.9	877.5
23-Sep-08	962.0	68.8	994.7	109.0	954.4	176.2	887.1	185.3	878.0
30-Sep-08	962.0	68.9	994.7	108.9	954.5	176.1	887.3	185.1	878.2
7-Oct-08	962.0	68.9	994.6	108.9	954.5	176.0	887.4	185.1	878.3
14-Oct-08	962.1	68.9	994.6	108.8	954.6	176.0	887.3	185.0	878.4
21-Oct-08	962.0	69.0	994.6	108.9	954.5	175.7	887.7	184.7	878.6
28-Oct-08	962.0	69.0	994.5	108.9	954.5	175.8	887.5	184.8	878.6
4-Nov-08	961.9	69.0	994.5	108.9	954.5	175.8	887.5	184.7	878.7
11-Nov-08	961.7	69.1	994.5	108.8	954.6	175.9	887.4	184.8	878.6
18-Nov-08	962.0	69.1	994.4	108.8	954.6	175.7	887.6	184.8	878.6
25-Nov-08	962.1	69.2	994.4	108.7	954.7	175.4	888.0	184.2	879.1
2-Dec-08	962.1	69.2	994.3	108.8	954.6	176.0	887.4	184.6	878.8
9-Dec-08	962.1	69.3	994.3	108.8	954.6	175.6	887.7	184.3	879.0
16-Dec-08	962.8	69.3	994.3	N/A		175.5	887.8	184.2	879.1
23-Dec-08	964.2	69.3	994.2	108.3	955.1	175.6	887.7	183.3	880.0
30-Dec-08	964.2	69.3	994.2	108.1	955.3	174.0	889.4	182.6	880.8
6-Jan-09	964.2	69.4	994.2	108.2	955.2	174.4	889.0	183.0	880.4
13-Jan-09	964.2	69.4	994.2	107.9	955.5	174.1	889.3	182.7	880.7
20-Jan-09	964.0	69.3	994.2	108.1	955.3	174.5	888.9	182.9	880.5
27-Jan-09	964.2	69.2	994.3	108.1	955.3	174.6	888.8	182.9	880.4
3-Feb-09	964.2	69.1	994.4	107.8	955.6	173.8	889.5	182.4	880.9
10-Feb-09	964.2	69.1	994.5	107.9	955.5	173.9	889.4	182.3	881.1
17-Feb-09	965.4	69.0	994.5	107.2	956.2	173.2	890.1	182.3	881.1
24-Feb-09	964.8	69.0	994.6	107.6	955.8	173.9	889.5	181.6	881.7

	J2	H2	U2	L2
Minimum Piezometer Level:	**994.2**	**954.2**	**886.5**	**877.3**
Maximum Piezometer Level:	**995.0**	**956.2**	**890.1**	**881.7**

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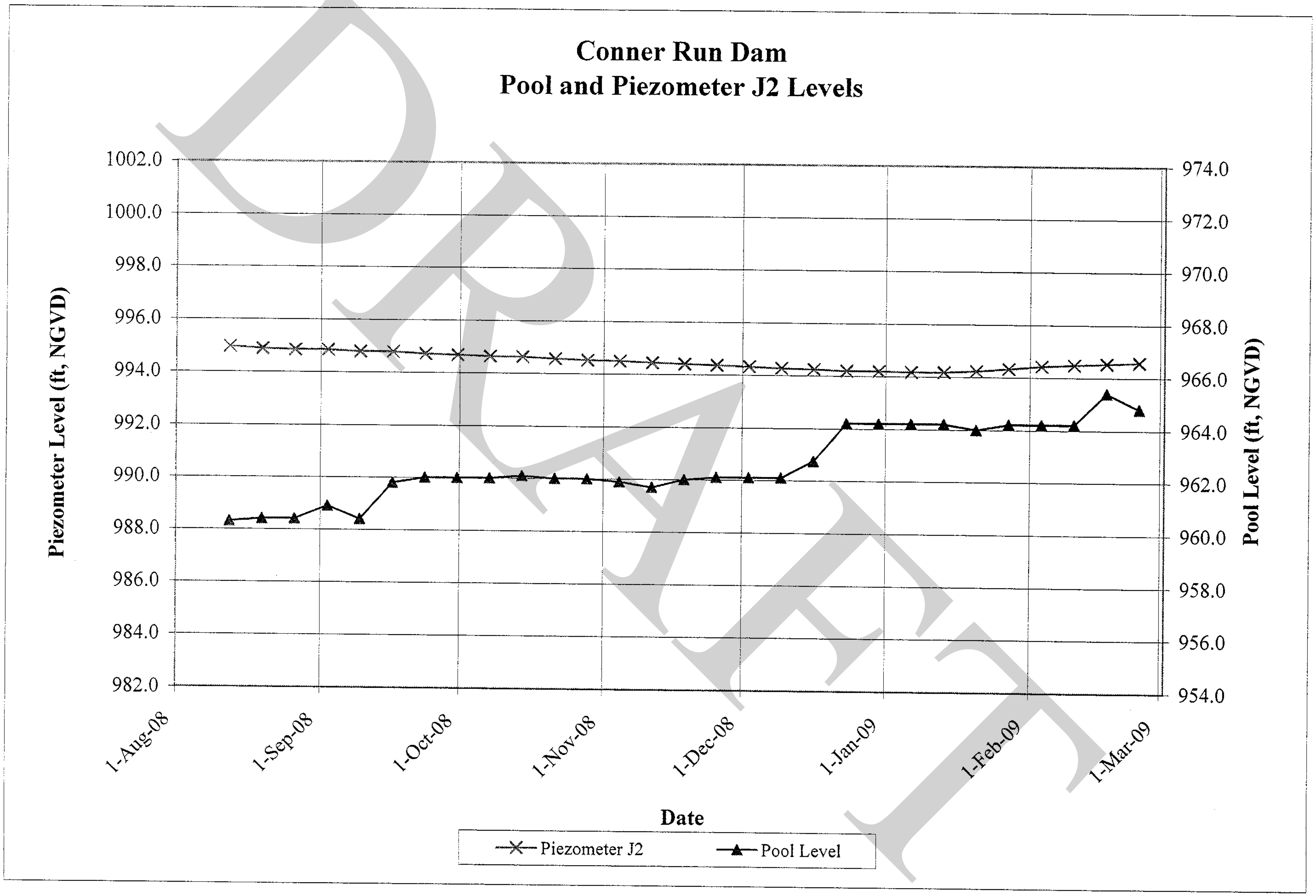

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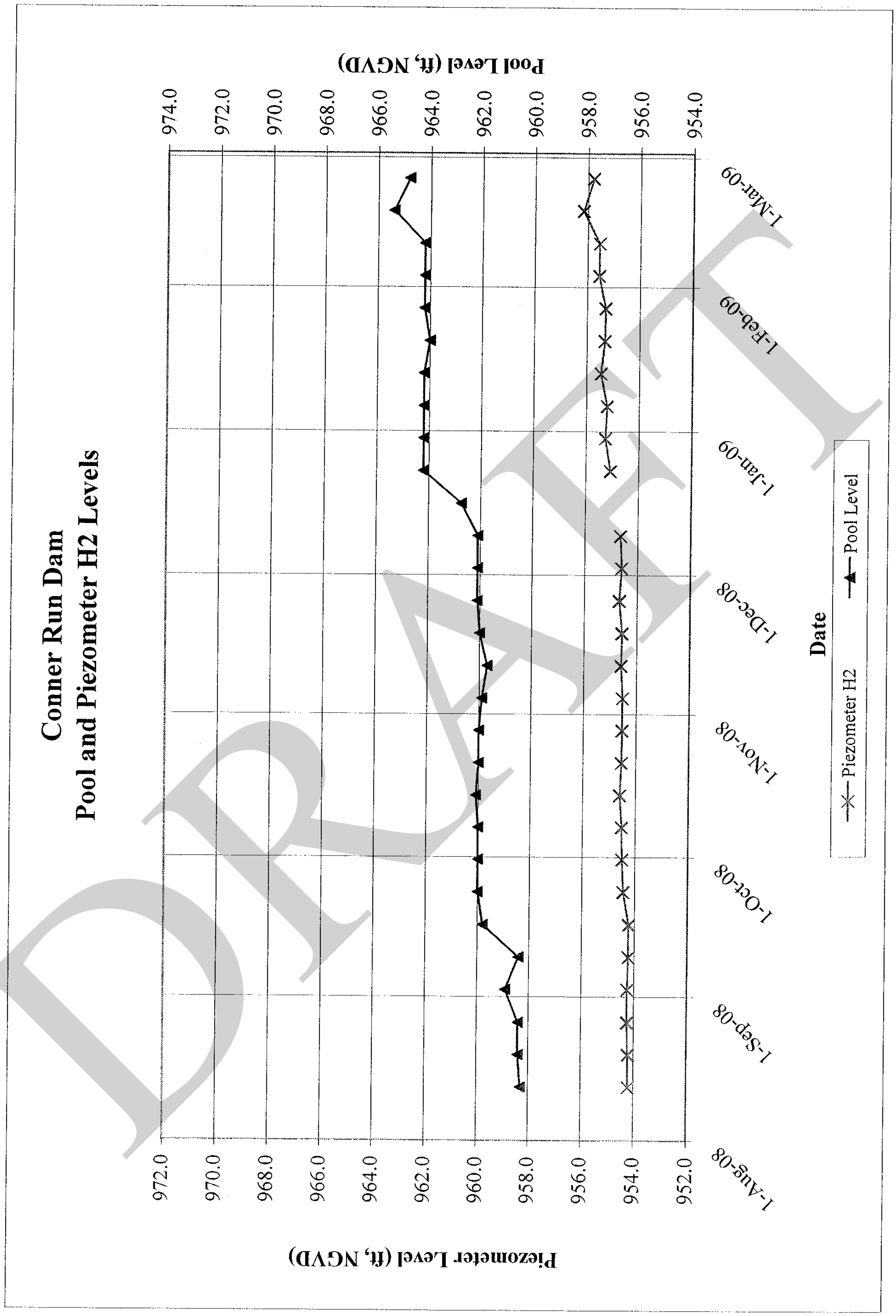

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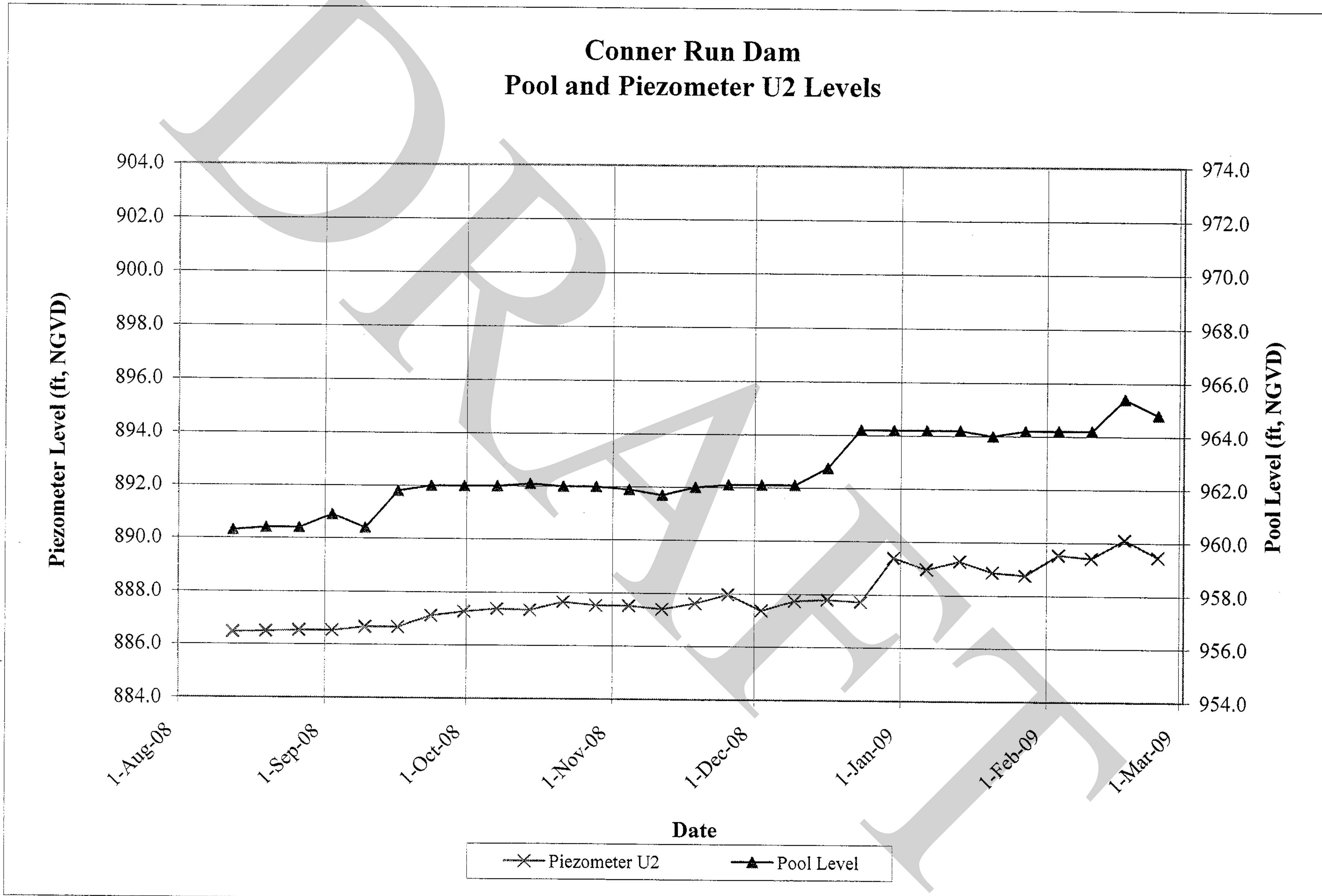

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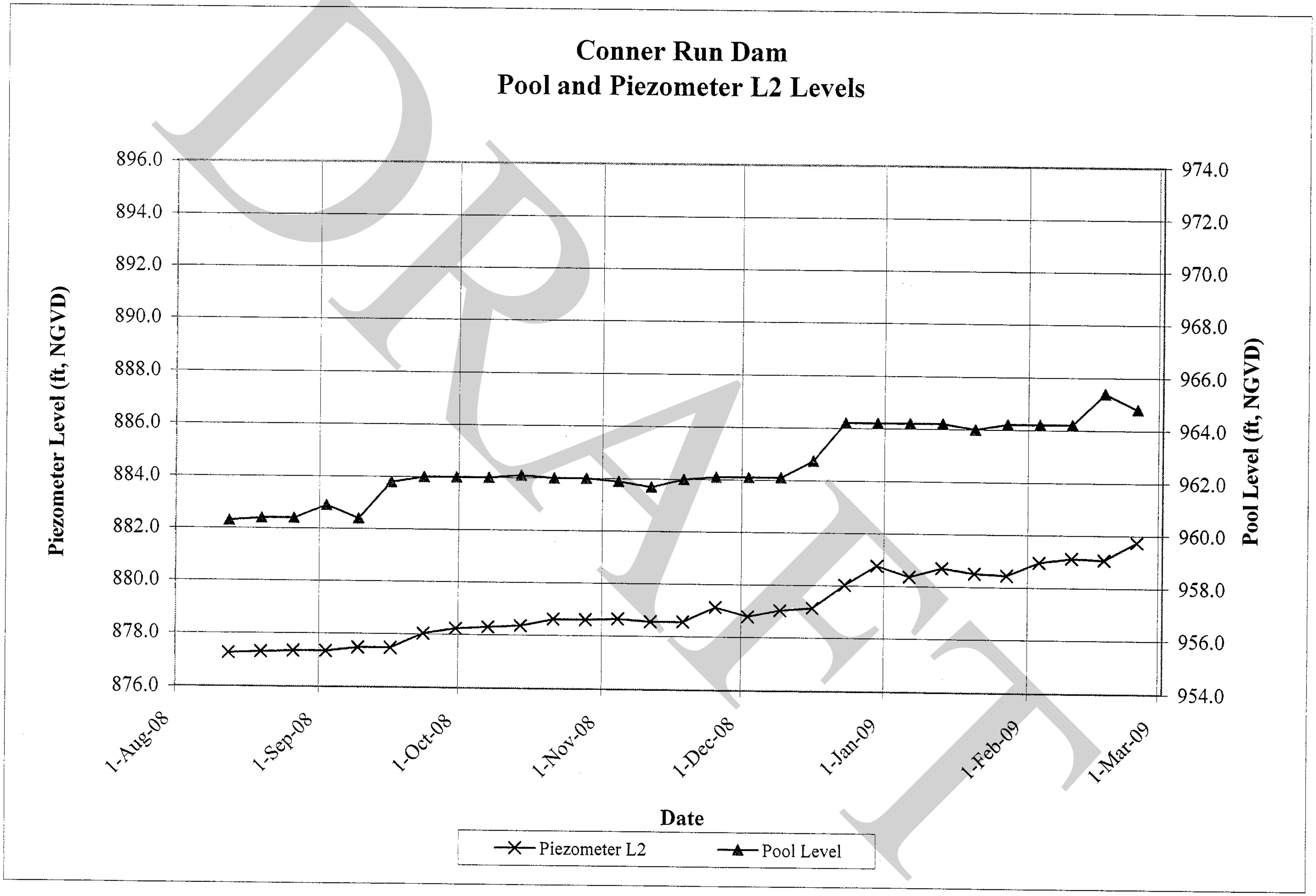

EXTENSOMETER B-202 DATA AND GRAPHS

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GA

Geo/Environmental Associates, Inc.

Instrumentation Data Sheet

Project: Conner Run Dam
GA Job No.: 05-357
Title: Extensometor B-202 Data
Performed By: SWF
Date: 3/11/09

EXTENSOMETER:

For Magnetic Tape Extensometer installed in Bore Hole B-202

December 31, 2002 Baseline Readings

Top of Pipe in B-202 Elevation (ft, NGVD)	Sensor Ring # 1 Elevation (ft, NGVD)	Sensor Ring # 2 Elevation (ft, NGVD)	Sensor Ring # 3 Elevation (ft, NGVD)	Sensor Ring # 4 Elevation (ft, NGVD)	Sensor Ring # 5 Elevation (ft, NGVD)
1056.88	887.88	682.75	632.70	582.69	532.71

1056.88 on 9/11/03
1056.88 on 10/16/03

Extensometer Readings and Differential Movements

Date	Average Sensor Ring 1 Reading (ft)	Differential Movement (ft)	Average Sensor Ring 2 Reading (ft)	Differential Movement (ft)	Average Sensor Ring 3 Reading (ft)	Differential Movement (ft)	Average Sensor Ring 4 Reading (ft)	Differential Movement (ft)	Average Sensor Ring 5 Reading (ft)	Differential Movement (ft)
8/5/08	169.02	-0.02	374.04	0.09	424.12	0.06	474.00	0.19	524.08	0.09
8/12/08	169.00	0.00	374.05	0.08	424.09	0.09	474.11	0.08	524.08	0.09
8/19/08	169.00	0.00	374.05	0.08	424.11	0.07	474.12	0.07	524.10	0.07
8/26/08	169.01	-0.01	374.05	0.08	424.12	0.06	474.13	0.06	524.09	0.08
9/2/08	169.01	-0.01	374.06	0.07	424.11	0.07	474.14	0.05	524.08	0.09
9/9/08	169.01	-0.01	374.06	0.07	424.10	0.08	474.12	0.07	524.10	0.07
9/16/08	169.02	-0.02	374.05	0.08	424.10	0.08	474.13	0.06	524.09	0.08
9/23/08	169.02	-0.02	374.04	0.09	424.11	0.07	474.14	0.05	524.09	0.08
9/30/08	169.02	-0.02	374.06	0.07	424.08	0.10	474.11	0.08	524.09	0.08
10/7/08	169.00	0.00	374.06	0.07	424.09	0.09	474.13	0.06	524.08	0.09
10/14/08	169.00	0.00	374.05	0.08	424.07	0.11	474.12	0.07	524.08	0.09
10/21/08	169.00	0.00	374.06	0.07	424.11	0.07	474.12	0.07	524.09	0.08
10/28/08	169.02	-0.02	374.06	0.07	424.10	0.08	474.14	0.05	524.09	0.08
11/4/08	169.00	0.00	374.06	0.07	424.10	0.08	474.12	0.07	524.08	0.09
11/11/08	169.01	-0.01	374.05	0.08	424.11	0.07	474.12	0.07	524.09	0.08
11/18/08	169.00	0.00	374.06	0.07	424.11	0.07	474.13	0.06	524.08	0.09
11/25/08	169.02	-0.02	374.06	0.07	424.12	0.06	474.15	0.04	524.08	0.09
12/2/08	169.02	-0.02	374.04	0.09	424.11	0.07	474.14	0.05	524.08	0.09
12/9/08	169.03	-0.03	374.05	0.08	424.12	0.06	474.13	0.06	524.08	0.09
12/16/08	169.00	0.00	374.04	0.09	424.13	0.05	474.12	0.07	524.08	0.09
12/23/08	169.01	-0.01	374.07	0.06	424.12	0.06	474.13	0.06	524.11	0.06
12/30/08	169.01	-0.01	374.07	0.06	424.12	0.06	474.14	0.05	524.10	0.07
1/6/09	169.01	-0.01	374.05	0.08	424.10	0.08	474.13	0.06	524.09	0.08
1/13/09	169.01	-0.01	374.05	0.08	424.12	0.06	474.14	0.05	524.09	0.08
1/20/09	169.02	-0.02	374.05	0.08	424.12	0.06	474.12	0.07	524.08	0.09
1/27/09	169.02	-0.02	374.05	0.08	424.11	0.07	474.13	0.06	524.08	0.09
2/3/09	169.03	-0.03	374.06	0.07	424.11	0.07	474.14	0.05	524.08	0.09
2/10/09	169.02	-0.02	374.06	0.07	424.11	0.07	474.13	0.06	524.07	0.10
2/17/09	169.01	-0.01	374.07	0.06	424.10	0.08	474.12	0.07	524.09	0.08
2/24/09	169.00	0.00	374.07	0.06	424.10	0.08	474.12	0.07	524.09	0.08

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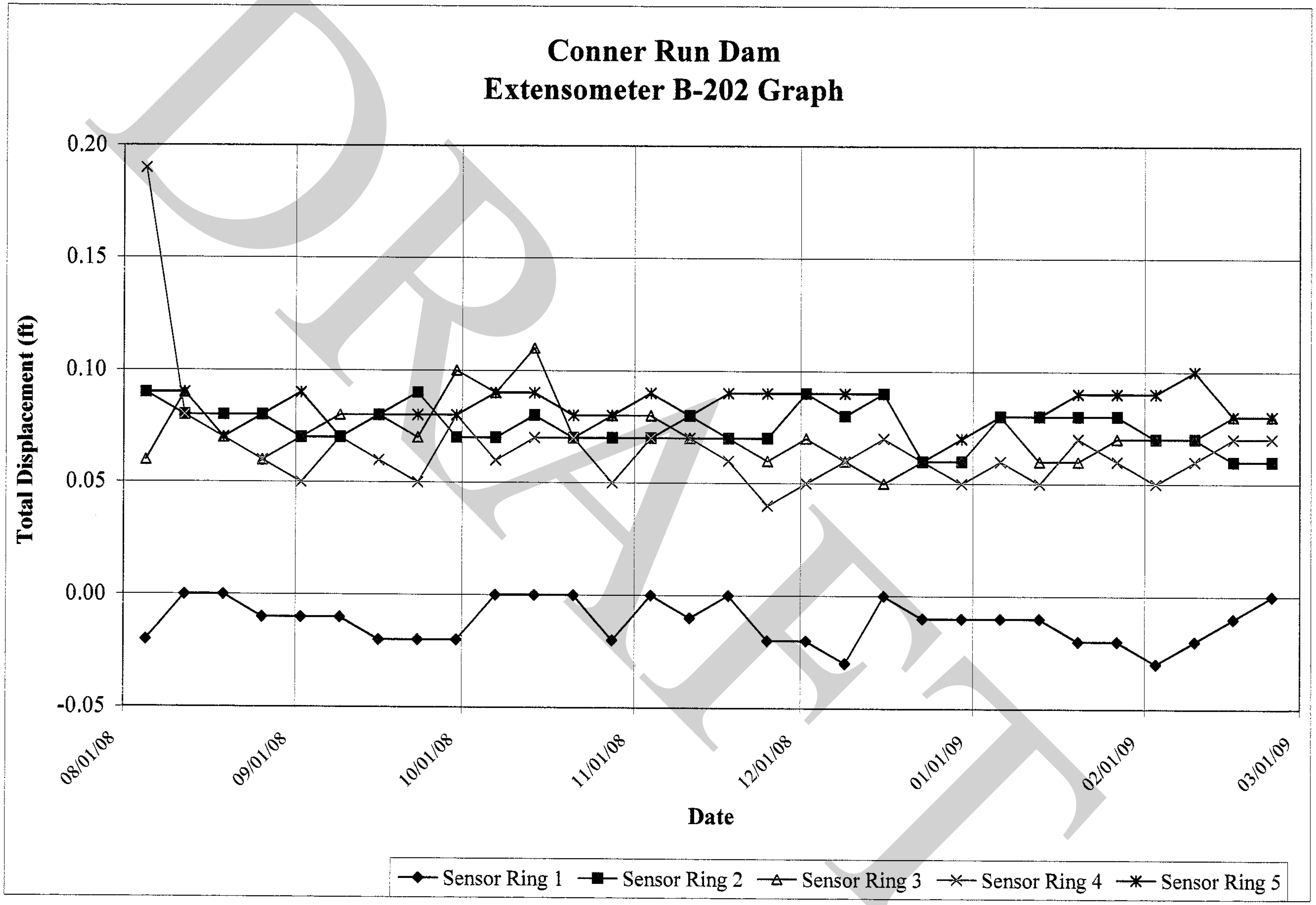

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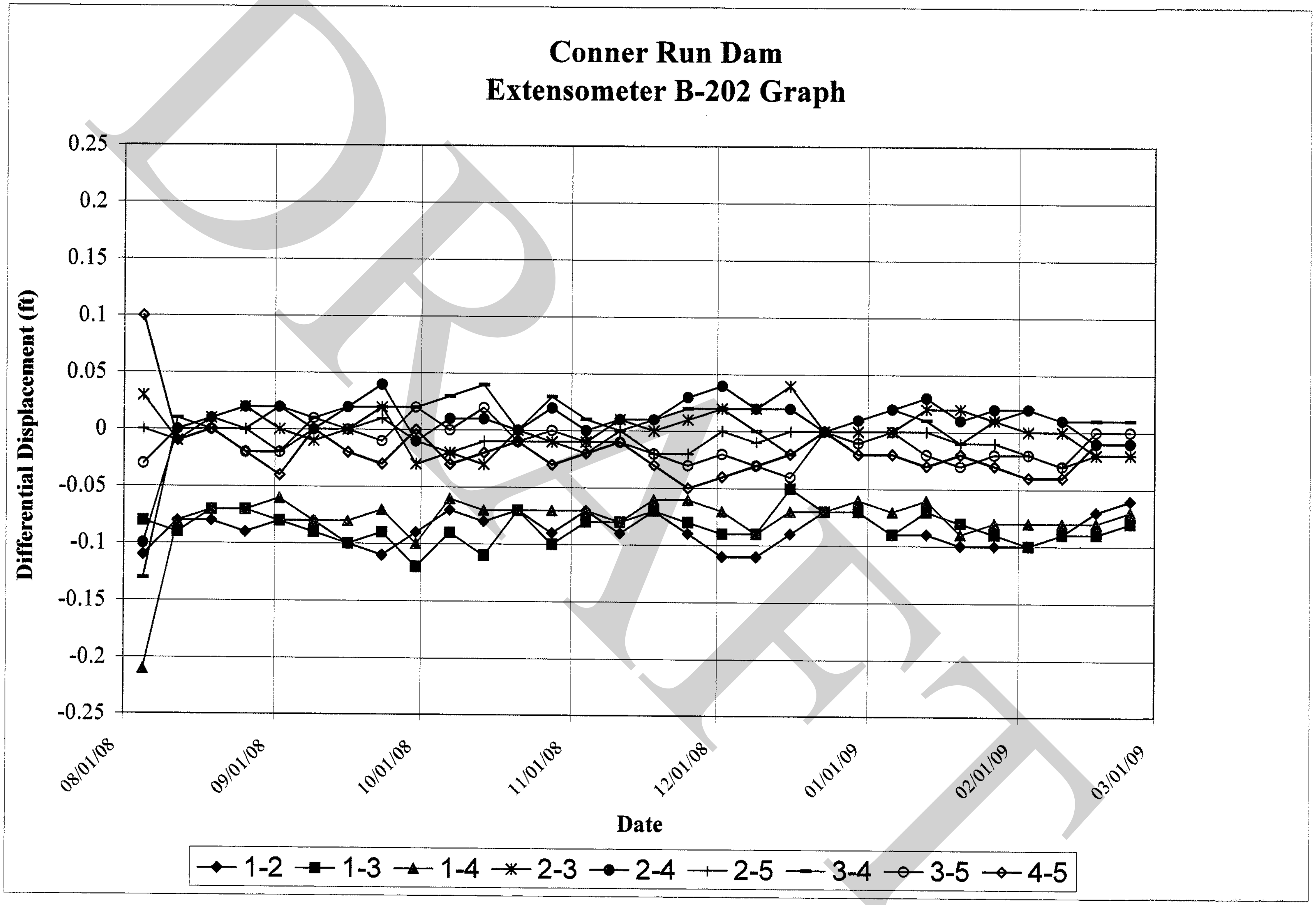

AEPKM-INSP006138

UNDERDRAIN AND SEEPAGE MONITORING DATA AND GRAPHS

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Geo/Environmental Associates, Inc.

Water Collection & Drainage Data Sheet

Project: Conner Run Dam
GA Job No.: 05-357
Title: Precipitation, Pool Level, & Underdain Discharge
Performed By: SWF
Date: 3/12/2009

Date	Precipitation (in)	Computer Rain Gauge (in)	Pool Level (ft, NGVD)	Underdrain Discharge (gpm)
5-Aug-08	0.00	0.00	960.3	"under water"
12-Aug-08	0.00	0.00	960.3	50.0
19-Aug-08	0.00	0.00	960.4	50.0
26-Aug-08	0.00	0.00	960.4	50.0
2-Sep-08	0.00	0.01	960.9	50.0
9-Sep-08	0.20	0.16	960.4	50.0
16-Sep-08	0.00	0.00	961.8	"under water"
23-Sep-08	0.00	0.00	962	"under water"
30-Sep-08	0.00	0.02	962	"under water"
7-Oct-08	0.00	0.01	962	"under water"
14-Oct-08	0.00	0.01	962.1	50.0
21-Oct-08	0.00	0.02	962	49.0
28-Oct-08	0.00	0.12	962	"under water"
4-Nov-08	0.00	0.01	961.9	49.0
11-Nov-08	0.00	0.00	961.7	"under water"
18-Nov-08	0.00	0.03	962	"under water"
25-Nov-08	0.40	0.11	962.1	"under water"
2-Dec-08	0.00	0.02	962.1	"under water"
9-Dec-08	0.90	0.05	962.1	"under water"
16-Dec-08	0.50	0.00	965.75	"under water"
23-Dec-08	0.60	0.02	964.2	"under water"
30-Dec-08	0.00	0.00	964.2	"under water"
6-Jan-09	1.00	0.64	964.2	"under water"
13-Jan-09	0.05	0.00	964.2	"under water"
20-Jan-09	0.00	0.00	964	"under water"
27-Jan-09	0.52	0.02	964.2	"under water"
3-Feb-09	0.00	0.01	964.2	"under water"
10-Feb-09	0.30	0.32	964.2	"under water"
17-Feb-09	0.00	0.00	965.4	"under water"
24-Feb-09	0.00	0.04	964.8	"under water"

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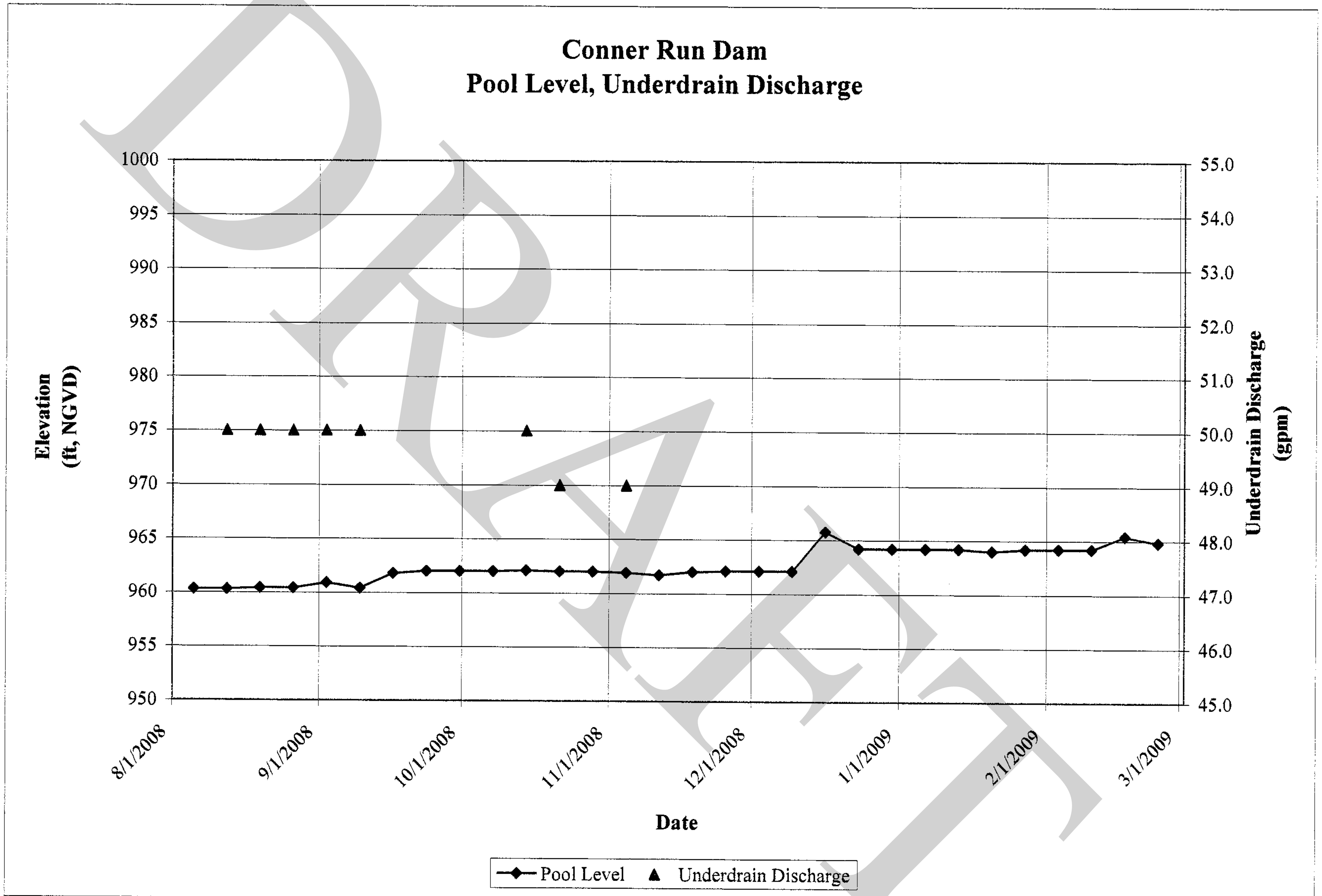

Geo/Environmental Associates, Inc.

Project: Conner Run Dam
GA Job No.: 05-357
Title: Precipitation, Pool Level, & Seepage/Runoff Data
Performed By: SWF
Date: 3/11/2009

Date	AEP Rain Gauge (in)	Computer Rain Gauge (in)	Pool Level (ft, NGVD)	Culvert C-1 (gpm)	Culvert C-2 (gpm)	Culvert C-3 (gpm)	Total Flow (gpm)
1-Aug-08	0.00	0.01					
2-Aug-08		0.06					
3-Aug-08		0.00					
4-Aug-08	0.00	0.02					
5-Aug-08	0.00	0.00	960.3	72	66	156	294
6-Aug-08	0.00	0.00					
7-Aug-08	0.00	0.00					
8-Aug-08	0.00	0.00					
9-Aug-08		0.00					
10-Aug-08		0.00					
11-Aug-08	0.01	0.00					
12-Aug-08	0.00	0.00	960.3	84	58	145	287
13-Aug-08	0.00	0.00					
14-Aug-08	0.03	0.01					
15-Aug-08	0.01	0.00					
16-Aug-08		0.00					
17-Aug-08		0.00					
18-Aug-08	0.00	0.00					
19-Aug-08	0.00	0.00	960.4	74	65	146	285
20-Aug-08	0.00	0.00					
21-Aug-08	0.00	0.00					
22-Aug-08	0.00	0.00					
23-Aug-08		0.00					
24-Aug-08		0.00					
25-Aug-08	0.00	0.00					
26-Aug-08	0.00	0.00	960.4	87	68	131	286
27-Aug-08	1.75	1.22					
28-Aug-08	0.00	0.00					
29-Aug-08	0.00	0.00					
30-Aug-08		0.00					
31-Aug-08		0.01					
1-Sep-08	0.00	0.00					
2-Sep-08	0.00	0.01	960.9	90	65	133	288
3-Sep-08	0.00	0.00					
4-Sep-08	0.00	0.00					
5-Sep-08	0.00	0.00					
6-Sep-08		0.00					
7-Sep-08		0.00					
8-Sep-08	0.00	0.00					
9-Sep-08	0.20	0.16	960.4	96	60	156	312
10-Sep-08	0.00	0.00					
11-Sep-08	0.00	0.00					
12-Sep-08	0.30	0.25					
13-Sep-08		0.00					
14-Sep-08		0.00					
15-Sep-08	0.00	0.06					
16-Sep-08	0.00	0.00	961.8	81	64	157	302
17-Sep-08	0.00	0.00					
18-Sep-08	0.00	0.00					
19-Sep-08	0.00	0.00					
20-Sep-08		0.00					
21-Sep-08		0.00					
22-Sep-08	0.00	0.00					
23-Sep-08	0.00	0.00	962	92	65	155	312
24-Sep-08	0.00	0.00					
25-Sep-08	0.00	0.00					
26-Sep-08	0.00	0.08					
27-Sep-08		0.10					
28-Sep-08		0.00					
29-Sep-08	0.00	0.00					
30-Sep-08	0.00	0.02	962	86	61	148	295
1-Oct-08	0.00	0.13					
2-Oct-08	0.00	0.00					
3-Oct-08	0.00	0.00					
4-Oct-08		0.00					
5-Oct-08		0.00					
6-Oct-08	0.00	0.00					
7-Oct-08	0.00	0.01	962	82	62	146	290
8-Oct-08	0.50	0.50					
9-Oct-08	0.00	0.01					
10-Oct-08	0.00	0.00					
11-Oct-08	0.00	0.00					
12-Oct-08		0.00					
13-Oct-08	0.00	0.00					

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Geo/Environmental Associates, Inc.

Project: Conner Run Dam
GA Job No.: 05-357
Title: Precipitation, Pool Level, & Seepage/Runoff Data
Performed By: SWF
Date: 3/11/2009

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Date	AEP Rain Gauge (in)	Computer Rain Gauge (in)	Pool Level (ft, NGVD)	Culvert C-1 (gpm)	Culvert C-2 (gpm)	Culvert C-3 (gpm)	Total Flow (gpm)
14-Oct-08	0.00	0.01	962.1	87	72	146	305
15-Oct-08	0.00	0.00					
16-Oct-08	0.00	0.01					
17-Oct-08	0.00	0.00					
18-Oct-08	0.00	0.00					
19-Oct-08		0.00					
20-Oct-08	0.00	0.00					
21-Oct-08	0.00	0.02	962	93	58	139	290
22-Oct-08	0.00	0.00					
23-Oct-08	0.00	0.00					
24-Oct-08	1.40	0.40					
25-Oct-08	0.00	0.50					
26-Oct-08		0.02					
27-Oct-08	0.10	0.00					
28-Oct-08	0.00	0.12	962	85	62	146	293
29-Oct-08	0.00	0.00					
30-Oct-08	0.00	0.00					
31-Oct-08	0.00	0.00					
1-Nov-08	0.00	0.00					
2-Nov-08		0.00					
3-Nov-08	0.00	0.00					
4-Nov-08	0.00	0.01	961.9	88	65	149	302
5-Nov-08	0.00	0.00					
6-Nov-08	0.00	0.00					
7-Nov-08	0.25	0.03					
8-Nov-08	0.00	0.19					
9-Nov-08		0.00					
10-Nov-08	0.00	0.02					
11-Nov-08	0.00	0.00	961.7	93	64	154	311
12-Nov-08	0.00	0.02					
13-Nov-08	0.00	0.25					
14-Nov-08	1.20	0.03					
15-Nov-08	0.00	0.81					
16-Nov-08		0.01					
17-Nov-08	0.20	0.10					
18-Nov-08	0.00	0.03	962	97	63	139	299
19-Nov-08	0.00	0.00					
20-Nov-08	0.00	0.00					
21-Nov-08	1.20	0.01					
22-Nov-08	0.00	0.01					
23-Nov-08		0.00					
24-Nov-08	0.66	0.66					
25-Nov-08	0.40	0.11	962.1	98	55	143	296
26-Nov-08	0.00	0.03					
27-Nov-08	0.00	0.00					
28-Nov-08	0.00	0.00					
29-Nov-08	0.00	0.00					
30-Nov-08	0.50	0.33					
1-Dec-08	0.00	0.07					
2-Dec-08	0.00	0.02	962.1	99	68	144	311
3-Dec-08	0.00	0.00					
4-Dec-08	0.02	0.16					
5-Dec-08	0.00	0.00					
6-Dec-08	0.00	0.00					
7-Dec-08	0.00	0.01					
8-Dec-08	0.00	0.01					
9-Dec-08	0.90	0.05	962.1	96	51	157	304
10-Dec-08	0.40	0.93					
11-Dec-08	1.00	0.89					
12-Dec-08	0.02	0.01					
13-Dec-08	0.00	0.00					
14-Dec-08	0.00	0.04					
15-Dec-08	0.50	0.23					
16-Dec-08	0.50	0.00	962.75	92	76	153	321
17-Dec-08	0.00	0.53					
18-Dec-08	0.00	0.00					
19-Dec-08		1.42					
20-Dec-08		0.01					
21-Dec-08	0.00	0.01					
22-Dec-08	0.00	0.00					
23-Dec-08	0.60	0.02	964.2	96	59	146	301
24-Dec-08	1.33	1.47					
25-Dec-08		0.01					
26-Dec-08		0.34					

US EPA ARCHIVE DOCUMENT

Geo/Environmental Associates, Inc.

Project: Conner Run Dam
GA Job No.: 05-357
Title: Precipitation, Pool Level, & Seepage/Runoff Data
Performed By: SWF
Date: 3/11/2009

Date	AEP Rain Gauge (in)	Computer Rain Gauge (in)	Pool Level (ft, NGVD)	Culvert C-1 (gpm)	Culvert C-2 (gpm)	Culvert C-3 (gpm)	Total Flow (gpm)
27-Dec-08		0.00					
28-Dec-08		0.05					
29-Dec-08	0.00	0.00					
30-Dec-08	0.00	0.00	964.2	98	96	175	369
31-Dec-08	0.00	0.00					
1-Jan-09		0.00					
2-Jan-09		0.00					
3-Jan-09		0.00					
4-Jan-09		0.16					
5-Jan-09	0.00	0.00					
6-Jan-09	1.00	0.64	964.2	95	81	169	345
7-Jan-09	0.30	0.54					
8-Jan-09	0.30	0.00					
9-Jan-09		0.00					
10-Jan-09		0.30					
11-Jan-09		0.00					
12-Jan-09	0.00	0.01					
13-Jan-09	0.05	0.00	964.2	86	73	181	340
14-Jan-09	0.10	0.00					
15-Jan-09	0.10	0.00					
16-Jan-09		0.00					
17-Jan-09		0.00					
18-Jan-09		0.08					
19-Jan-09	0.00	0.01					
20-Jan-09	0.00	0.00	964	94	60	170	324
21-Jan-09	0.00	0.00					
22-Jan-09	0.00	0.00					
23-Jan-09		0.00					
24-Jan-09		0.00					
25-Jan-09		0.00					
26-Jan-09	0.20	0.00					
27-Jan-09	0.52	0.02	964.2	106	78	169	353
28-Jan-09	1.90	0.42					
29-Jan-09	0.05	0.00					
30-Jan-09		0.00					
31-Jan-09		0.00					
1-Feb-09		0.56					
2-Feb-09	0.00	0.00					
3-Feb-09	0.00	0.01	964.2	91	76	174	341
4-Feb-09	0.00	0.00					
5-Feb-09	0.00	0.00					
6-Feb-09		0.01					
7-Feb-09	0.00	0.05					
8-Feb-09	0.60	0.00					
9-Feb-09	0.20	0.25					
10-Feb-09	0.30	0.32	964.2	109	58	177	344
11-Feb-09		0.30					
12-Feb-09		0.05					
13-Feb-09		0.00					
14-Feb-09		0.02					
15-Feb-09		0.00					
16-Feb-09	0.00	0.00					
17-Feb-09	0.00	0.00	965.4	101	81	152	334
18-Feb-09	0.10	0.11					
19-Feb-09	0.00	0.02					
20-Feb-09		0.00					
21-Feb-09		0.07					
22-Feb-09		0.01					
23-Feb-09	0.00	0.00					
24-Feb-09	0.00	0.04	964.8	102	73	172	347

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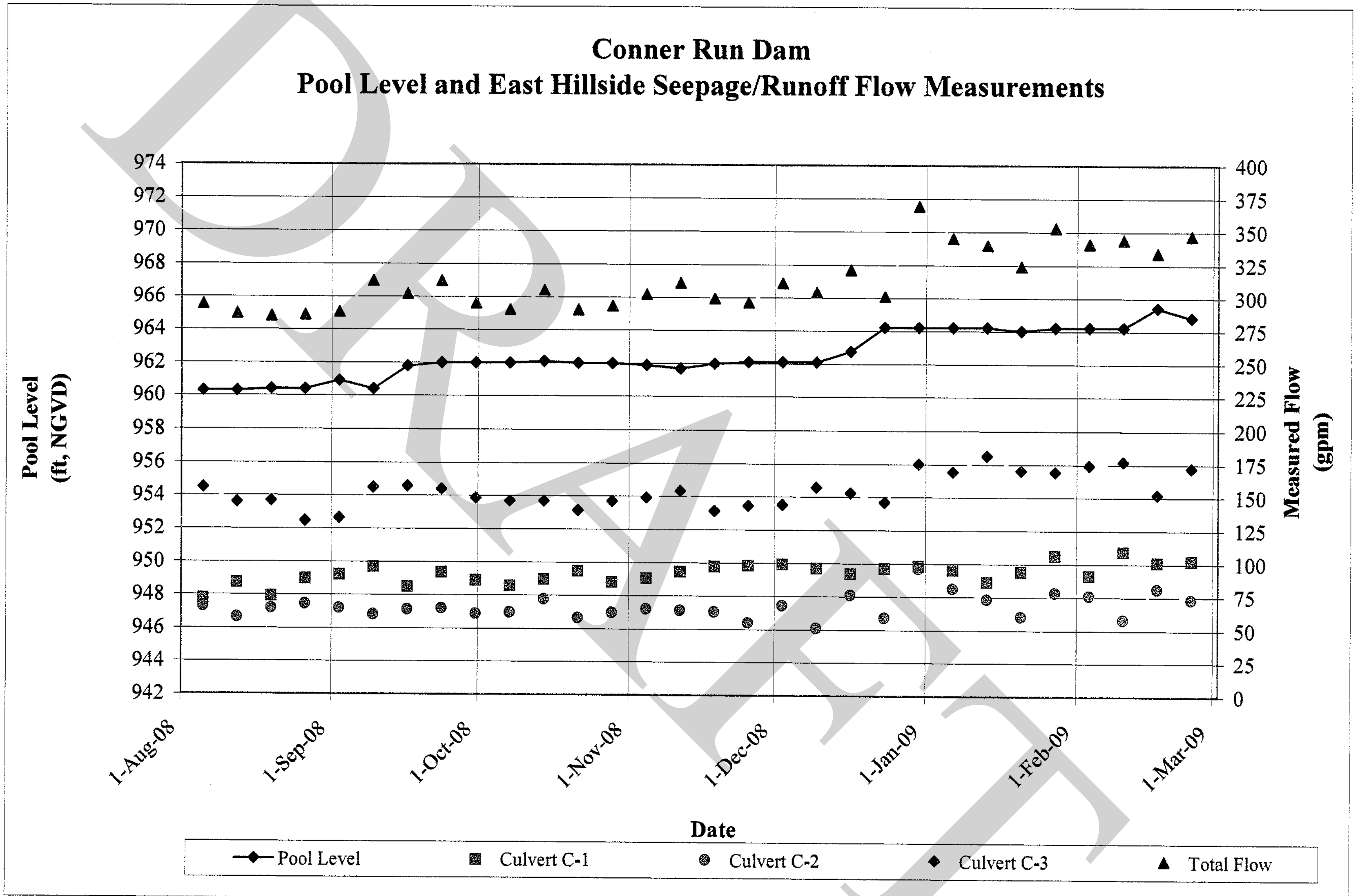
US EPA ARCHIVE DOCUMENT



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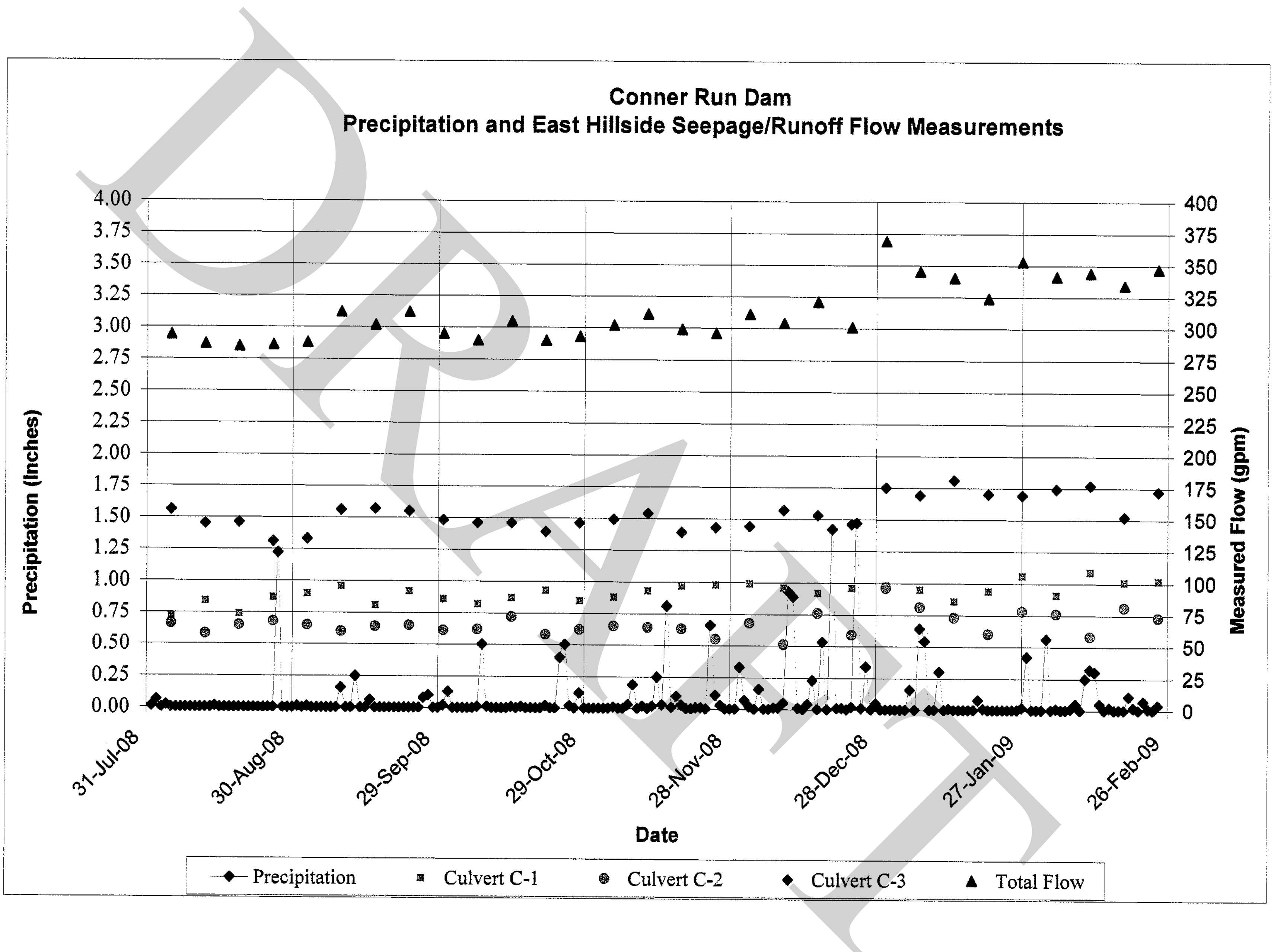

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