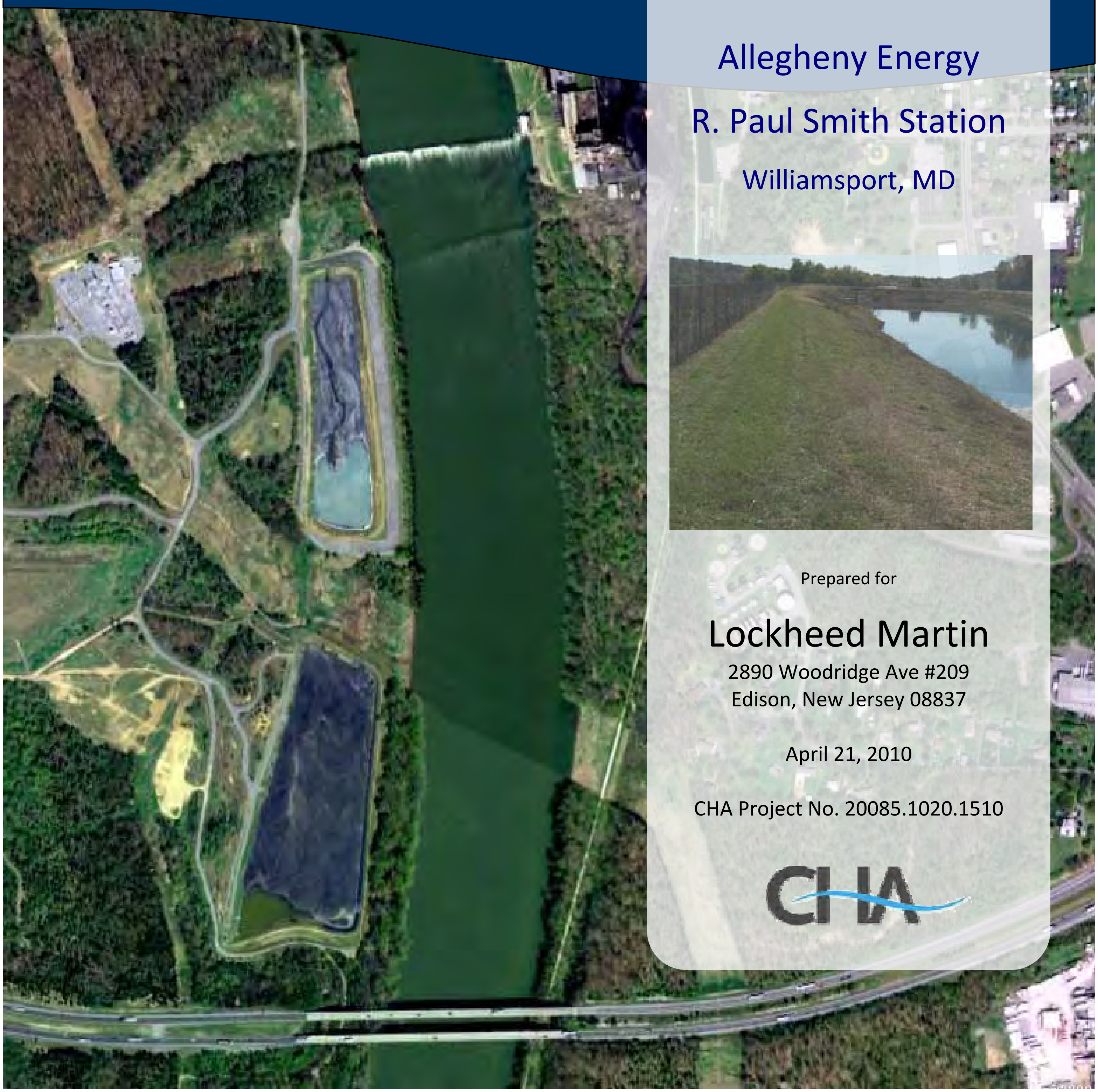
Assessment of Dam Safety
Coal Combustion Surface Impoundments (Task 3)
Final Report



Allegheny Energy

R. Paul Smith Station

Williamsport, MD

Prepared for

Lockheed Martin

2890 Woodridge Ave #209
Edison, New Jersey 08837

April 21, 2010

CHA Project No. 20085.1020.1510

I acknowledge that the management units referenced herein:

- Ash Pond #3
- Ash Pond #4

have been assessed on October 20, 2009.

Signature: ______________________________
Katherine E. Adnams, P.E.
Senior Geotechnical Engineer

Reviewer: ______________________________
Warren A. Harris, P.E.
Geotechnical Operations Manager

Reviewer: ______________________________
Khalid Abed, P.E.
Principal Engineer
Registered in the State of West Virginia

KHALID J. ABED REGISTERED 15288 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

4/20/10

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1.0 INTRODUCTION & PROJECT DESCRIPTION

1.1 Introduction

CHA was contracted by Lockheed Martin (a contractor to the United States Environmental Protection Agency) to perform site assessments of selected coal combustion surface impoundments (Project #0-381 Coal Combustion Surface Impoundments/Dam Safety Inspections). As part of this contract, CHA was assigned to perform a site assessment of Allegheny Energy's Ash Pond #3 and Ash Pond #4 at the R. Paul Smith Power Station. The Power Station is located in Williamsport, Maryland, and the ash lagoons are in Falling Waters, West Virginia as shown on Figure 1 – Project Location Map.

CHA made a site visit on October 20, 2009 to inventory coal combustion surface impoundments at the facility, perform visual observations of the containment dikes, and collect relevant information regarding the site assessment.

CHA Engineers Katherine Adnams, P.E., and Khalid Abed, P.E. were accompanied by the following individuals:

Company or Organization	Name and Title
Allegheny Energy	Gary Haag, Environmental Manager
Allegheny Energy	Erik Johnsson, Engineer
Allegheny Energy	Mark Vindivich, Manager Production
GAI Consultants	Barry Newman, PE, Vice President – Geotechnical and Structural Engineering

1.2 Project Background

Ash Ponds #3 and #4 are under the jurisdiction of the State of West Virginia Department of Environmental Protection (WVDEP). According to the West Virginia Title 47 Legislative Rule, Series 34 Dam Safety Rule, the dikes for these impoundments have a Hazard Classification of Class 2 (Significant Hazard) meaning the failure of the dam may cause minor damage to dwellings, commercial or industrial buildings, important public utilities, main railroads, or cause major damage to unoccupied buildings, or where a low risk highway may be affected or damaged. The potential for loss of human life resulting from failure must be unlikely.

1.2.1 State Issued Permits

Ash Ponds #3 and #4 were constructed prior to WVDEP requiring Certificates of Approval, which became a requirement in 1992. Allegheny Energy received a Certificate of Approval for Ash Pond #3 in 1996 and another in 1999 for repair to the outlet works.

Allegheny Energy received an initial Certificate of Approval for work at Ash Pond #4 in 1981, and another in 1997 for repair to the outlet works.

A National Pollutant Discharge Elimination System (NPDES) permit, MD0000582 has been issued to Allegheny Energy authorizing discharge to the Potomac River in accordance with effluent limitations, monitoring requirements and other conditions set forth in the permit. The permit became effective on August 16, 2008 and is set to expire on July 16, 2013.

1.3 Site Description and Location

Ash Ponds #3 and #4 (also referred to in some documents as Lagoons #3 and #4) are located on the west bank of the Potomac River in Falling Waters, West Virginia. Pond #3 is located to the north of Pond #4. Figure 2 shows a site plan, and Figures 3 and 4 shows a typical cross section of the dams. Allegheny Energy alternates use of the ponds, pumping to one until it is full, and then switching to the other while the full impoundment is dewatered and dredged with the ash taken to a nearby landfill.

A map of the region indicating the location of the R. Paul Smith Power Station and Ash Ponds #3 and #4 identifying schools, hospitals, or other critical infrastructure located within approximately five miles down gradient of the ash pond is provided as Figure 3. The community of Falling Waters, West Virginia is about 5 miles downstream from the dam.

1.3.1 Ash Pond #3

Ash Pond #3 is impounded on three sides (north, east, and south) by an earthen embankment dike. The west side is impounded by natural topography. The Ash Pond #3 dikes have a maximum height of approximately 46 feet resulting in a maximum storage capacity of 104 acre-feet. The east dike is buttressed with rock fill, while the north and south dike sections are armored with rock fill, but not buttressed (i.e., the rock fill was not placed to contribute to the structural stability). The toe of the east dike buttress extends approximately to the shoreline of the Potomac River at normal water level in the river. The water level in Lagoon #3 is controlled by an HDPE spillway riser pipe at the south end of the lagoon. Originally constructed in the 1960s (exact year unknown) this impoundment has been modified several times; in 1980 the crest of the dike was raised after flooding of the Potomac River related to Hurricane Agnes (1972) came near the dam crest elevation, and in 1999 the corrugated metal pipe (CMP) outlet corroded through and caused increased flow through the discharge. Repair work was performed in 1999 without release of CCW. Figures 4A and 4B show typical cross sections of the Ash Pond #3 dikes.

1.3.2 Ash Pond #4

Ash Pond #4 is impounded on three sides (north, east, and south) by an embankment dike. The west side is impounded by natural topography. The Potomac River lies approximately 70 to 100 feet east of the lagoon. The Ash Pond #4 dikes have a maximum height of approximately 41 feet resulting in a maximum storage capacity of 218 acre-feet. The dikes have downstream slopes of about 2H:1V, and upstream slopes of about 1.7H to 2H:1V. The upstream slope is partially lined with a hypalon geosynthetic liner. The downstream slope is grasses and weedy vegetation. The water level in Ash Pond #4 is controlled by an HDPE spillway riser pipe at the south end of the spillway. Originally constructed in the early 1960s (exact year unknown) this impoundment had repairs performed in 1997 on the spillway outlet pipe after corrosion through the CMP outlet pipe resulted in increased flows discharging from the pond. Figure 5 shows a typical cross section of the Ash Pond #4 dikes.

1.3.3 Other Impoundments

There were no other impoundments observed at the R. Paul Smith Power Station Site. CHA inquired as to whether Ponds #1 and #2 existed, and Allegheny Energy responded that these were formerly in Maryland at the physical plant site and that they were retired in the 1960s. Pond #1 was removed and Pond #2 was filled with soil and grass covered.

1.4 Previously Identified Safety Issues

In 1997 and 1999, failures of the original CMP outlet pipes occurred in Ash Pond #4 and Ash Pond #3, respectively. Routine observations by plant personnel found increased flows from the outlet pipes, which suggested failure within the outlet structure. During each situation, Allegheny Energy hired an outside consultant to investigate where the failure had occurred and develop repairs to be implemented. In both cases, the riser structure was replaced with a 42-inch diameter HDPE riser, and the 18-inch CMP pipes were slip lined with 14-inch HDPE pipes with the annulus between CMP and HDPE grouted.

Based on our review of the information provided to CHA and as reported by Allegheny Energy, there have been no additional safety issues identified at Ponds #3 and #4 in the last 10 years.

1.5 Site Geology

According to U.S. Geological Survey Open-File Report 01-188, *Geology of the Chesapeake and Ohio Canal National Historical Park and Potomac River Corridor, District of Columbia, Maryland, West Virginia, and Virginia,* the geology of the area of Ponds #3 and #4 is likely shale, siltstone and sandstone bedrock with possible layers of limestone within the Great Valley geologic region. This region is likely part of the Martinsburg formation which is surrounded by other geologic formations of limestone and dolomite formations that include abundant caves and sinkholes. The bedrock is overlain by Holocene and Pleistocene era terraces of sand, gravel and boulders, and Holocene era alluvium consisting of unconsolidated clay, silt, sand and gravel underlying modern era floodplains.

CHA observed road signs in Falling Waters, West Virginia indicating that sinkholes due to karst topography were common, but did not see evidence of such features at the Ash Pond sites.

1.6 Bibliography

CHA reviewed the following documents provided by WVDEP and Allegheny Energy in preparing this report:

- *R. Paul Smith Power Station, Lagoon/Dam No. 3,* letter from GAI Consultants, March 13, 2009.

- *Results of Supplemental Stability Analyses, Wastewater Treatment/Ash Storage Lagoon/Dam No. 4*, GAI Consultants, October 2009.
- *Order of Compliance,* issued by West Virginia Department of Environmental Protection, January 30, 2009.
- *Modification to Certificate of Approval – Outlet Works Reconstruction, Lagoon No. 4,* SE Technologies, September 1997.
- *Outlet Works Reconstruction Wastewater/Ash Storage Lagoon No. 3,* GAI Consultants, January 1999.
- *WVDEP Inspection Reports for R. Paul Smith Power Station Lagoons #3 and #4,* WVDEP 2009, 2006.
- *Biannual Independent Consultant Inspection Report – R. Paul Smith Power Station Lagoons #3 and #4,* Various consultants, 2004, 2006, 2008, 2009.
- *Dam Safety Maintenance Plans for Wastewater/Ash Storage Lagoons No. 3 and No.4,* Allegheny Energy, May 2006.

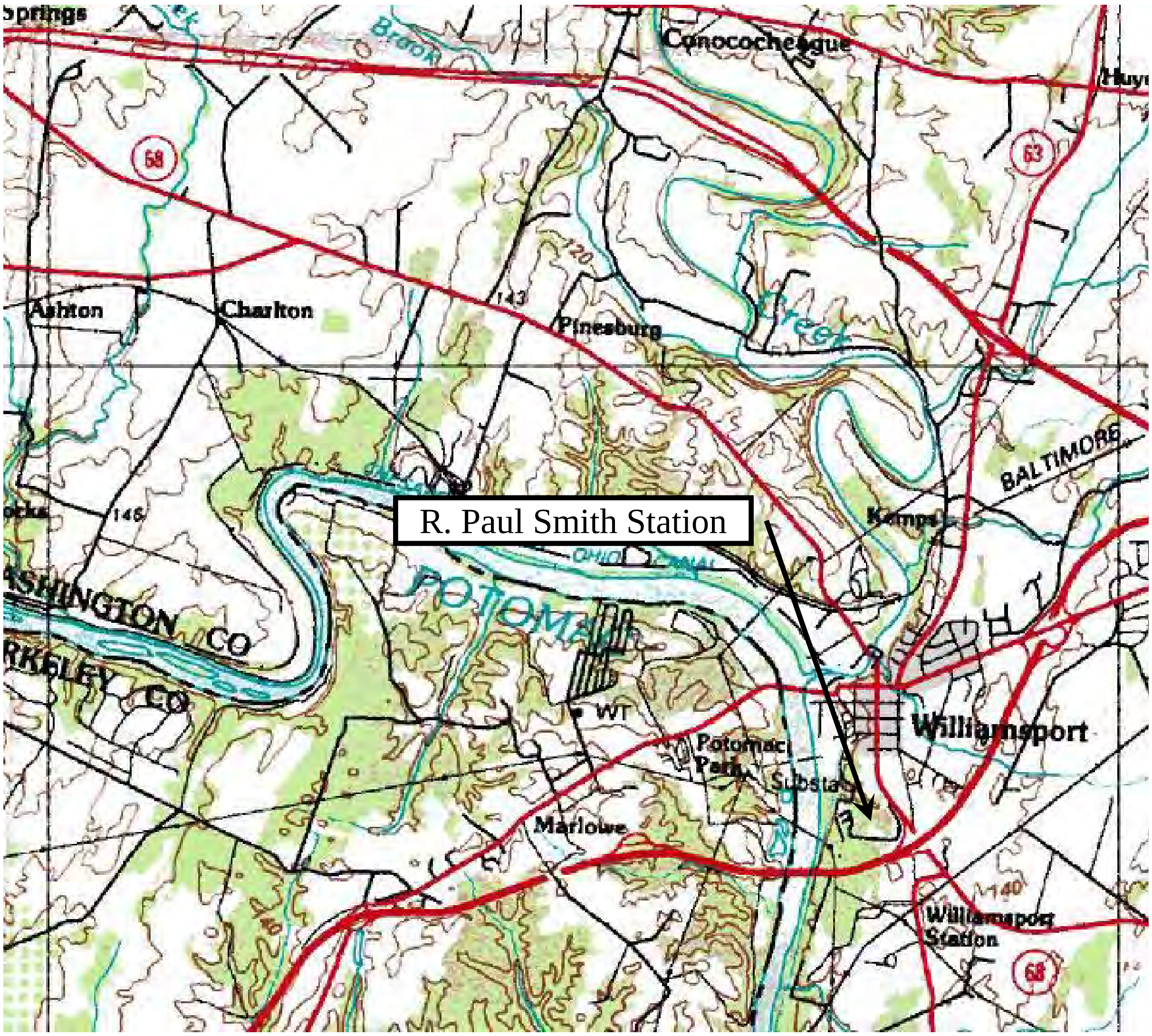

IMAGE DATE: 07/01/1981

N	CHA	**Figure 1** **Project Location Map**
Scale: 1" = 1 mile	**Project No.:** **20085.1020.1510**	**Allegheny Energy** **R. Paul Smith Station** **Williamsport, MD**

0 639 1279
Scale in feet

IMAGE REFERENCE: GOOGLE EARTH, IMAGE DATED JANUARY 31, 2008

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PHOTO SITE PLAN

R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 2

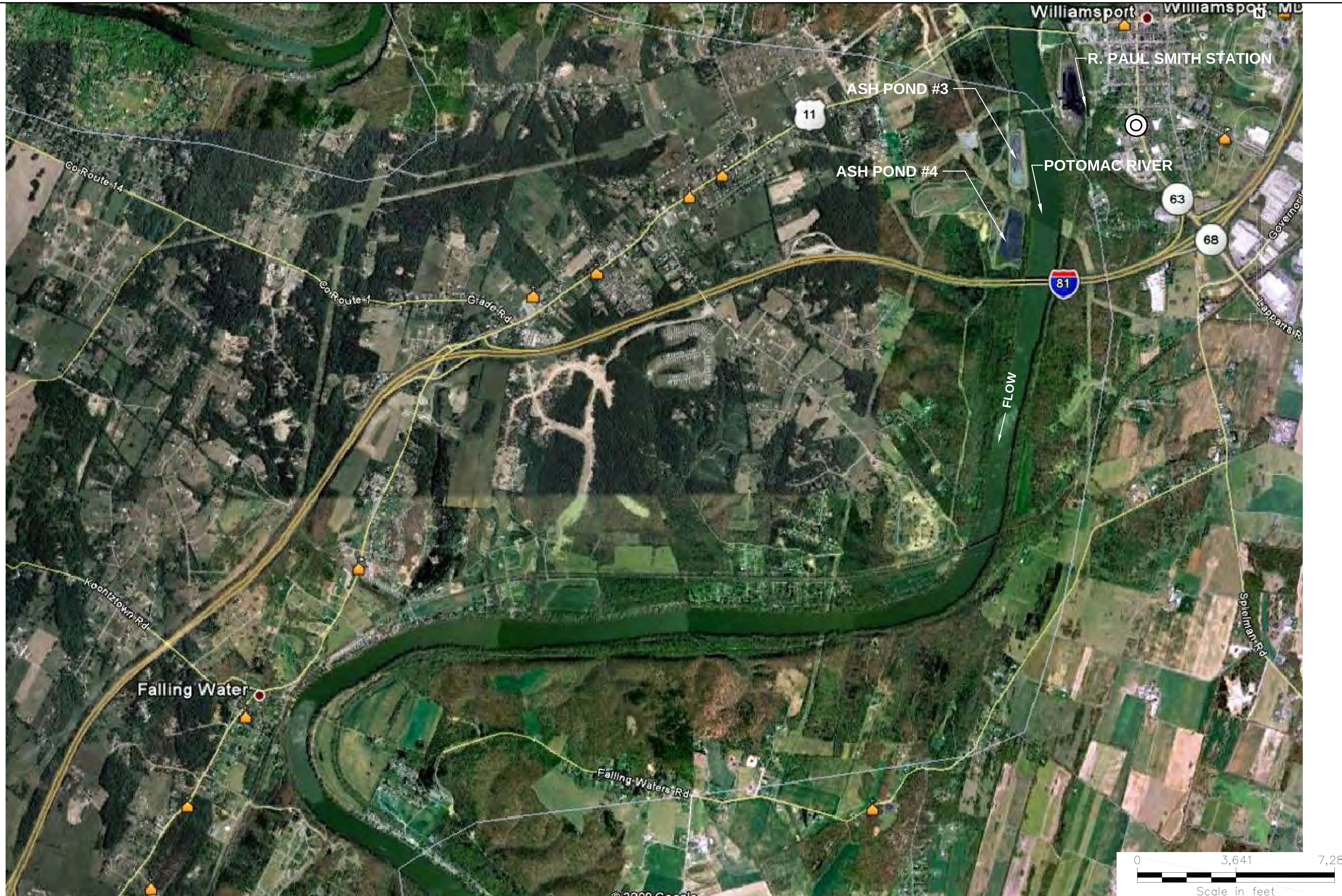

IMAGE REFERENCE: GOOGLE EARTH, IMAGERY DATED JUNE 8, 2005

LEGEND

Symbol	Meaning	Symbol	Meaning
63	STREET, HIGHWAY	(church symbol)	CHURCH
(circle symbol)	FIRE DEPARTMENT	(school symbol)	SCHOOL

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CRITICAL INFRASTRUCTURE MAP

R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

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FIGURE 3

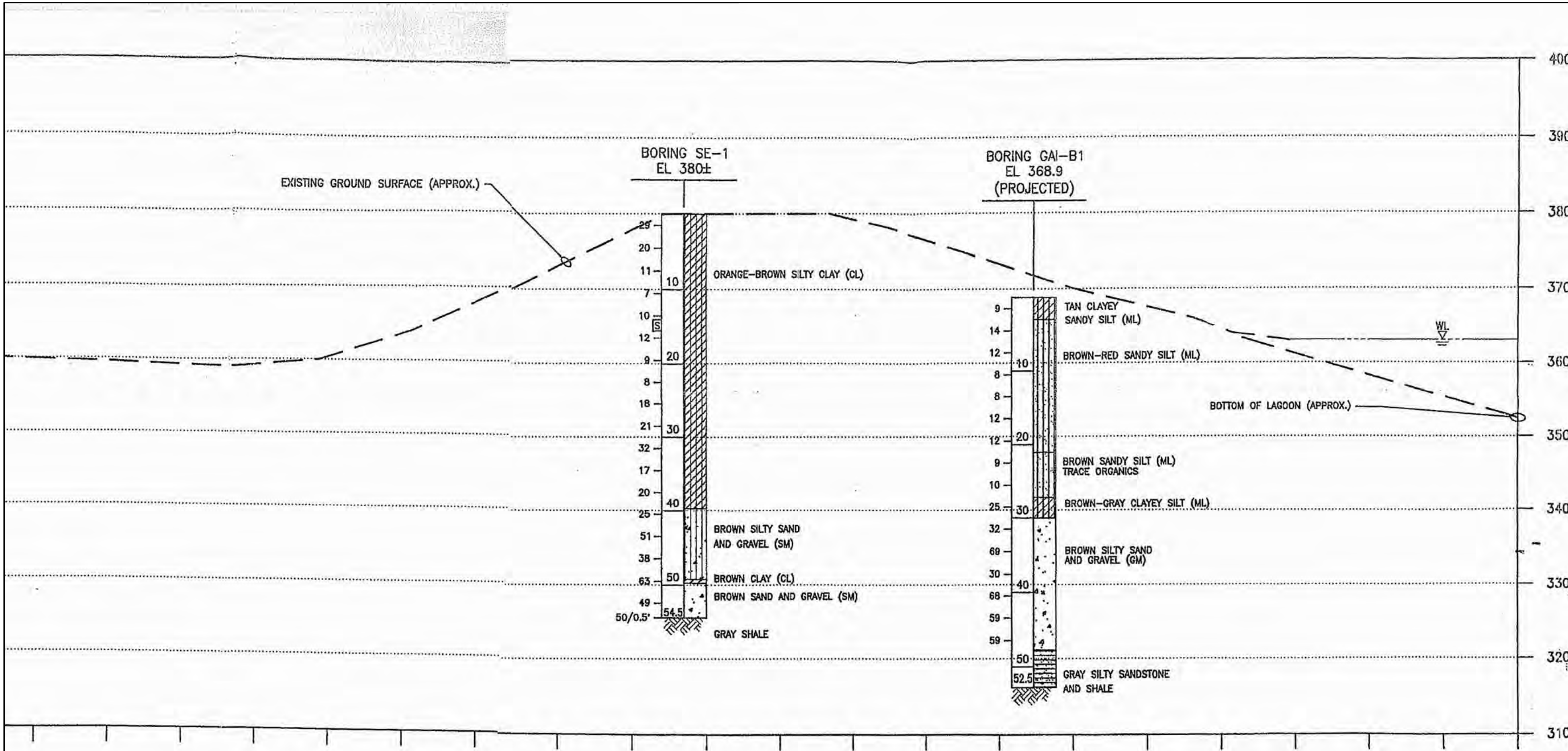

IMAGE REFERENCE: DRAWING 415-411 SHEET 4 OF 5 – CERTIFICATE OF APPROVAL GEOLOGIC CROSS SECTION C-C AND B-B, SE TECHNOLOGIES, 8/3/1995

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TYPICAL CROSS SECTION – ASH POND #3 NORTH DIKE

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WILLIAMSPORT, MARYLAND

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FIGURE 4A

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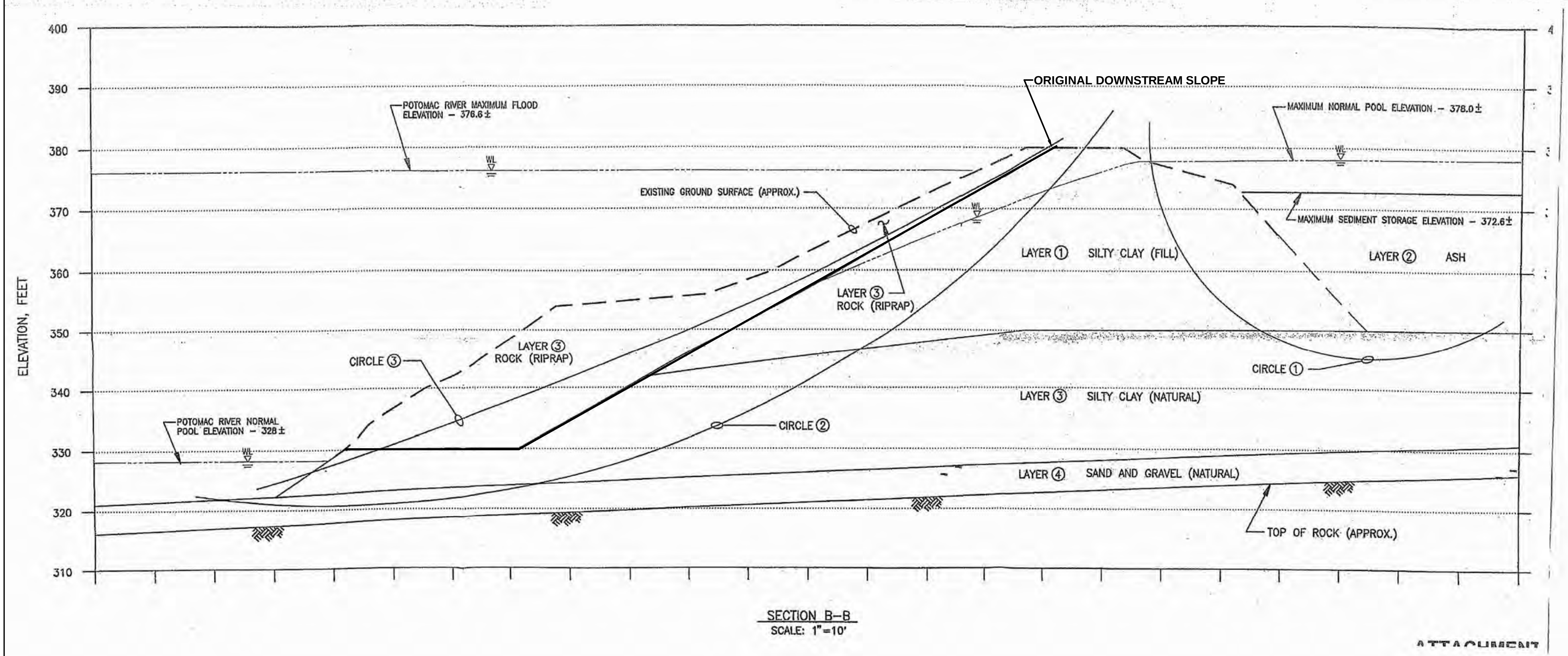

IMAGE REFERENCE: DRAWING 415-411 SHEET 5 OF 5 – CERTIFICATE OF APPROVAL STABILITY CROSS SECTION A-A AND B-B, SE TECHNOLOGIES, 8/3/1995

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TYPICAL CROSS SECTION – ASH POND #3 EAST DIKE

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WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 4B

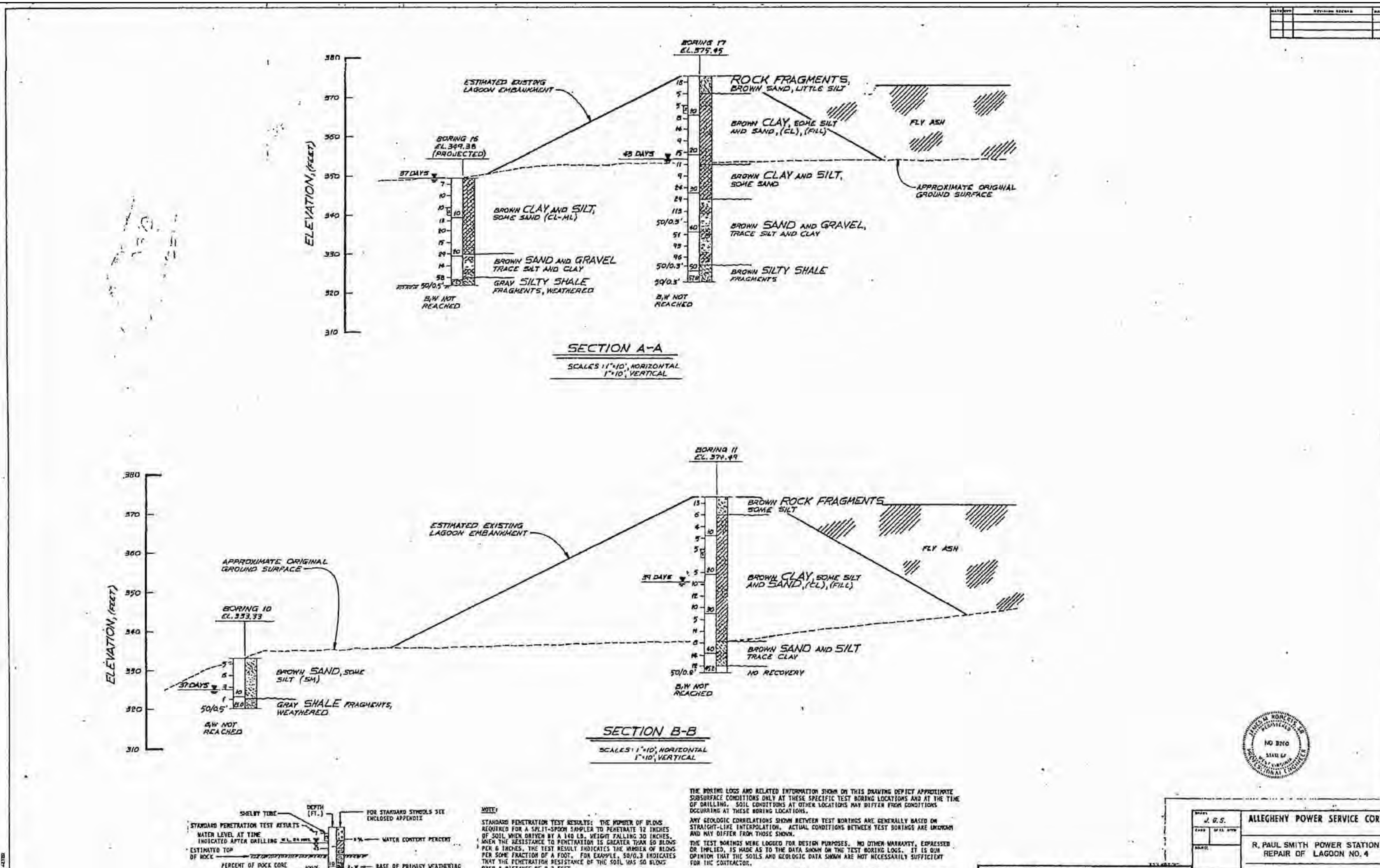

IMAGE REFERENCE: GEOLOGIC SECTIONS A-A AND B-B, SRW ASSOCIATES INC. DRAWING NO. 80157-E1 DATED SEPT. 19, 1980

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TYPICAL CROSS SECTION – ASH POND #4

R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

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FIGURE 5

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2.0 FIELD ASSESSMENT

2.1 Visual Observations

CHA performed visual observations of Ash Ponds #3 and #4 following the general procedures and considerations contained in Federal Emergency Management Agency's (FEMA's) *Federal Guidelines for Dam Safety* (April 2004), and Federal Energy Regulatory Commission (FERC) Part 12 Subpart D to make observations concerning settlement, movement, erosion, seepage, leakage, cracking, and deterioration. A Coal Combustion Dam Inspection Checklist and Coal Combustion Waste (CCW) Impoundment Inspection Form, prepared by the US Environmental Protection Agency, were completed on-site during the site visit. Copies of the completed forms were submitted via email to a Lockheed Martin representative approximately three days following the site visit to the R. Paul Smith Power Station. Copies of these completed forms are included in Appendix A. Photo logs and Site Photo Location Plan (Figures 6A and 6B) for Ash Ponds #3 and #4 are located at the end of Section 2.4.

CHA's visual observations were made on October 20, 2009. The weather was sunny with temperatures between 40 and 70 degrees Fahrenheit. Prior to the days we made our visual observations, the following approximate rainfall amounts occurred (as reported by www.weather.com).

Table 1– Approximate Precipitation Prior to Site Visit

Date of Site Visit – October 20, 2009		
Day	**Date**	**Precipitation (inches)**
Monday	October 13, 2009	Trace
Tuesday	October 14, 2009	0.00
Wednesday	October 15, 2009	0.56
Thursday	October 16, 2009	0.15
Friday	October 17, 2009	0.45
Saturday	October 18, 2009	0.06
Sunday	October 19, 2009	0.00
Total	**Week Prior to Site Visit**	**1.22**
Total	**30 Days Prior to Site Visit**	**1.80**

2.2 Visual Observations – Ash Pond #3

CHA performed visual observations of Ash Pond #3. Ash Pond #3 is about 1,700 feet long with a maximum height of 46 feet. The pond is impounded by dikes on the north, east and south sides, and by natural ground on the west side.

2.2.1 Ash Pond #3 – Embankments and Crest

In general, the alignments of the crest of Ash Pond #3 dikes do not show signs of change in horizontal alignment. The crest is typically about 12 feet wide and is grass covered as shown in Photos 2, 6, and 15. The crest is slightly wider at the west end of the north dike because of ash left against the upstream slope during past dredging operations.

The upstream slope is grass covered to the elevation corresponding to maximum storage, and exposed ash below that elevation due to recent 2008 dredging operations. The upstream slope of the north dike is shown in Photo 4, the upstream slope of the east dike is shown in Photo 7, and the upstream slope of the south dike is shown in Photos 16 and 17. The north end of the east dike was over excavated to an overly steep slope during recent dredging operations. This over excavation during dredging operations appears, from reports reviewed, to occur frequently. The 2009 GAI report notes that this condition was discussed in a 1978 and 1995 stability reports. Non-disturbed slopes are about 3H:1V. A bench remains in the southeast corner of the pond adjacent to the outlet structure. This bench is a remnant of access ramps constructed to perform upgrades to the outlet structure in 1999. The upstream slope between the top of the ramp and the crest of the dike is quite steep, with contours on a May 2009 survey showing the slope at about 1.3 to 1.4 horizontal to 1 vertical. The remaining portions of the south dike upstream slope are about 2.5H:1V.

The downstream slope is armored with rip rap generally about 6 to 8 inches in diameter. The east dike is buttressed with an approximately 20- to 25-foot wide stone bench which then slopes to the shore of the Potomac River. Access to the downstream slope of the buttress is hindered by tree growth and the proximity to the river, with some sections of the buttress extending to the water line, while in other areas there was a narrow strip of shoreline beyond the toe of slope. Photo 5 shows the downstream slope of the north dike, Photos 8, 11 and 12 show the downstream slope of the east dike, Photos 9, 10 and 14 show the east dike buttress, and Photos 18, 19 and 20 show the downstream slope of the south dike. In general the dike slope was free of vegetation, although areas of grass had established along the south dike.

An area of possible seepage has been noted and observed in past inspection reports about 35 feet from the toe of the south dike near the outlet pipe discharge point. This area is shown in Photos 21 and 22. CHA did not observe flow or deposition of sediment in the seepage area, and Allegheny Energy indicated that it is likely related to natural drainage between Ponds #3 and #4, but that they had not definitively determined this so they continue to make observations as if it were seepage. The ground surface in this seepage area is about 4 feet below the elevation of standing water in the recently dredged pond that was observed in the pond during CHA's visit.

2.2.2 Ash Pond #3 – Outlet Control Structure

Ash Pond #3 discharges through an HDPE decant structure with multiple ports in the riser as shown in Photo 16. As the water/ash level rises when the pond is in service, Allegheny Energy personnel install blind flanges when they are ready to raise the level to the next port. This riser discharges below the south dike via a 14-inch HDPE which was sliplined into the original 18-inch CMP pipe. The discharge end of the pipe is shown in Photo 23. It discharges into a Fabriform® lined channel which discharges to the Potomac River as shown in Photo 24.

2.3 Visual Observations – Ash Pond #4

Ash Pond #4 is about 2,020 feet long with a maximum height of 41 feet. The pond is impounded by dikes on the north, east and south sides, and by natural ground on the west side.

2.3.1 Ash Pond #4 – Embankments and Crest

In general, the alignments of the crest of Ash Pond #4 dikes do not show signs of change in horizontal alignment. The crest is about 10 feet wide and is grass covered as shown in Photos 27, 33, 34 and 42. The surface has moderate rutting from vehicle traffic on the crest. An approximately 14-inch diameter, 2-inch deep depression was observed on the crest in the area where the discharge pipe passes beneath the east dike. The discharge pipe was slip-lined in 1997, as described in Section 1.3.2.

The upstream slope at the east end of the north and south dikes, and the entire length of the east dike is lined with a hypalon liner as shown in Photos 29, 33, and 43. Reports reviewed by CHA indicated this liner was installed in 1981 to control the phreatic surface within the embankment to maintain adequate slope stability. Allegheny Energy maintains the liner, routinely patching small holes made by animals walking on the liner as shown in Photo 30. The western ends of the north and south dike are covered with weedy vegetation, which had been freshly cut prior to our site visit. The surface of vegetated upstream slope on the north dike was soft to about 18 inches and irregularly graded. Allegheny Energy indicated that some of the soft material was likely ash left after various dredging operations that became weed covered. This slope is shown in Photos 27 and 28. The vegetated portion of the upstream slope on the south dike is steep and Allegheny Energy indicated that this slope will be regraded and buttressed as part of upcoming work to be performed when the pond is next taken out of service (i.e., when they switch to sluicing ash into Pond #3).

The downstream slopes are weed covered which was freshly cut at the time of our site visit. Photo Nos. 31, 35, and 46 show the general condition of the downstream slope. Many features of deterioration of the downstream slopes were noted as listed below:

- Several areas of surface erosion and sloughing were observed. Near the northeast corner, surface erosion has occurred at the fence line as shown in Photo 36. This feature was noted in previous inspection reports and according to Allegheny Energy personnel, has remained unchanged in many years. A similar area of surface erosion was noted near location marking tag #30. Between marking tags #56 and #57, a clump of woody vegetation stumps appeared to be inhibiting sheet flow along the slope surface but rather forcing erosion rills to develop around it.
- A bench with a top elevation about 2 feet lower than the crest that is located near the middle portion of the east dike appeared to have a surface slump with bulging and steepening of the toe. This feature was located near location marking tag #48.
- In general the surface soils on the east downstream slope were soft, and shifted when walked on. Significant rain had been received in the week preceding our site visit and Allegheny Energy personnel indicated that some of the surface sloughing such as that shown in Photo 38 may have occurred while contractor crews were weed-whacking the slope.
- The natural slope between the toe of the Ash Pond #4 dike and the Potomac River is covered with trees. For the most part, these trees start at the toe of the dike. However, in a few locations, such as that shown in Photo 37, large trees are actually within the toe of the east dike. Low hanging branches from these trees beyond the toe of the dike are encroaching on the dike as shown in Photo 40. Small shrubs were observed on the south dike as shown in Photo 47.
- Filled in rodent holes were observed on the downstream slopes as shown in Photo 39. Allegheny Energy described burrowing rodents as an ongoing problem at this site, and that they routinely fill rodent burrows as found, and each spring perform rodent control

finding that performing removal of the animals around mating season has had a positive impact on gaining control on the rodent population.

CHA did not observe seepage and the drainage swale at an apparent toe drain along the south dike was dry. CHA also took a reading in a piezometer at about the mid point of the east dike, which indicated water in the dike was between 28 and 30 feet below the crest surface. The dike in this area is about 22 feet high. Allegheny Energy's consultant, GAI Consultants, indicated that they had found similar piezometer readings during a 2009 review of the stability of the Ash Pond #4 dike, which is more thoroughly discussed in Section 3.3.2.

2.3.2 Ash Pond #4 – Outlet Control Structure

Ash Pond #4 discharges through an HDPE riser in the southeast corner of the pond as seen in Photo 48. Allegheny Energy indicated this structure was the same as the one observed in Ash Pond #3. At the time of CHA's site visit the water level in Ash Pond #4 was at the top crest of the decant structure. The decant structure discharges beneath the east dike through a 14-inch diameter HDPE sliplined into the original CMP pipe as described in Section 1.3.2. The discharge end of the pipe is seen in Photo 49 and discharges into a rip rap lined channel to the Potomac River as shown in Photo 50.

2.4 Monitoring Instrumentation

There are a few piezometers on the Ash Pond #4 dikes. These piezometers were installed in 1997 as part of the outlet riser repair project, and have not been monitored until 2009 when they were used by GAI to determine the phreatic surface in the dam for stability analyses to meet requirements of a WVDEP Order of Compliance issued in the wake of the TVA Kingston event. There is no monitoring instrumentation on Ash Pond #3 dikes.

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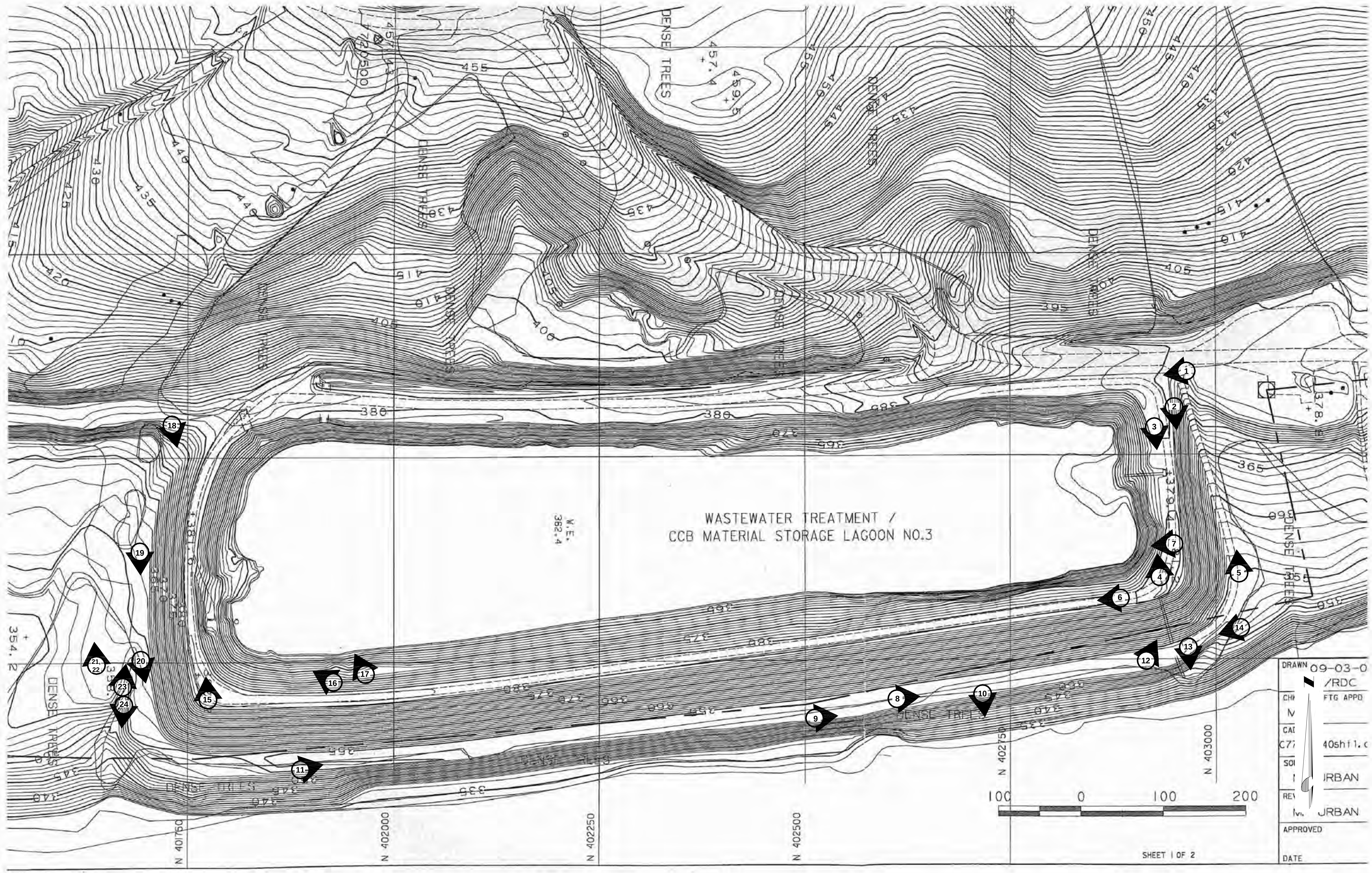

IMAGE REFERENCE: R PAUL SMITH POWER STATION ACTIVE CCB LANDFILL FACILITY 2009 TOPOGRAPHIC MAPPING 5-18-09, ALLEGHENY ENERGY SUPPLY CO., LLC

CHA

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PHOTO LOCATION PLAN – ASH POND #3

ASH POND COMPLEX
R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

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DATE: 02/2010

FIGURE 6A

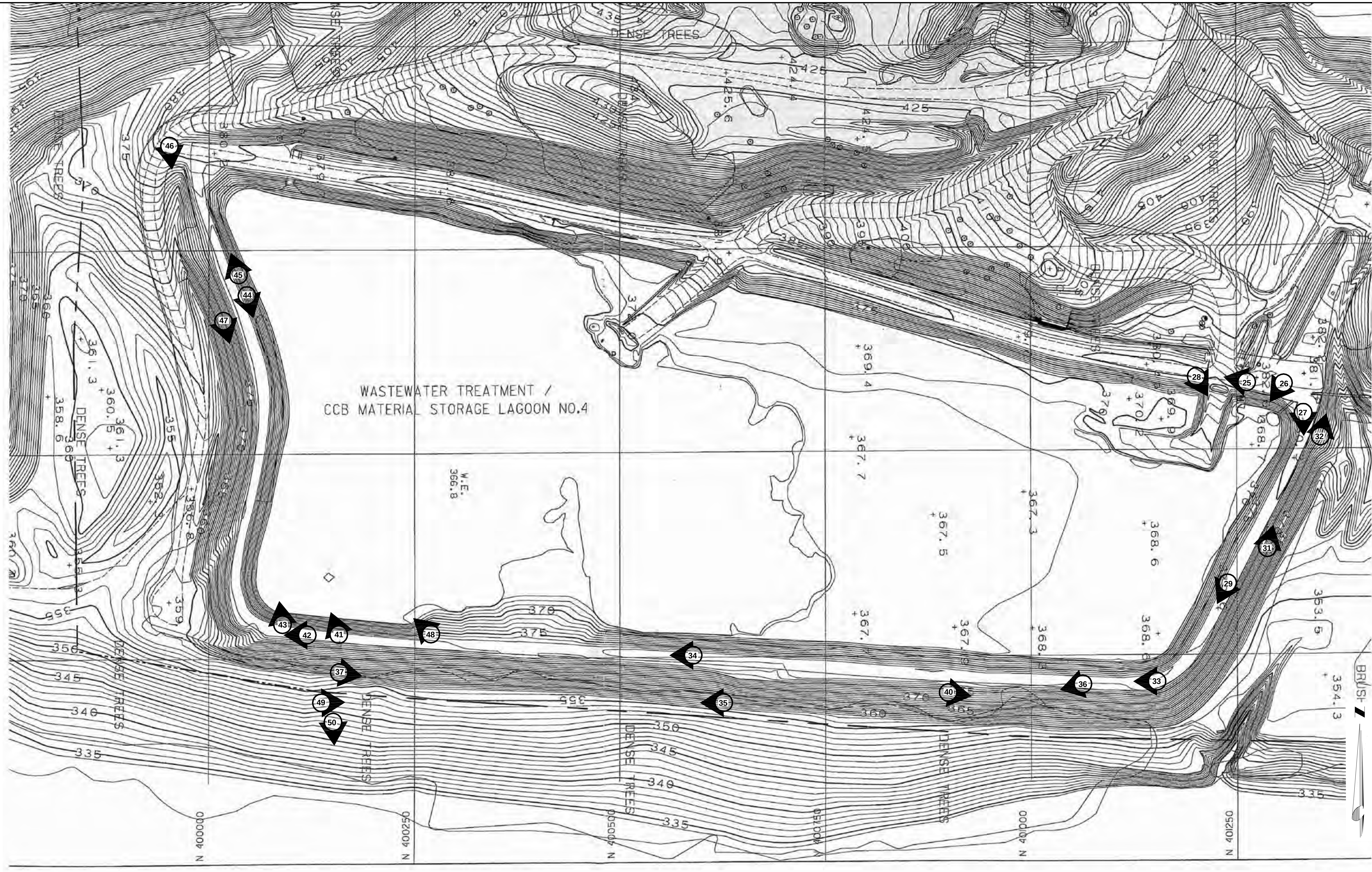

IMAGE REFERENCE: R PAUL SMITH POWER STATION ACTIVE CCB LANDFILL FACILITY 2009 TOPOGRAPHIC MAPPING 5-18-09, ALLEGHENY ENERGY SUPPLY CO., LLC

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PHOTO LOCATION PLAN – ASH POND #4

ASH POND COMPLEX
R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

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FIGURE 6B

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1

Pond #3, looking southeast from the north abutment. West side of pond (right side of photo) is in natural ground.

2

Crest of north dike at Pond #3, looking east.

3

Upstream slope of north dike at Pond #3, looking east.
Irregularity of slope related to remaining ash from recent dredging operations.

4

Upstream slope of north dike at Pond #3, looking west. Pond was dredged in 2008.

CHA	**ALLEGHENY ENERGY R. PAUL SMITH STATION POND #3 WILLIAMSPORT, MD**
CHA Project No.: 20085.1020.1510	October 20, 2009

5

Downstream slope of north dike at Pond #3, looking west towards north abutment.

6

Crest of east dike at Pond #3, looking south

7

Upstream slope of east dike at Pond #3, looking south. Irregularity in slope related to over excavation during recent dredging operations.

8

Downstream slope of east dike at Pond #3 looking north.

9

Trees growing in stone buttress on east dike of Pond #3, looking north.

10

Stone buttress on east dike of Pond #3 extends to the edge of the Potomac River.

CHA	ALLEGHENY ENERGY R. PAUL SMITH STATION POND #3 WILLIAMSPORT, MD
CHA Project No.: 20085.1020.1510	October 20, 2009

11

Downstream slope of east dike at Pond #3, looking north.

12

Sluice lines from R. Paul Smith Station at northeast corner of Pond #3 service both Pond #3 and Pond #4. Hardened steel lines to dike crest and they are replaced approximately every 15 years as routine maintenance.

CHA	**ALLEGHENY ENERGY** **R. PAUL SMITH STATION** **POND #3** **WILLIAMSPORT, MD**
CHA Project No.: 20085.1020.1510	October 20, 2009

13

Slice lines from R. Paul Smith Station traverse the Potomac River are hardened steel and protected with rip rap. The sluice lines are replaced approximately every 15 years as routine maintenance.

14

Stone buttress looking south from northeast corner of Pond #3.

15

Crest of south dike at Pond #3, looking west toward south abutment.

16

Upstream slope of south dike of Pond #3 looking south and decant structure.
Bench is remnant of an access road built when the decant structure was replaced in 1997.

17

Upstream slope of south dike of Pond #3 looking southwest. South abutment at right of photo.

18

Downstream slope of south dike of Pond #3, looking east.

19

Downstream slope of south dike of Pond #3, looking east.

20

Typical patchy vegetation on rip rap armor of downstream slopes of Pond #3. Mostly grasses, occasional saplings.

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R. PAUL SMITH STATION
POND #3
WILLIAMSPORT, MD

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21

Possible (and previously noted) seepage area south of south dike of Pond #3 looking north.
Possibly related to natural drainage between Ponds #3 and #4.

22

Close up of possible seepage area. No obvious flow and no observed deposition of sediment.

23

Outlet pipe from the decant structure. Pond currently dewatered/dredged below the decant elevation.

24

Fabriform lined discharge channel from Pond #3 to the Potomac River.

25

West side of Pond #4 is in natural ground, looking south.

26

Pond #4, looking southeast.

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27

Crest of the north dike at Pond #4, looking east.

28

Upstream slope of north dike at Pond #4, looking northeast.

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29

Hypalon liner on the upstream slope of the north dike at Pond #4.

30

Routine maintenance includes patching holes on the hypalon liner created by animals walking on the liner.

31

Downstream slope of north dike at Pond #4, looking north.

32

Sluice lines at north abutment.

33

Crest of east dike at Pond #4, looking south.

34

Crest of east dike at Pond #4, looking south.

35

Downstream slope of east dike at Pond #4, looking south.

36

Surface erosion at downstream slope/crest on east dike at Pond #4.
This erosion has been noted in previous inspection reports and has not changed in many years.

37

Large tree at toe of east dike slope at Pond #4, looking north.

38

Erosion/surficial sloughing on east dike at Pond #4. Surface soil soft.

39

Filled in rodent holes on east dike at Pond #4. Rodent control is performed each spring and observed holes are filled as part of routine maintenance of the dikes.

40

Adjacent tree branches near east dike slope at Pond #4.

41

Depression about 2 inches deep and 18 inches in diameter on crest of east dike in approximate area of outlet pipe.

42

Crest at southeast corner of Pond #4.

43

Upstream slope of south dike at Pond #4, looking southwest.

44

Upstream slope of south dike at Pond #4, looking east.

45

Upstream slope of the south dike at Pond #4, looking west toward the south abutment.

46

Downstream slope of the south dike at Pond #4, looking east.

47

Small trees on downstream slope on south dike at Pond #4, looking east.

48

Decant structure in the southeast corner of Pond #4.

49

Discharge pipe from Pond #4.

50

Rip rap channel from the Pond #4 outlet to the Potomac River.

CHA	**ALLEGHENY ENERGY** **R. PAUL SMITH STATION** **POND #4** **WILLIAMSPORT, MD**
CHA Project No.: 20085.1020.1510	October 20, 2009

3.0 DATA EVALUATION

3.1 Design Assumptions

CHA has reviewed the design assumptions related to the design and analysis of the stability and hydraulic adequacy of the Ash Ponds #3 and #4, which were available at the time of our site visits and provided to us by Allegheny Energy. The design assumptions are listed in the following sections.

3.2 Hydrologic and Hydraulic Design

Dams in West Virginia are governed by West Virginia Rule 47CSR34. Under this legislation the Ash Ponds #3 and #4 are classified as Class 2, significant hazard, dams. This classification requires the dam to safely pass or store the inflow from 50 percent of the 6-hour duration Probable Maximum Precipitation (PMP), discharge 90% of the stored storm volume within 10 days after the storm event, and emergency spillway operation frequency shall be no more than once in 50 years, if included. Ash Ponds #3 and #4 were constructed with only primary drop inlet type spillways and do not have emergency spillways. In this case the West Virginia regulations require that the impoundment have adequate storage to contain the full inflow from the design storm (i.e., assumes the outlet becomes clogged during a storm event).

3.2.1 Ash Pond #3 – Hydrologic and Hydraulic Design

CHA reviewed hydrologic and hydraulic analyses performed by GAI Consultants in 1999 when the spillway was repaired. These analyses suggest that 50 percent of the PMP at the R Paul Smith site is 14 inches, and the drainage area is about 64 acres. When accounting for infiltration within the watershed, the resulting volume of inflow to Ash Pond #3 was determined by GAI to be 37.4 acre-feet. From a maximum operating pool of El. 373, the resulting peak water surface elevation is 377.5.

3.2.2 Ash Pond #4 – Hydrologic and Hydraulic Design

CHA reviewed hydrologic and hydraulic analyses performed by SE Technologies, Inc. in 1997 when the spillway was repaired. These analyses used 50 percent of the PMP reported to be 13.75 inches, and a drainage area of about 74 acres. The maximum reported elevation in Ash Pond #4 was determined to be El. 372.9 with discharge through the spillway. The outflow hydrograph ordinates were included in the report, so CHA evaluated the volume which this analysis assumed would discharge from the pond and determined that during the storm event, approximately 6.1 acre-feet had been estimated to drain from the pond. From the elevation-volume rating curve included in the SE Technologies report, CHA determined that even without outflow from the outlet structure, the design storm will be stored within the pond. With outflow the peak water surface elevation will be about El. 372.9, and without outflow the peak water surface elevation will be slightly below El. 375 with the top of the dikes at El. 378.

3.2.3 Flooding from the Potomac River

The Potomac River is susceptible to flooding. The highest recorded flooding occurred in 1936 when the River rose to El. 377.6 at the ash ponds. In 1972, runoff from Hurricane Agnes reportedly resulted in peak river flows in the area of Ash Ponds #3 and #4 of approximately El. 365. Having been inactive for several years, prior to return to service,in 1980, the rock buttress was added to the Pond #3 east dike and the crest of the dikes were raised to El. 380. The crest of Pond #4 is at El. 378.

CHA reviewed data readily available on the internet on historic flooding in the Potomac River at Williamsport, Maryland and Falling Waters, West Virginia. Available references from USGS and FEMA indicate:

- 100-yr flood elevation is estimated on FIRM maps to be El. 371 adjacent to the upstream end of Pond #4 and at El. 372 at the power plant dam, slightly upstream from the upstream end of Pond #3.
- Top five historic crests on Potomac between 1936 and present do not include Hurricane Agnes in 1972. These five events ranged from crest stage 34.8 to 48.6. Flood stage is reportedly at 23 feet (or approximately El. 329 based on the peak stage and elevation associated with the 1936 event). No specific correlation between River stage and elevation was found for this section of the Potomac River.
- Top five historic crests reported in Williamsport were also listed as the top five in Hancock the nearest upstream USGS gauging station. Four of the top five in Williamsport were in the top five at Shepherdstown, the nearest downstream USGS gauging station. Data available suggested that it was possible that during a 1996 event the gage in Shepherdstown was not in service. At Shepherdstown a 1985 event had about the same river stage level as Hurricane Agnes; the 1985 event at Hancock was about 5 feet lower than the rise at Hancock as a result of Hurricane Agnes.

Hurricane Agnes dropped 6.3 inches of rain on Hagerstown, Maryland (about 6 miles to the northeast from Williamsport) between June 20 and 23, 1972. Reportedly, despite the rain, flood levels on the Potomac did not come close to the record floods of 1936, which resulted from a combination of heavy rain on top of heavy snow packs. A similar rain on snow event occurred in 1996, which produced one of the top five flood events in this area of the Potomac River.

Reports about the impact of Hurricane Agnes indicated that above Hancock, no unusual flooding was observed and that most of the flooding occurred in tributaries of the Potomac River downstream of the confluence with the Shenandoah River. On tributaries between the Conococheague Creek at Fairview, Maryland, which joins the Potomac River in Williamsport, and the Rock Creek at Washington, DC, flooding exceeded the 100-year frequency elevations. Peak flows in some of the larger streams ranged from 2 to 6 times greater than previously recorded maximums.

Given the relatively frequent number of flooding events between 1936 and the present at Williamsport, CHA recommends quantifying the risk to Ash Ponds #3 and #4 from high waters on the Potomac River.

3.3 Structural Adequacy & Stability

CHA has reviewed engineering reports for slope stability in comparison to the criteria established by West Virginia Rule 47CSR34 for Ash Ponds #3 and #4 as indicated in the following subsections.

3.3.1 Ash Pond #3 – Structural Adequacy & Stability

GAI reviewed the structural stability of Ash Pond #3 as part of Allegheny Energy's response to WVDEP's Order of Compliance following the TVA Kingston incident. This review was largely performed by reviewing previous engineering reports by GAI and others dating back to 1978. The analyses were performed looking at downstream slopes of 2H:1V, and "as designed" upstream slopes of 3H:1V. The upstream slope was much steeper below the maximum ash disposal line during CHA's site visit due to over excavation during 2008 dredging operations, and this type of condition was described by GAI as being noted in 1978 and 1995 as well.

The general soil profile at Ash Pond #3 consists of the homogeneous silty clay fill embankment founded on natural silty clay overlying sand and gravel overlying bedrock. Table 2 summarizes the soil properties used in the stability analyses. The year in parentheses indicates properties used in the respective reviews of stability.

Table 2 – Ash Pond #3 Soil Parameters Used in Stability Analyses

Soil Stratum	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Embankment Fill	130 ('95) 125 ('99)	32 ('95) 28 ('99)	100 ('95) 200 ('99)
Ash	95 ('95,'99)	31 ('95,'99)	0 ('95,'99)
Proposed Shale Fill	125 ('99)	34 ('99)	400 ('99)
Rip Rap	140 ('95,'99)	40 ('95,'99)	0 ('95,'99)
Natural Silty Clay	130 ('95) 125 ('99)	35 ('95,'99)	0 ('95,'99)
Natural Sand and Gravel[1]	135 ('95)	39 ('95)	0 ('95)

1. Sand and gravel layer not included in 1999 analyses

Cross sections of the north, south and buttressed east dikes were evaluated for stability. The results of these analyses are presented in Table 3 below and graphical interpretation is presented in Figures 4B (Section 2), 7A and 7B.

Table 3 – Ash Pond #3 Engineering Comparison to Design Criteria

Design Consideration	**Criteria**	**Engineering Results**		
		North Dike	East Dike	South Dike
Downstream Slope Steady State Conditions (1995): *Pond surface @ El. 378* *Potomac River @ Normal Pool*	1.5 SS[1] 1.2 EQ[2]	1.8 SS 1.5 EQ	1.5 SS 1.3 EQ	2.0 SS 1.7 EQ
Downstream Slope Steady State Conditions (1995): *Pond surface @ El. 378* *Potomac River @ El. 376*	--	1.9 SS 1.5 EQ	1.9 SS 1.5 EQ	2.0 SS 1.5 EQ

Table 3 – Ash Pond #3 Engineering Comparison to Design Criteria - continued

Design Consideration	Criteria	Engineering Results		
		North Dike	East Dike	South Dike
Upstream Slope Steady State Conditions (1999): *Pond surface @El. 372* *Potomac River @ Normal Pool*	1.5	2.2	2.2	2.2
Upstream Slope Steady State Conditions (1995): *Pond surface @ El. 360* *Potomac River @El. 376*	--	1.5 SS 1.3 EQ	1.5 SS 1.3 EQ	1.5 SS 1.3 EQ
Upstream Slope Steady State Conditions (1999): *Pond surface @ El. 360* *Potomac River @El. 376*	--	1.6	1.6	1.6
Upstream Slope Rapid Drawdown Conditions (1999): *Pond drawdown to El. 360* (Approx. discharge pipe elev.) *Pond drawdown to El. 347*	1.2	1.4 1.1	1.4 1.1	1.4 1.1
Analyze liquefaction potential and safeguard against if needed		No conclusion provided to CHA.		

1. SS = Steady State loading conditions
2. EQ = Earthquake loading conditions

The upstream slope stability analyses performed in 1999 indicate that the upstream slopes would be regraded with shale fill to return the slopes to a 3H:1V slope angle following over excavation during dredging operations. CHA did not observe shale fill along slopes still apparently at approximate 3H:1V slopes although deposited ash from successive years of pond use may have buried this fill. However, the northeast corner of the impoundment was severely over excavated during 2008 dredging operations resulting in an upstream slope between 1.6H:1V to steeper than 1:1 based on a May 2009 survey and field observations by CHA. Based on the May 2009 survey, slopes not over excavated during the last dredging operation were between 2.5H:1V and 3H:1V.

An evaluation of liquefaction was not provided to CHA. However, subsurface information provided does not appear to suggest liquefaction susceptible foundation soils are found at this site.

3.3.2 Ash Pond #4 – Structural Adequacy & Stability

GAI reviewed the structural stability of Ash Pond #4 as part of Allegheny Energy's response to WVDEP's Order of Compliance following the TVA Kingston incident. To evaluate the stability of the Ash Pond #4 dikes, GAI began by reviewing past reports by SRW in 1980 and SE Technologies in 1997. From soil borings performed by SRW in 1980, the strata and associated engineering properties were identified at the site as shown in Table 4.

Table 4 – Ash Pond #4 Soil Parameters Used in Stability Analyses

Soil Stratum	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Shale Fill	135	38	0
Clay (Embankment Fill)	135	35	0
Soft to Medium Stiff Clay, some silt and sand	130	32	0
Medium Stiff to Stiff Clay, some silt and sand	135	35	0
Medium Stiff to Very Stiff Clay and Silt, some sand	135	31	0
Stiff to Very Stiff Clay and Silt, some sand	135	35	0
Sand and Gravel	140	38	0
Fly Ash	75	30	0

Note: not all strata were represented in each cross section analyzed.

GAI reproduced cross sections of the Ash Pond #4 dikes based on strata boundaries and soil propertied from the SRW cross section with the exception of including a friction angle of 30 degrees for the fly ash, whereas SRW did not assume strength within the fly ash and a peak ground acceleration of 0.08g was used as compared to SRW 0.05g. Cross sections of the north, east, and south dikes were evaluated for stability. The results of these analyses are presented in Table 5 below and graphical representation is presented in Figures 8A through 8H. The proposed bench listed in the table is a proposed modification by GAI to meet upstream slope required factors of safety. The bench is proposed to be "left in place" fly ash. This bench will be created each time the pond is dredged through a modification to the cleanout procedures and field survey indicating the limits of dredging to occur.

Table 5 – Ash Pond #4 Engineering Comparison to Design Criteria

Design Consideration	Criteria	North Dike	East Dike	South Dike
Steady State Normal Pool	1.5	1.5	1.5	1.5
Earthquake and Normal Pool	1.2	1.3	1.2	1.2
Upstream Steady State Normal Pool with Proposed Bench	1.5	2.2 (deep) 1.4 (shallow)	2.6 (deep) 1.5 (shallow)	Not Performed
Upstream Earthquake Normal Pool with Proposed Bench	1.2	1.6 (deep) 1.2 (shallow)	1.8 (deep) 1.2 (shallow)	Not Performed
Upstream Slope Rapid Drawdown with Proposed Bench	1.2	2.4	2.4	Not Performed

3.3.3 Instrumentation Review Relative to Stability

There are inactive piezometers on the Ash Pond #4 dikes that were installed in 1997. GAI found several of these piezometers and found water levels to be 30 or more feet below the dam crest, which is consistent with the hypalon liner effectively preventing seepage through the embankment.

There are no monitoring instruments on the Ash Pond #3 dikes.

3.4 Operations, Maintenance, and Inspections

West Virginia Rule 47CSR34 15.4 requires periodic safety inspections of dams as follows for Class 2, significant hazard dams:

- Monthly or more frequently by the Owner;
- At least every three years by the Owner's engineer; and
- At any time as desired by the State.

According to our conversations with WVDEP, these inspections are only required to be visual inspections. Inspection reports for those inspections performed by the Owner's engineer are to be submitted to WVDEP and are to include descriptions of maintenance work to be performed as a result of the inspection findings. These reports are to be certified by an engineer to verify that the dam and its appurtenances are functioning as designed. Special inspections are required following a storm event equal to or greater than a 50-year, 6 hour rainfall following the same reporting criteria, which at Ash Ponds #3 and #4 is about 4.5 inches according to National Weather Service's Technical Paper No. 40 - *Rainfall Frequency Atlas of the Eastern United States for Duration from 30 minutes to 24 hours and Return Periods from 1 to 100 years* (TP-40).

3.4.1 Inspection Procedures

Allegheny Energy hires an outside consultant to inspect the dams every two years. CHA was provided with copies of inspection reports for 2004, 2006, 2008 and 2009. Although earlier than usual, an additional inspection was performed in 2009 as a proactive measure following the TVA Kingston incident. These inspections are typically performed following vegetation clearing in the spring. These inspection reports are submitted to WVDEP.

Typical items of note during these inspections included small saplings taking root on the embankments, animal burrows, over excavation of upstream slopes during dredging, small holes in the hypalon liner at Ash Pond #4, sparse vegetation in some areas, minor surface sloughing from runoff.

3.4.2 Inspections by West Virginia Dam Safety

WVDEP dam safety personnel make periodic inspections of Ash Ponds #3 and #4. Over the last five years, West Virginia Dam Safety personnel have made inspections in 2009, and 2006. The most recent inspection in 2009 was performed in follow-up to the TVA incident, and was part of a West Virginia Dam Safety initiative to have current site visits to each of the coal waste impoundments at power plants in the State.

Typical items of note during these inspections included removing animals and filling burrows, repair holes in the upstream liner at Ash Pond #4, monitor movement of the downstream slope where fence post foundations are exposed from surficial sloughing, and over excavation during dredging of the upstream slopes.

Brian Long, PE (WVDEP) indicated to CHA that the recommendations are of maintenance needs only. They do not use the inspection report as a medium for transmitting more serious concerns or needs at the dam. More serious issues, not addressed in a timely manner by the Owner on their own accord would be addressed via the Civil Administrative Penalties section of 47CSR34.

3.4.3 Maintenance

Allegheny Energy provided CHA with a copy of their Dam Safety Maintenance Plans for Ash Ponds #3 and #4 which were approved by WVDEP in May 2006. These maintenance plans provide a matrix of maintenance activities and the month in which these maintenance tasks are to be performed. The maintenance matrices are attached at the end of this section.

3.5 Foundation Conditions

Data reviewed by CHA indicates that Ash Ponds #3 and #4 were constructed on natural clay, silt and sand alluvial deposits. Constructed in the 1960s, no foundation preparation plans were available for CHA's review.

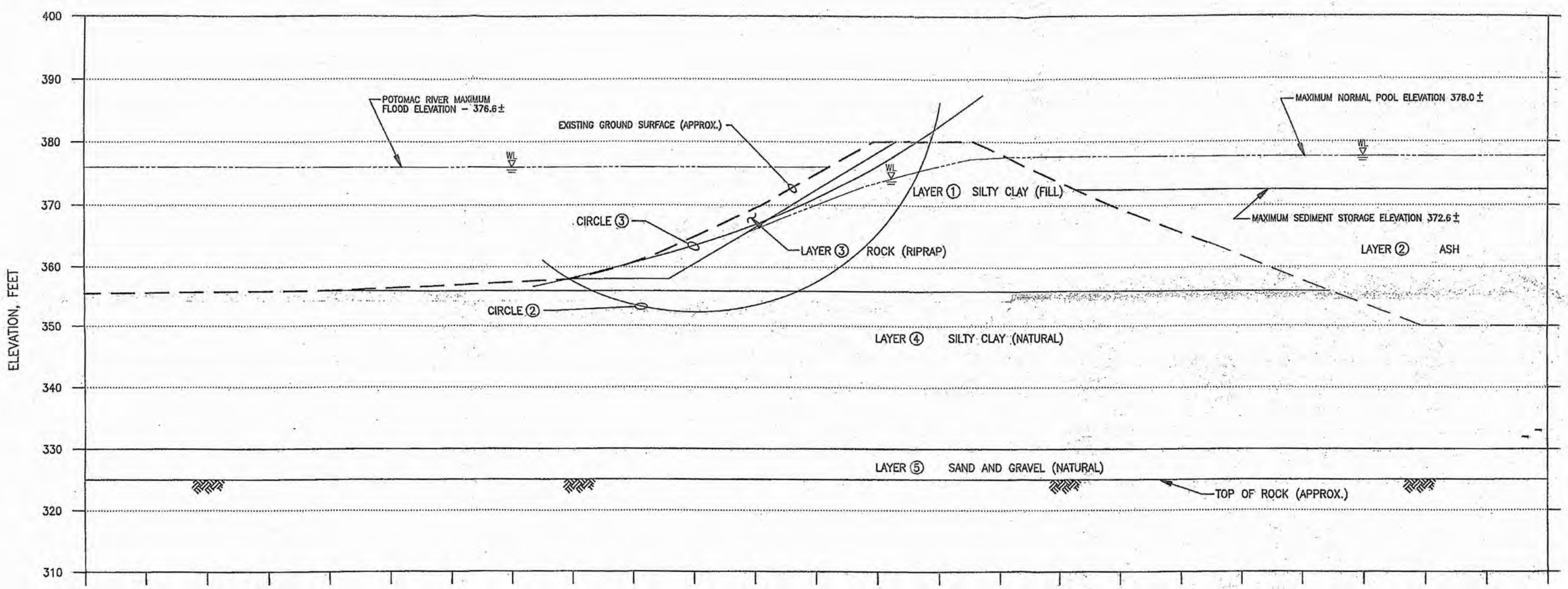

IMAGE REFERENCE: DRAWING 415-411 SHEET 5 OF 5 – CERTIFICATE OF APPROVAL STABILITY CROSS SECTION A-A AND B-B, SE TECHNOLOGIES, 8/3/1995

CHA

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STABILITY ANALYSIS – ASH POND #3

ASH POND COMPLEX
R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 7A

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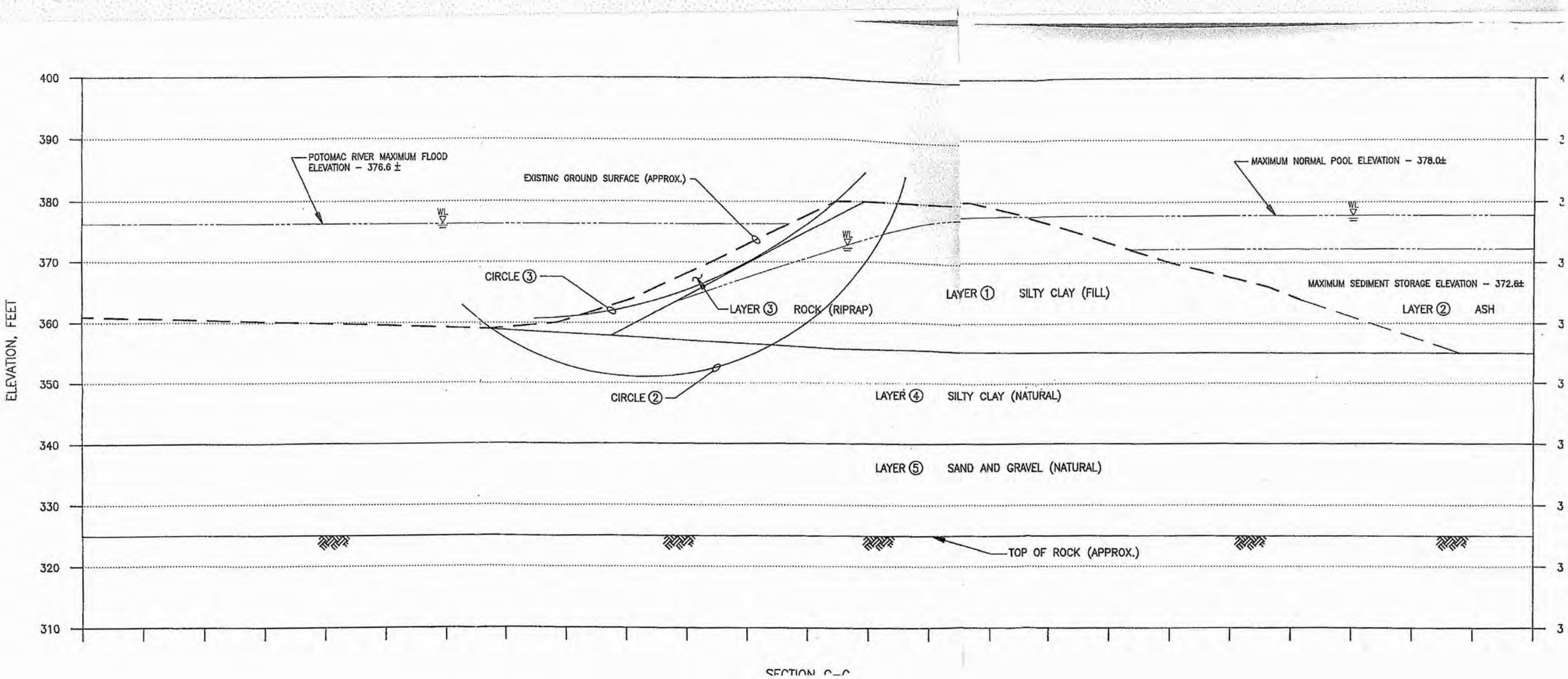

IMAGE REFERENCE: DRAWING 415-411 SHEET 5 OF 5 – CERTIFICATE OF APPROVAL STABILITY CROSS SECTION A-A AND B-B, SE TECHNOLOGIES, 8/3/1995

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STABILITY ANALYSIS – LAGOON #3 DAM

ASH POND COMPLEX
R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

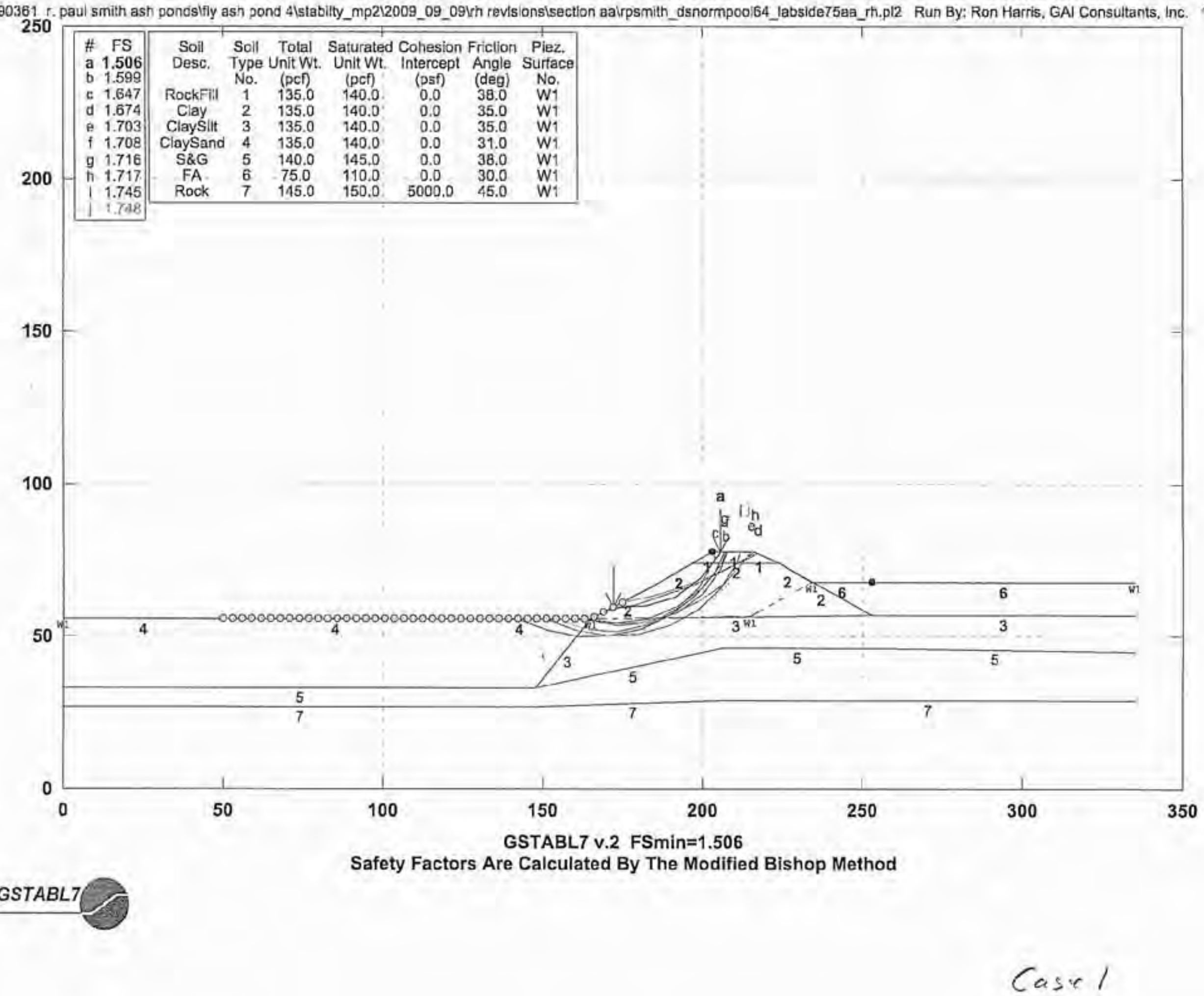
PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 7B

R P Smith #4 Downstream Slope Side Dike Normal Pool 368' Top 378' Sec AA, Static

p:\pit\2009\c090361 r. paul smith ash ponds\fly ash pond 4\stabilty_mp2\2009_09_09\rh revisions\section aa\rpsmith_dsnormpool64_labside75aa_rh.pl2 Run By: Ron Harris, GAI Consultants, Inc. 10/9/2009 09



#	FS
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b	1.599
c	1.647
d	1.674
e	1.703
f	1.708
g	1.716
h	1.717
i	1.745
j	1.748

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
RockFill	1	135.0	140.0	0.0	38.0	W1
Clay	2	135.0	140.0	0.0	35.0	W1
ClaySilt	3	135.0	140.0	0.0	35.0	W1
ClaySand	4	135.0	140.0	0.0	31.0	W1
S&G	5	140.0	145.0	0.0	38.0	W1
FA	6	75.0	110.0	0.0	30.0	W1
Rock	7	145.0	150.0	5000.0	45.0	W1

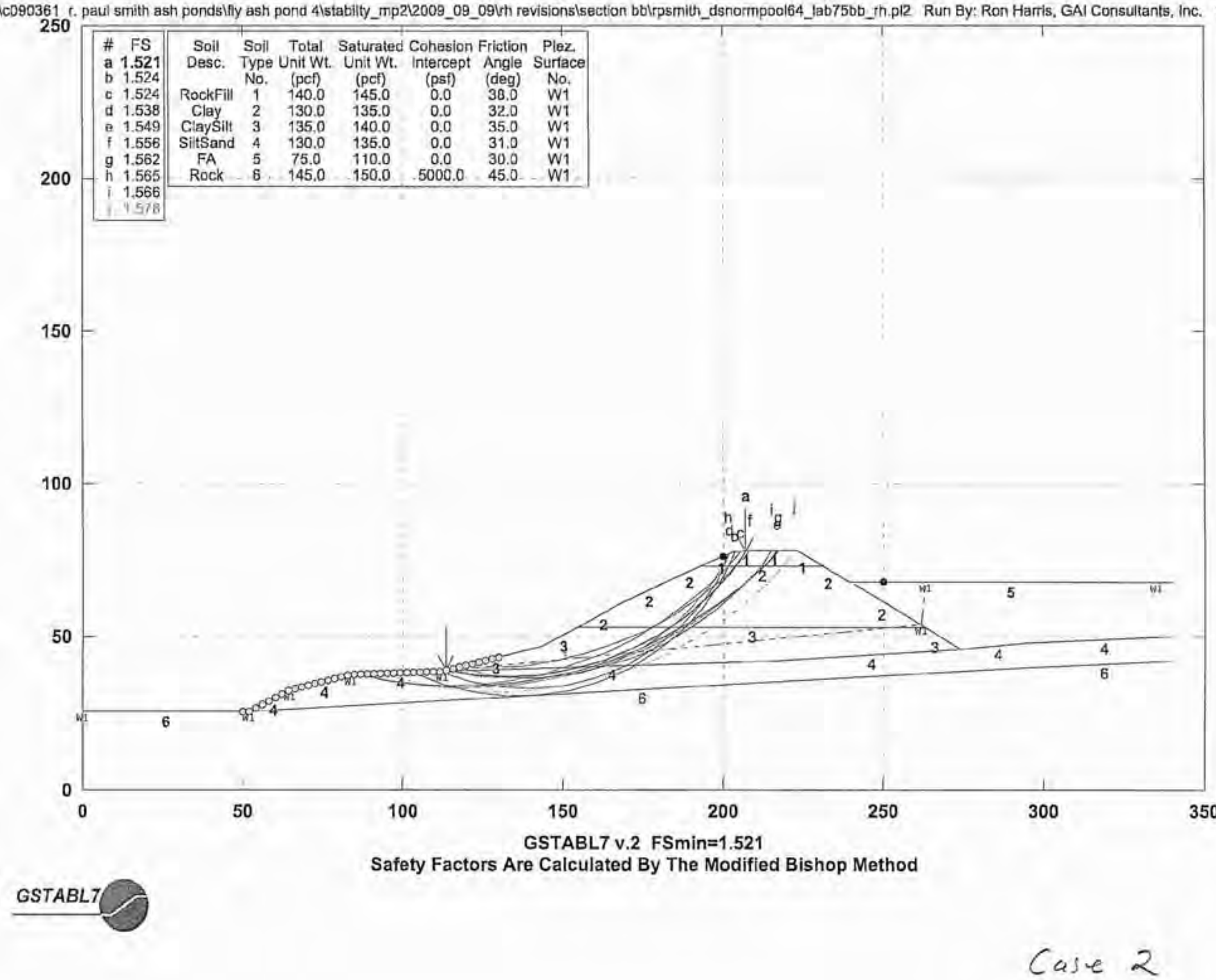
GSTABL7 v.2 FSmin=1.506

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

R P Smith #4 Downstream Slope Normal Pool 368,Top 378', Sec. BB Static

p:\pit\2009\c090361 r. paul smith ash ponds\fly ash pond 4\stabilty_mp2\2009_09_09\rh revisions\section bb\rpsmith_dsnormpool64_lab75bb_rh.pl2 Run By: Ron Harris, GAI Consultants, Inc. 10/9/2009 09:



#	FS
a	1.521
b	1.524
c	1.524
d	1.538
e	1.549
f	1.556
g	1.562
h	1.565
i	1.566
j	1.578

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
RockFill	1	140.0	145.0	0.0	38.0	W1
Clay	2	130.0	135.0	0.0	32.0	W1
ClaySilt	3	135.0	140.0	0.0	35.0	W1
SiltSand	4	130.0	135.0	0.0	31.0	W1
FA	5	75.0	110.0	0.0	30.0	W1
Rock	6	145.0	150.0	5000.0	45.0	W1

GSTABL7 v.2 FSmin=1.521

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

IMAGE REFERENCE: RESULTS OF SUPPLEMENTAL STABILITY ANALYSES – WASTEWATER TREATMENT/ASH STORAGE LAGOON/DAM NO. 4, GAI CONSULTANTS, OCTOBER 2009

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STABILITY ANALYSES – ASH POND #4

R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 8A

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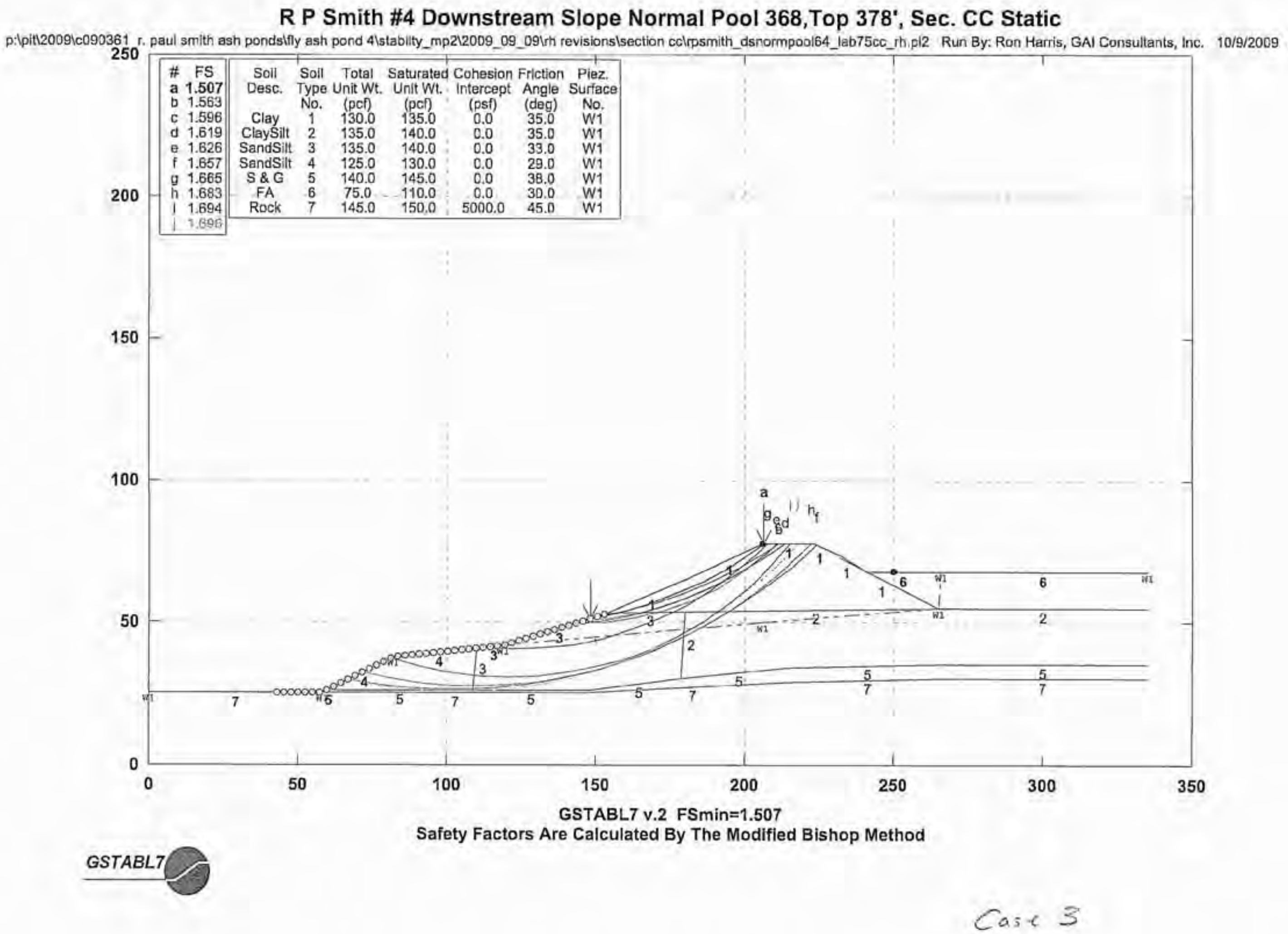

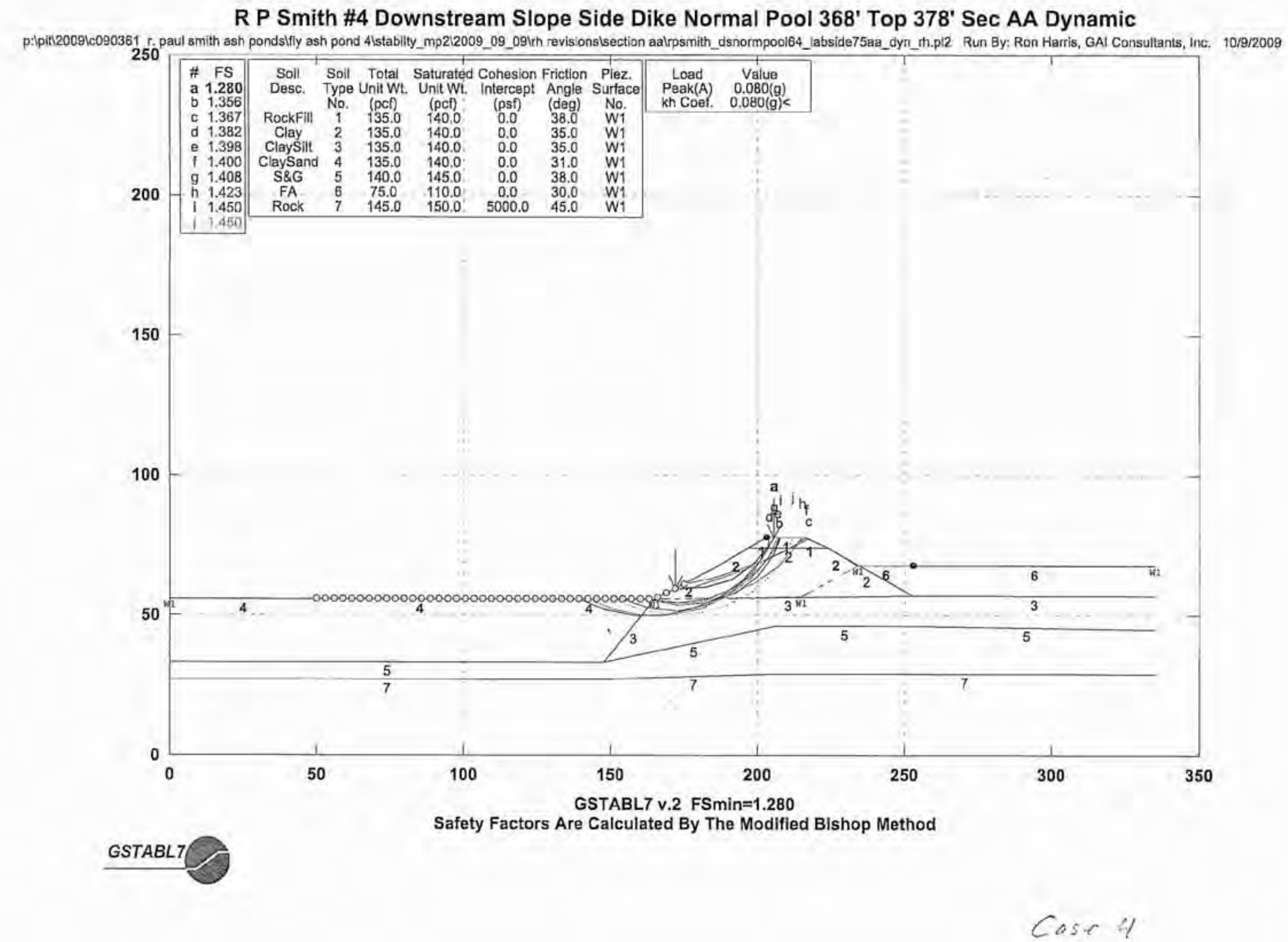

IMAGE REFERENCE: RESULTS OF SUPPLEMENTAL STABILITY ANALYSES – WASTEWATER TREATMENT/ASH STORAGE LAGOON/DAM NO. 4, GAI CONSULTANTS, OCTOBER 2009

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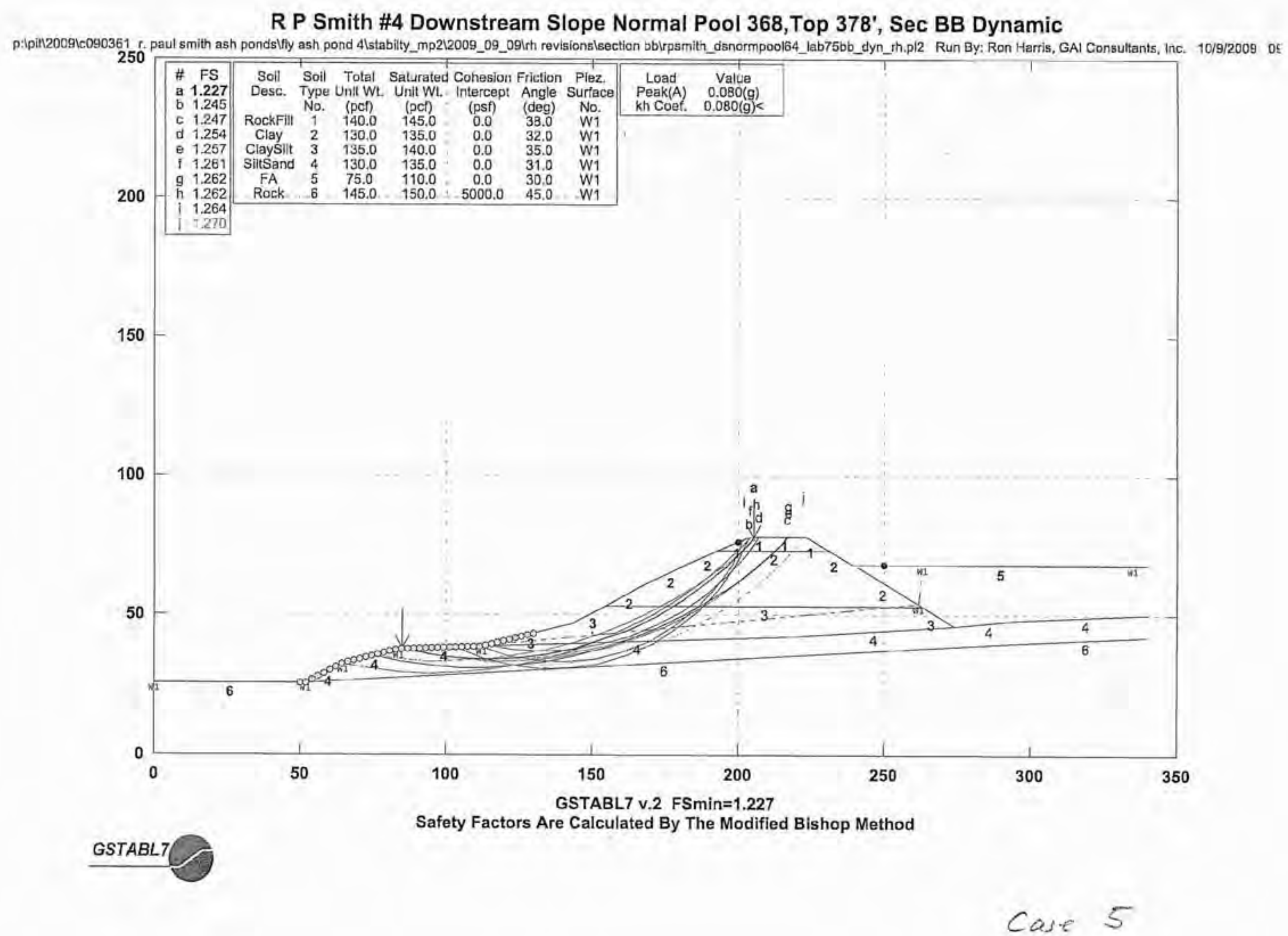
STABILITY ANALYSES – ASH POND #4

R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 8B



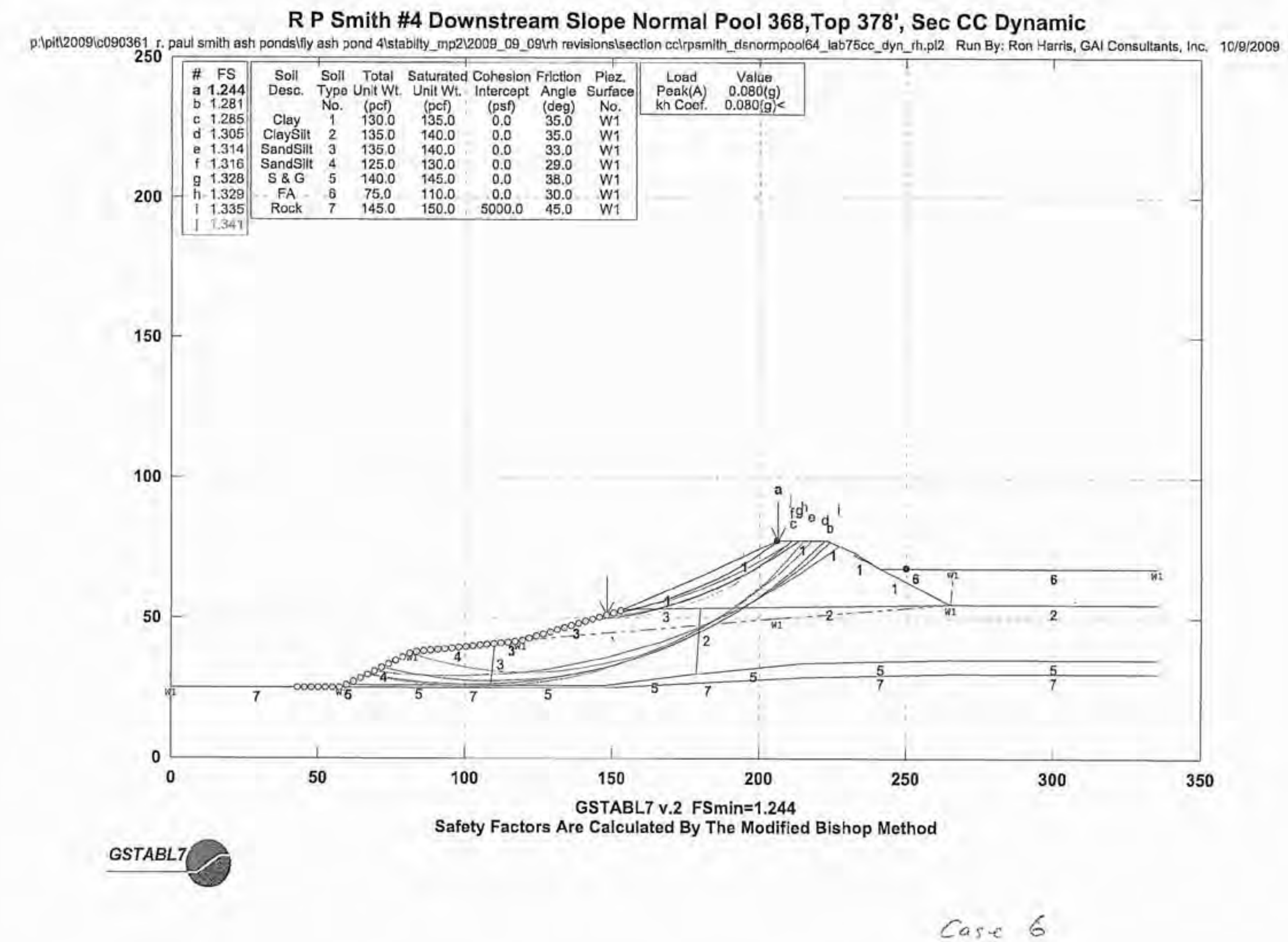


IMAGE REFERENCE: RESULTS OF SUPPLEMENTAL STABILITY ANALYSES – WASTEWATER TREATMENT/ASH STORAGE LAGOON/DAM NO. 4, GAI CONSULTANTS, OCTOBER 2009

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STABILITY ANALYSES – ASH POND #4

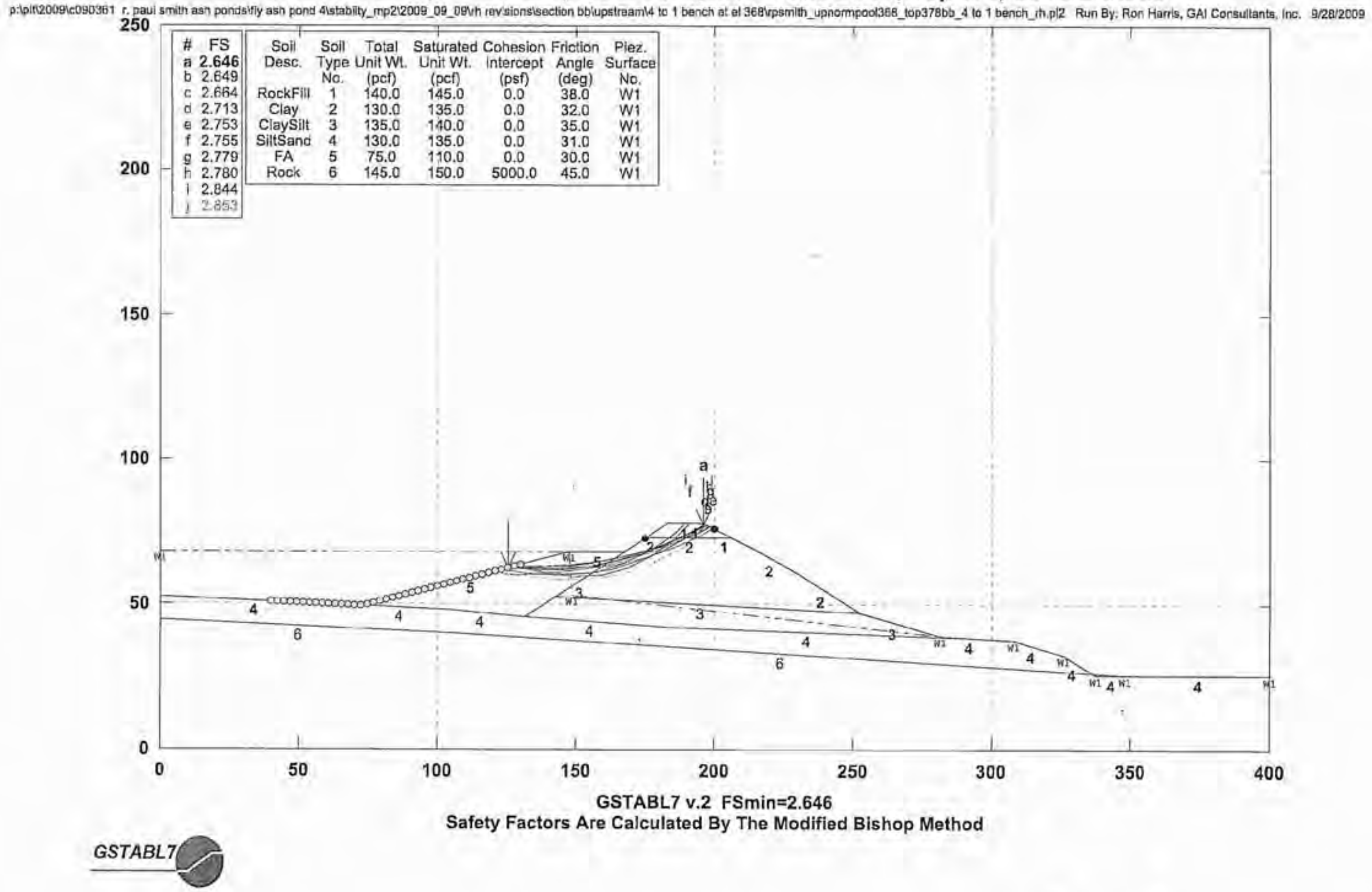
R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 8C

RP Smith #4 Upstream Slope, Pool 368, 4:1 Bench at 368, Top 378, Sec BB Static



#	FS
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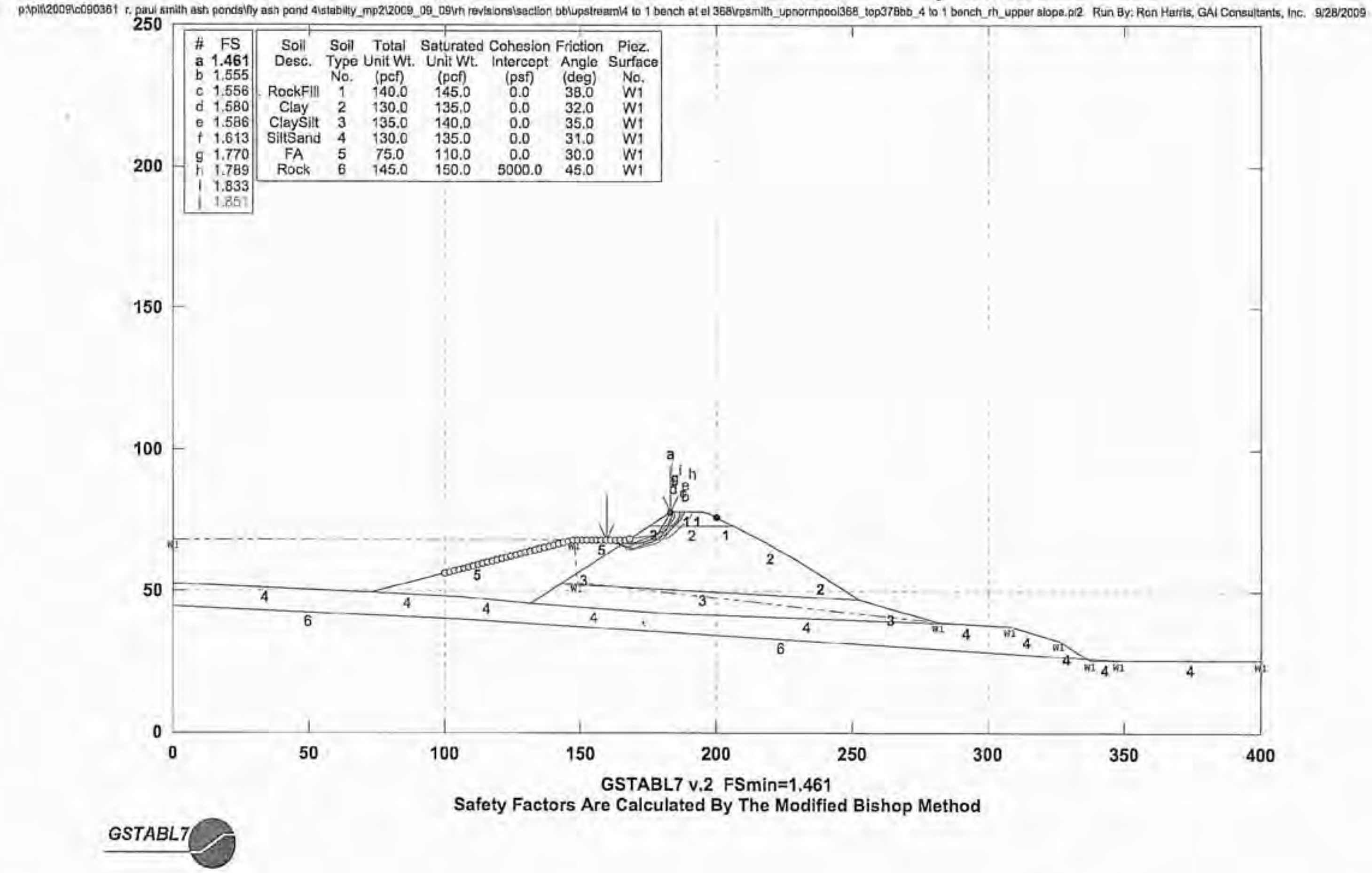
b	2.649
c	2.664
d	2.713
e	2.753
f	2.755
g	2.779
h	2.780
i	2.844
j	2.853

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
RockFill	1	140.0	145.0	0.0	38.0	W1
Clay	2	130.0	135.0	0.0	32.0	W1
ClaySilt	3	135.0	140.0	0.0	35.0	W1
SiltSand	4	130.0	135.0	0.0	31.0	W1
FA	5	75.0	110.0	0.0	30.0	W1
Rock	6	145.0	150.0	5000.0	45.0	W1

GSTABL7 v.2 FSmin=2.646
Safety Factors Are Calculated By The Modified Bishop Method

RP Smith #4 Upstream Slope, Pool 368, 4:1 Bench at 368, Top 378, Sec BB Static



#	FS
a	1.461
b	1.555
c	1.556
d	1.580
e	1.586
f	1.613
g	1.770
h	1.789
i	1.833
j	1.851

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
RockFill	1	140.0	145.0	0.0	38.0	W1
Clay	2	130.0	135.0	0.0	32.0	W1
ClaySilt	3	135.0	140.0	0.0	35.0	W1
SiltSand	4	130.0	135.0	0.0	31.0	W1
FA	5	75.0	110.0	0.0	30.0	W1
Rock	6	145.0	150.0	5000.0	45.0	W1

GSTABL7 v.2 FSmin=1.461
Safety Factors Are Calculated By The Modified Bishop Method

IMAGE REFERENCE: RESULTS OF SUPPLEMENTAL STABILITY ANALYSES – WASTEWATER TREATMENT/ASH STORAGE LAGOON/DAM NO. 4, GAI CONSULTANTS, OCTOBER 2009

CHA
III Winners Circle, PO Box 5269 · Albany, NY 12205-0269
Main: (518) 453-4500 · www.chacompanies.com

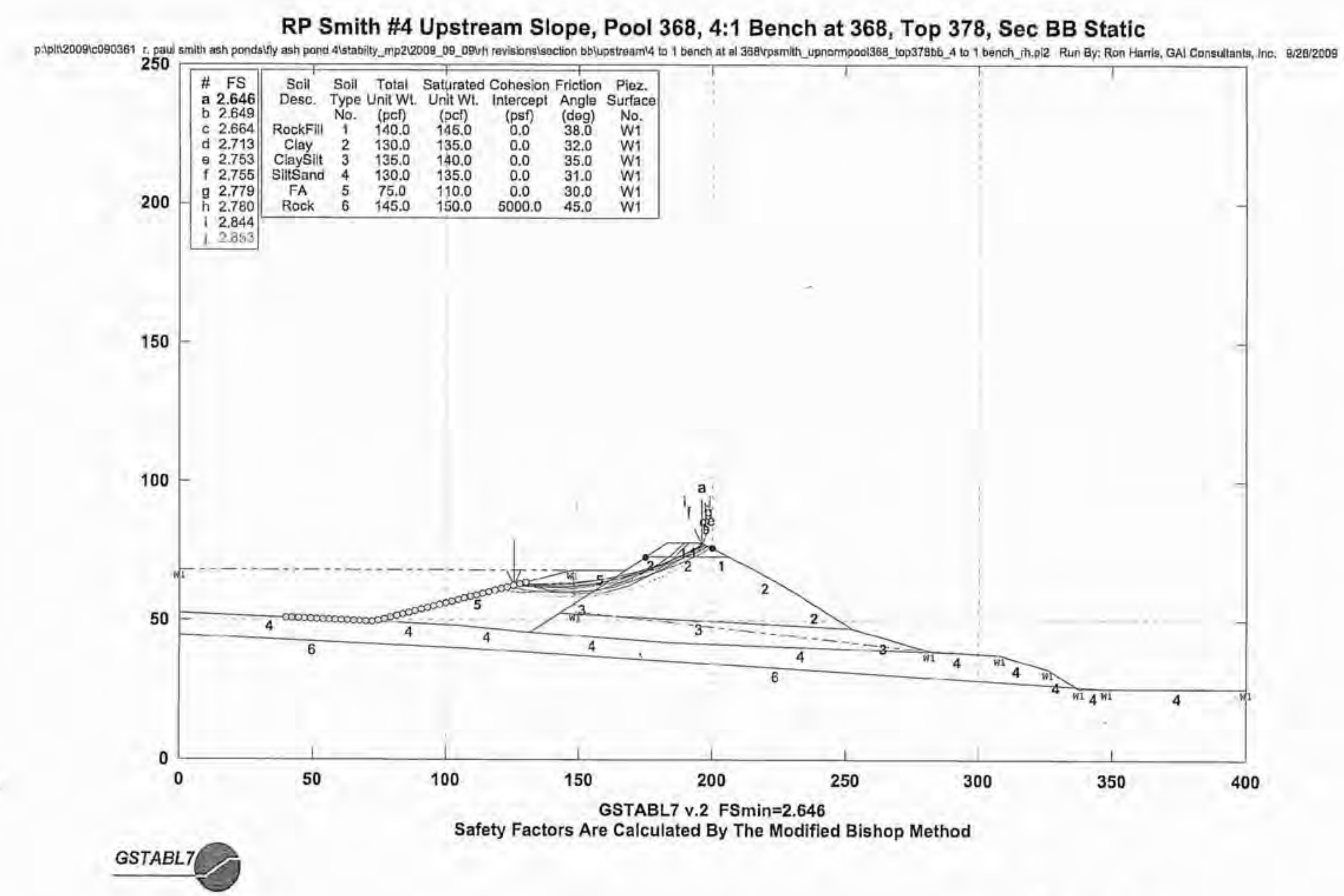
STABILITY ANALYSES – ASH POND #4

R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

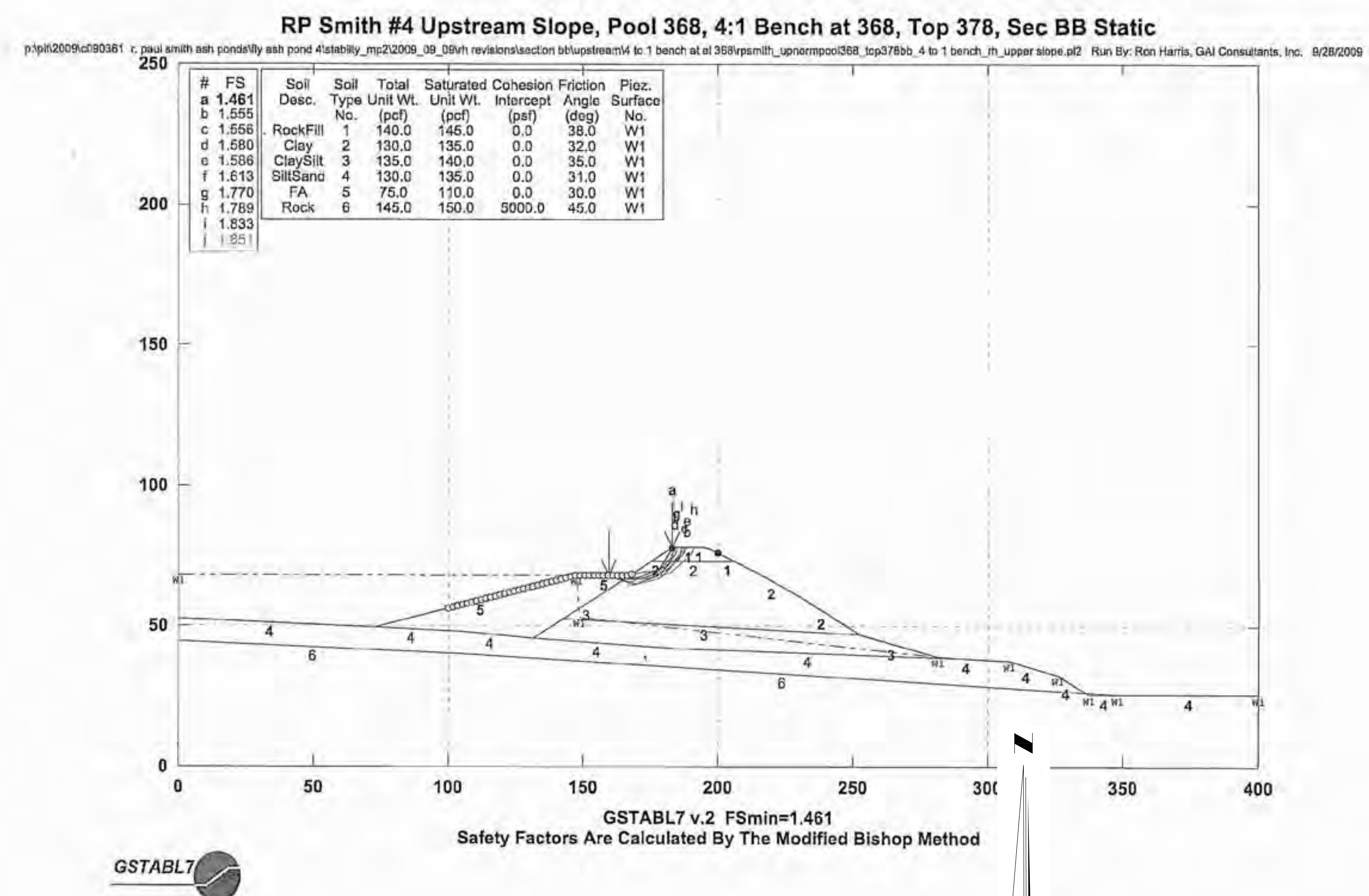
PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 8D



Case 9



Case 10

IMAGE REFERENCE: RESULTS OF SUPPLEMENTAL STABILITY ANALYSES – WASTEWATER TREATMENT/ASH STORAGE LAGOON/DAM NO. 4, GAI CONSULTANTS, OCTOBER 2009

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STABILITY ANALYSES – ASH POND #4

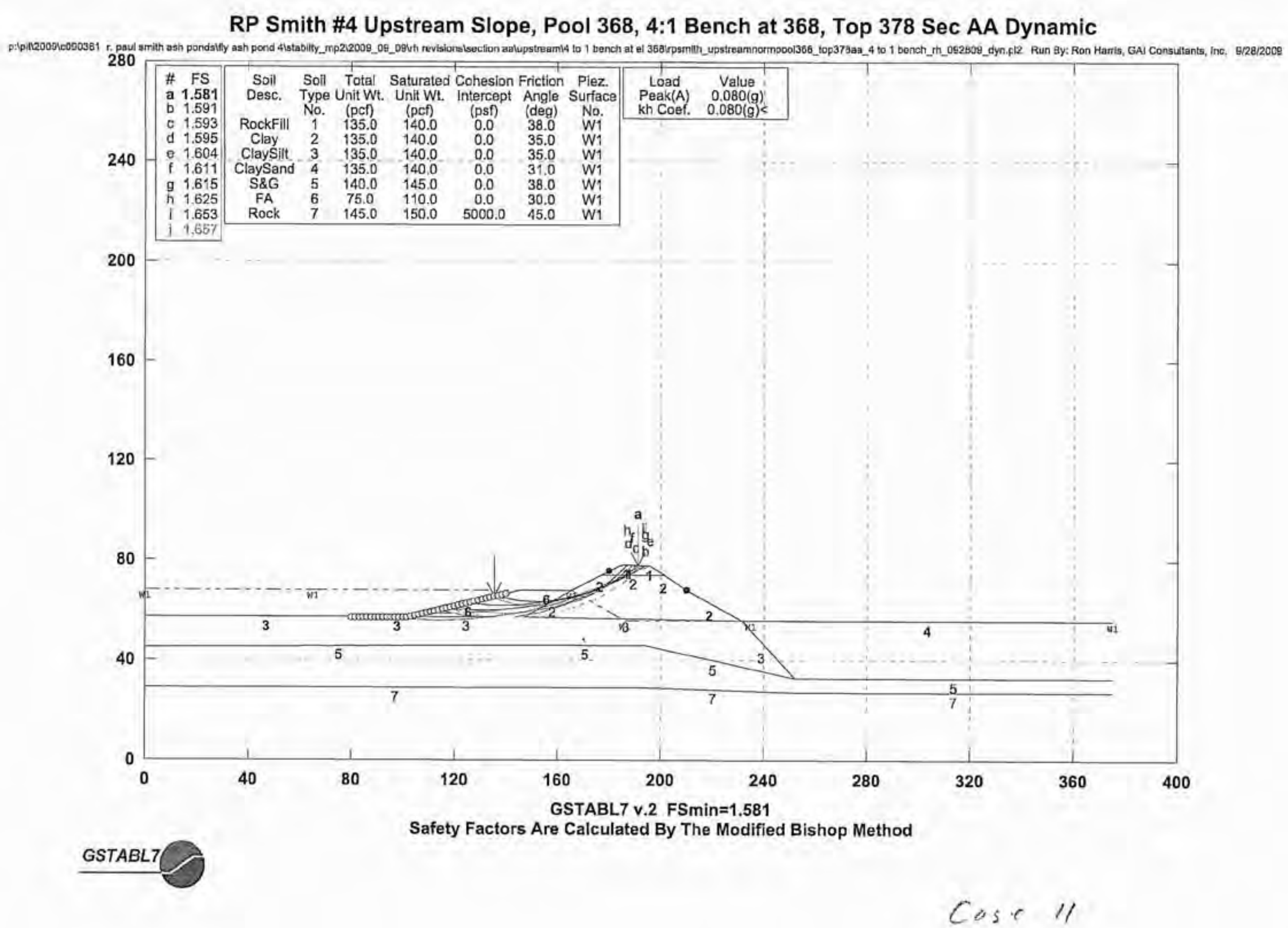
ASH POND COMPLEX
R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 8E

File: K:\20085\CADD\ACAD\FIGURES\1020 R PAUL SMITH\1020_RPS-FIGURES.DWG Saved: 2/16/2010 9:59:59 AM Plotted: 2/16/2010 10:05:14 AM User: Gray, Timmolyn



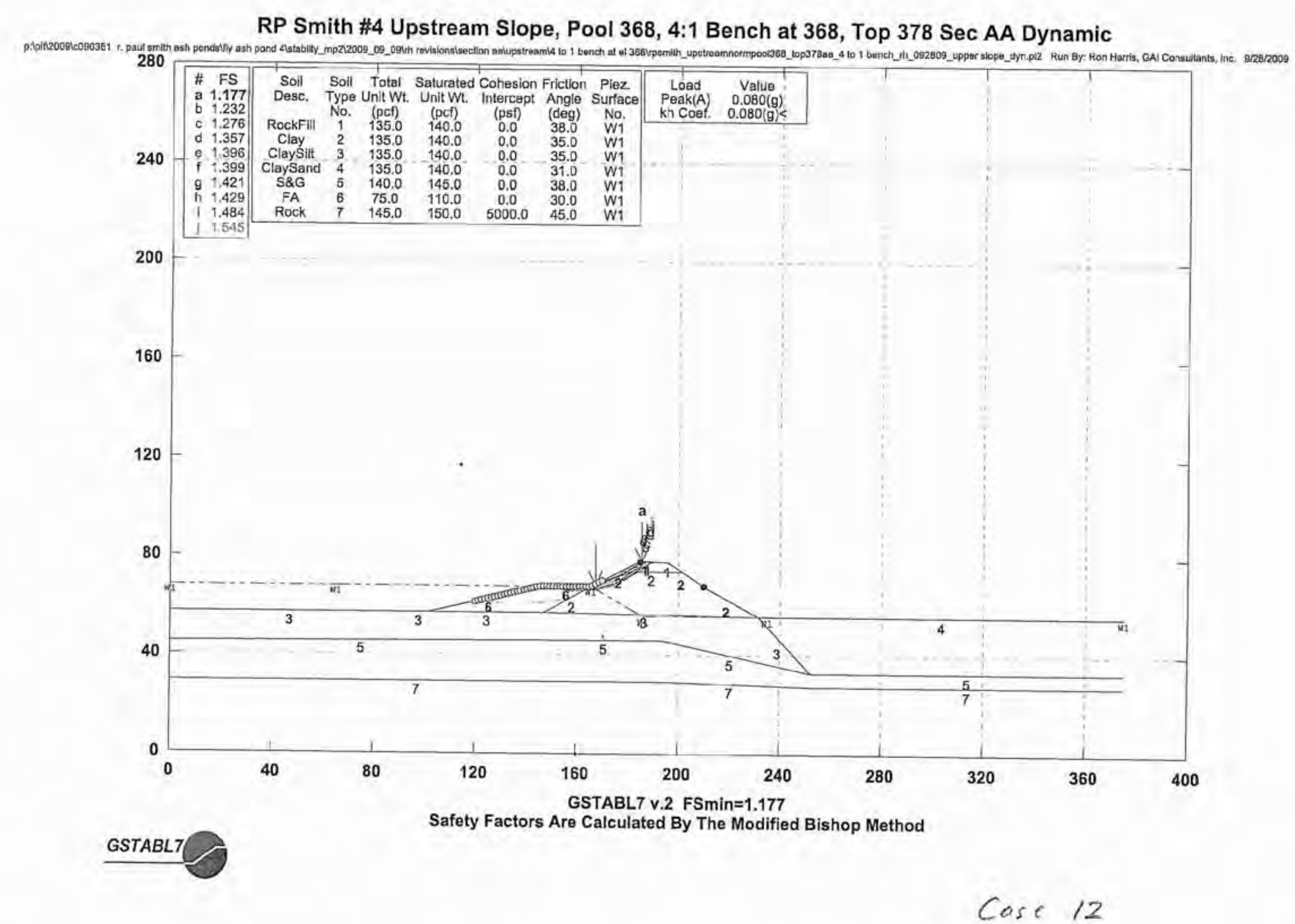


IMAGE REFERENCE: RESULTS OF SUPPLEMENTAL STABILITY ANALYSES – WASTEWATER TREATMENT/ASH STORAGE LAGOON/DAM NO. 4, GAI CONSULTANTS, OCTOBER 2009

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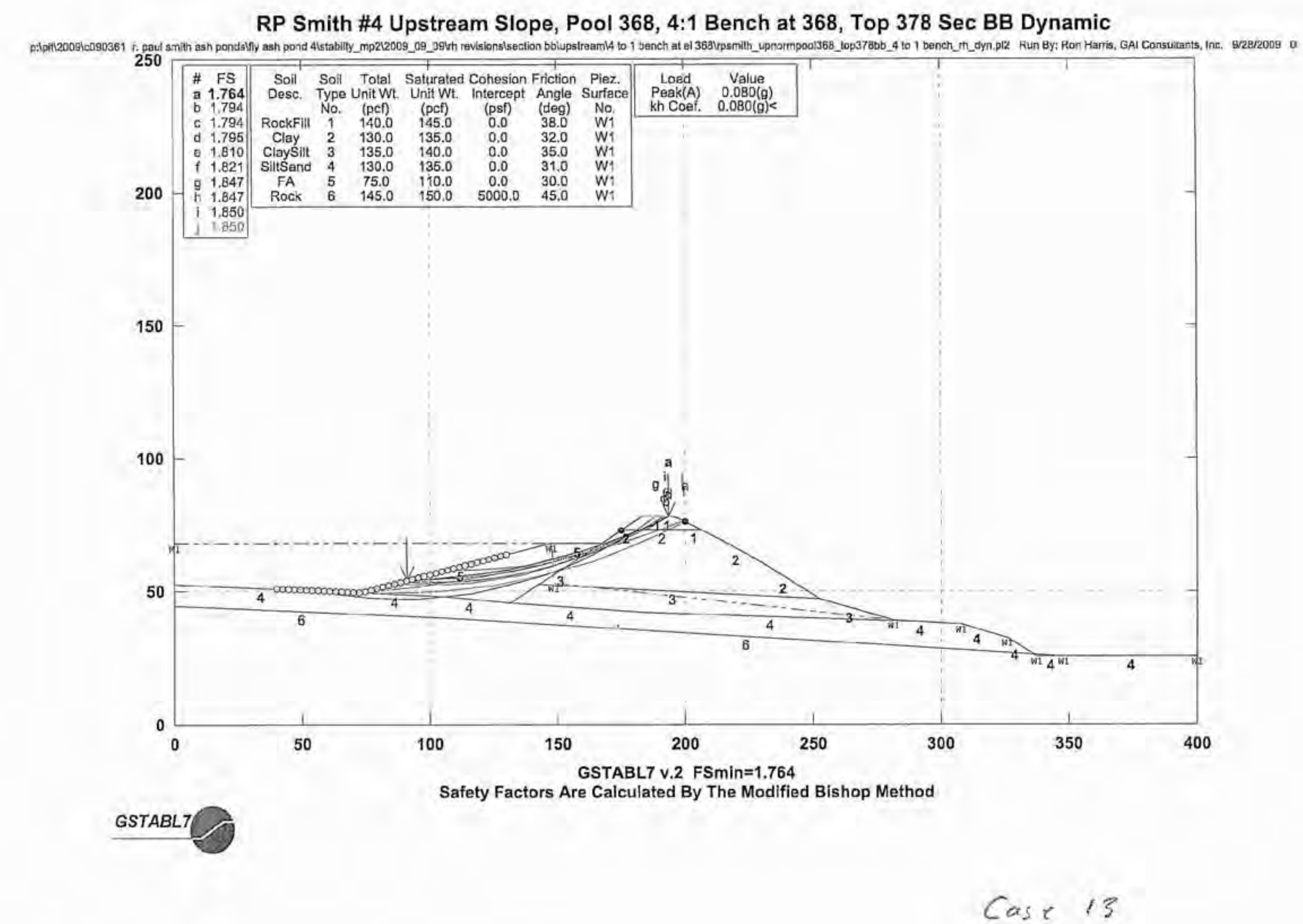
STABILITY ANALYSES – ASH POND #4

R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 8F



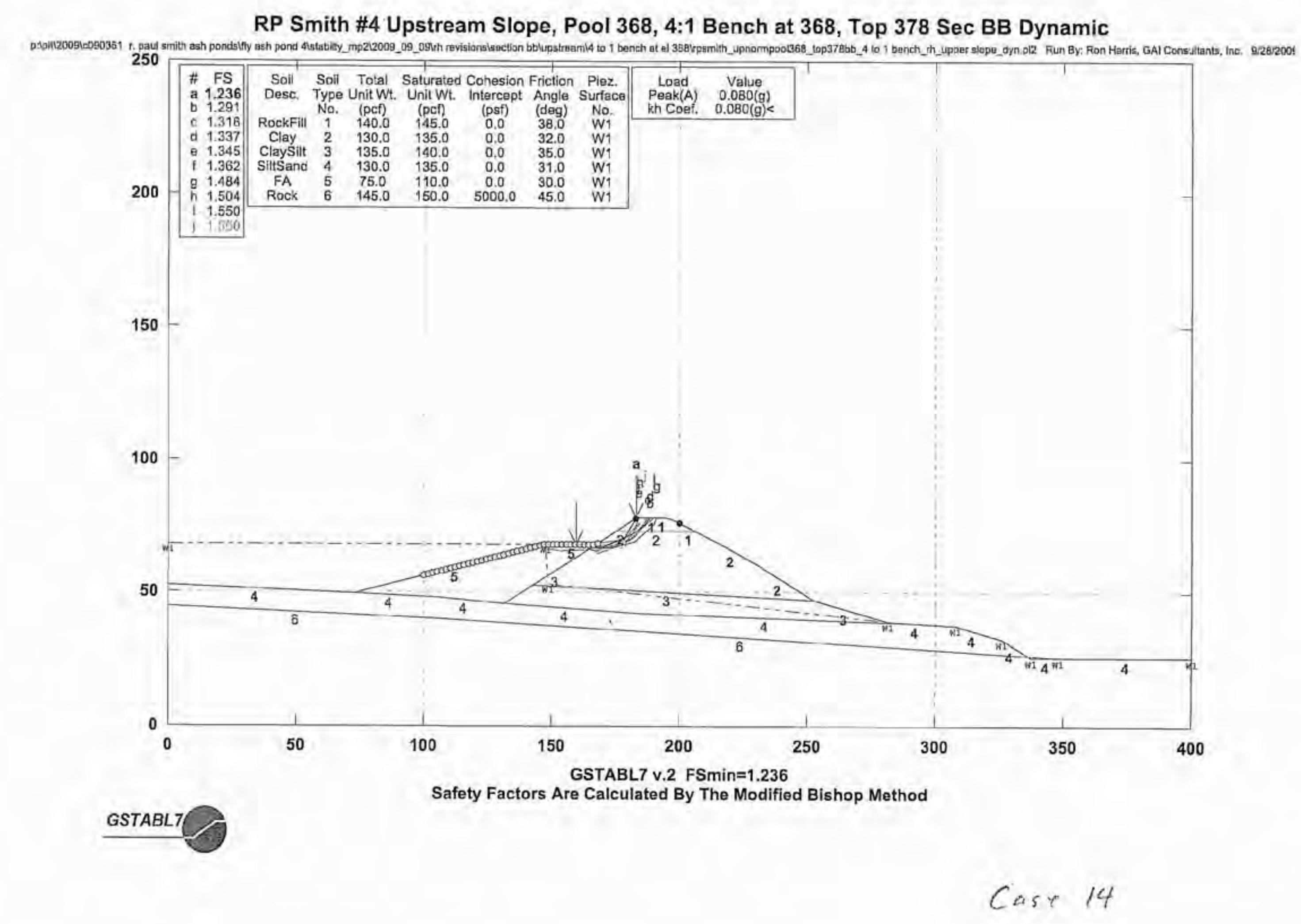


IMAGE REFERENCE: RESULTS OF SUPPLEMENTAL STABILITY ANALYSES – WASTEWATER TREATMENT/ASH STORAGE LAGOON/DAM NO. 4, GAI CONSULTANTS, OCTOBER 2009

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STABILITY ANALYSES – ASH POND #4

R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 8G

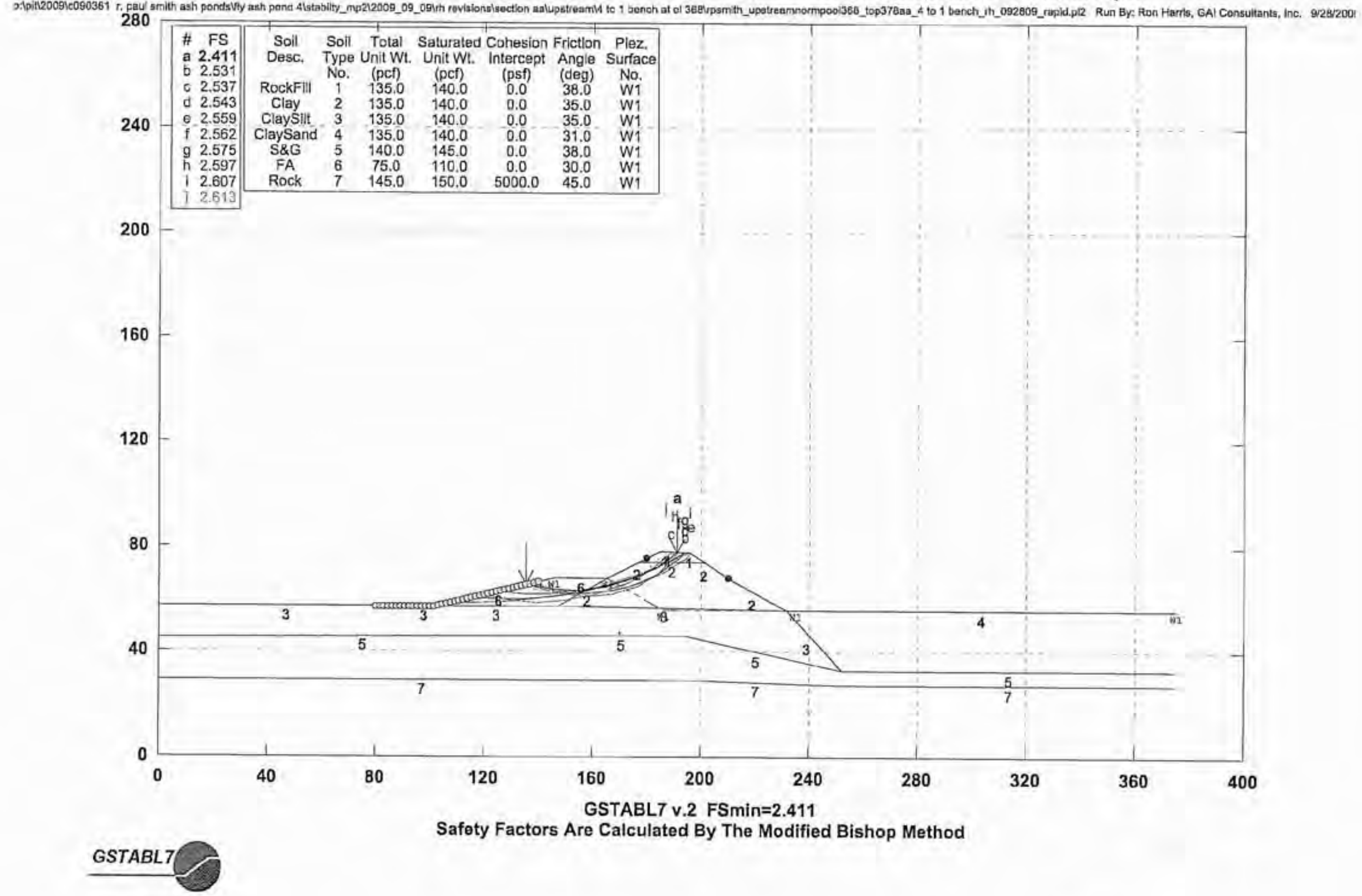
File: K:\20085\CADD\ACAD\FIGURES\1020 R PAUL SMITH\1020_RPS-FIGURES.DWG Saved: 2/16/2010 9:59:59 AM Plotted: 2/16/2010 10:05:41 AM User: Gray, Timmolyn

RP Smith #4 Upstream Slope, Pool 368, 4:1 Bench at 368, Top 378, Sec AA Rapid

p:\pit\2009\c090361 r. paul smith ash ponds\fly ash pond 4\stability_mp2\2009_09_09\rh revisions\section aa\upstream\4 to 1 bench at el 368\rpsmith_upstreamnormpool368_top378aa_4 to 1 bench_rh_092809_rapid.pl2 Run By: Ron Harris, GAI Consultants, Inc. 9/28/200

#	FS
a	**2.411**
b	2.531
c	2.537
d	2.543
e	2.559
f	2.562
g	2.575
h	2.597
i	2.607
j	2.613

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
RockFill	1	135.0	140.0	0.0	38.0	W1
Clay	2	135.0	140.0	0.0	35.0	W1
ClaySilt	3	135.0	140.0	0.0	35.0	W1
ClaySand	4	135.0	140.0	0.0	31.0	W1
S&G	5	140.0	145.0	0.0	38.0	W1
FA	6	75.0	110.0	0.0	30.0	W1
Rock	7	145.0	150.0	5000.0	45.0	W1



GSTABL7 v.2 FSmin=2.411
Safety Factors Are Calculated By The Modified Bishop Method

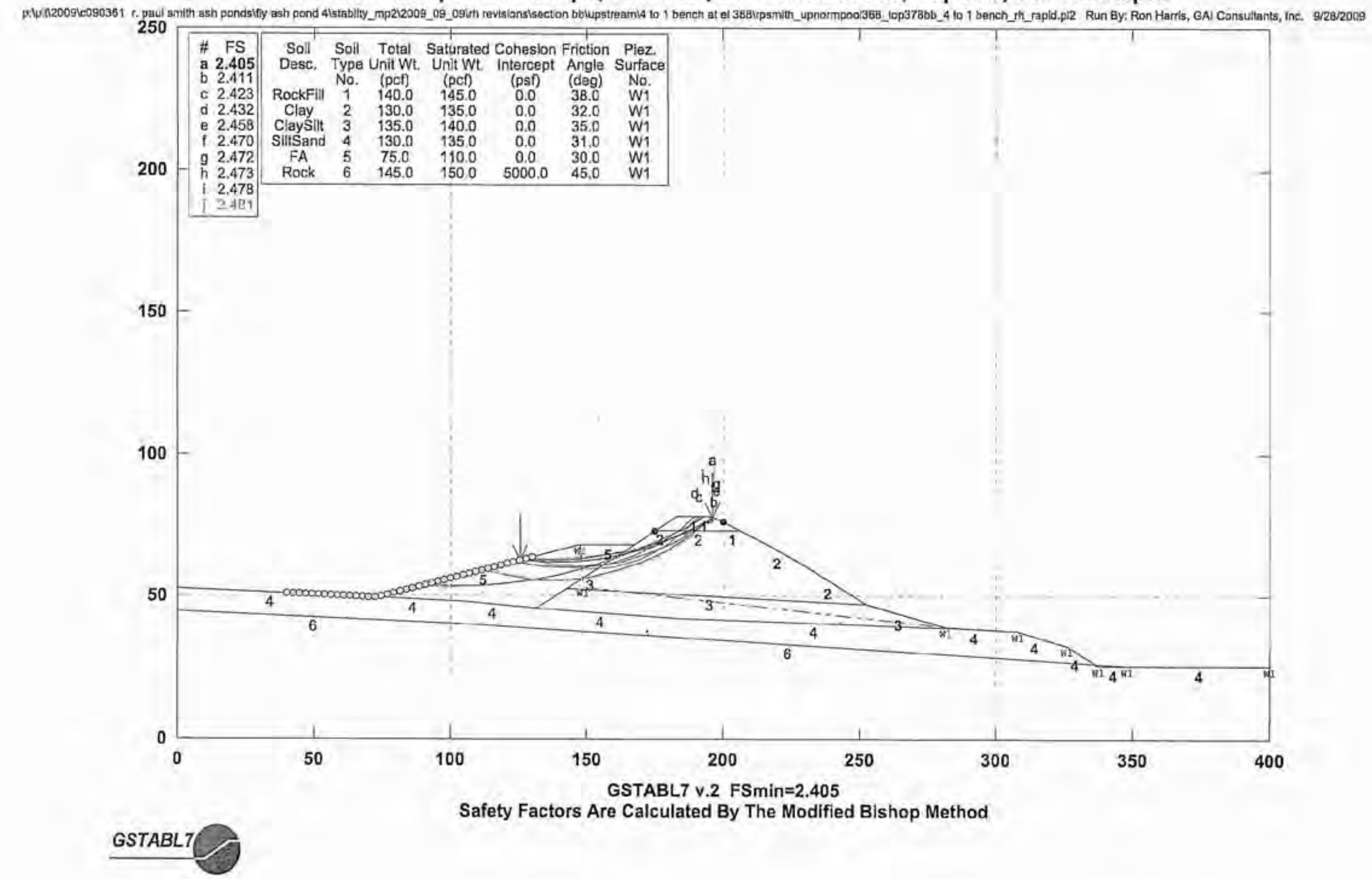
Case 15

RP Smith #4 Upstream Slope, Pool 368, 4:1 Bench at 368, Top 378, Sec BB Rapid

p:\p\f\2009\c090361 r. paul smith ash ponds\fly ash pond 4\stability_mp2\2009_09_09\rh revisions\section bb\upstream\4 to 1 bench at el 368\rpsmith_upnormpool368_top378bb_4 to 1 bench_rh_rapid.pl2 Run By: Ron Harris, GAI Consultants, Inc. 9/28/2009

#	FS
a	**2.405**
b	2.411
c	2.423
d	2.432
e	2.458
f	2.470
g	2.472
h	2.473
i	2.478
j	2.481

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
RockFill	1	140.0	145.0	0.0	38.0	W1
Clay	2	130.0	135.0	0.0	32.0	W1
ClaySilt	3	135.0	140.0	0.0	35.0	W1
SiltSand	4	130.0	135.0	0.0	31.0	W1
FA	5	75.0	110.0	0.0	30.0	W1
Rock	6	145.0	150.0	5000.0	45.0	W1



GSTABL7 v.2 FSmin=2.405
Safety Factors Are Calculated By The Modified Bishop Method

Case 16

IMAGE REFERENCE: RESULTS OF SUPPLEMENTAL STABILITY ANALYSES – WASTEWATER TREATMENT/ASH STORAGE LAGOON/DAM NO. 4, GAI CONSULTANTS, OCTOBER 2009

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STABILITY ANALYSES – ASH POND #4

R. PAUL SMITH STATION
WILLIAMSPORT, MARYLAND

PROJECT NO. 20085.1020

DATE: 02/2010

FIGURE 8H

File: K:\20085\CADD\ACAD\FIGURES\1020 R PAUL SMITH\1020_RPS-FIGURES.DWG Saved: 2/16/2010 9:59:59 AM Plotted: 2/16/2010 10:05:53 AM User: Gray, Timmolyn

4.0 CONCLUSIONS/RECOMMENDATIONS

4.1 Acknowledgement of Management Unit Condition

I acknowledge that the management unit referenced herein was personally inspected by me and was found to be in the following condition: **Satisfactory.**

A management unit found to be in satisfactory condition is defined as one in which no existing or potential management unit safety deficiencies are recognized. Acceptable performance is expected under all applicable loading conditions in accordance with the applicable criteria. Minor maintenance items may be required.

CHA presents the following recommendations for maintenance and updating of analyses in Sections 4.2 through 4.6.

4.2 Upstream Slopes

In reviewing historic documents for Ash Ponds #3 and #4, there were several mentions of portions of the upstream slopes of the dikes being over excavated during pond dredging operations. CHA observed this type of situation on the north end of the Ash Pond #3 dike. Proposed improvements to the Ash Pond #4 upstream slopes include leaving a buttress of deposited fly ash in place after each dredging. Careful survey control and monitoring of contractor activities is needed to ensure that dredging operations do not alter the slope angles needed to meet the required factors of safety with regard to slope stability.

In addition, before Ash Pond #3 is put back into service, the upstream slope in the northeast corner of the pond should be repaired with compacted soil having similar characteristics to the design properties of the dam and placed to the designed slope angle.

4.3 Downstream Slopes on Ash Pond #4

Surface soils were quite soft on the downstream slope of Ash Pond #4 and were subject to sloughing underfoot while walking on the slopes. Irregularity in the slope surface and review of previous reports suggested that surface sloughing is an ongoing situation on the Ash Pond #4 dikes. In addition to general softness and grading irregularities, CHA observed erosion rills, and possible bulge areas as discussed in Section 2.3.1. CHA recommends quantitative monitoring of the downstream slope surfaces to provide better information regarding the nature of slope movements and changes.

Continued removal of brush and small shrubs is required. Trees between Ash Pond #4 and the Potomac River for the most part start just beyond the toe of the east dike. However, in a few locations, there are large trees within the toe of the dike. CHA recommends at least a 10-foot buffer zone between the toe of the dike and tree growth.

Some of the trees from beyond the toe of the east dike have branches nearing contact with upper portions of the slope. CHA recommends these branches be cut to facilitate access on the slope, and to prevent branches from rooting on the slope of the dike.

4.4 Tree Removal on Ash Pond #3 Buttress

The stone fill buttress on the east dike of Ash Pond #3 is heavily covered in trees. Trees on embankments can compromise the integrity of the slope by creating scarps if trees fall over from age or during a storm, and roots penetrating into the embankment can provide preferential paths for seepage. In addition, these trees make inspection of the toe of the buttress difficult. Therefore, CHA recommends the trees along the buttress be removed.

4.5 Monitoring Instrumentation

CHA recommends piezometers be installed on the Ash Pond #3 dikes to evaluate the phreatic surface with relation to the phreatic surfaced assumed for the stability analyses. Routine monitoring of the phreatic surface should be established with corresponding elevations of the water and ash levels within the pond at the time of measurement for a comprehensive understanding of the embankment behavior.

4.6 Evaluation of Conditions from Potomac River Flooding

CHA understands that the Ash Pond #3 dikes were raised in 1980 to be 3.4 feet higher than the water surface elevation attained by the Potomac River at Williamsport during Hurricane Agnes in 1972. A brief review of historical flood records suggests that Hurricane Agnes has crested in the vicinity of Williamsport higher than the flows from Hurricane Agnes at least five times since 1936. CHA recommends that a comprehensive, probabilistic analysis of flood elevations in the Potomac River at Williamsport be performed. This analysis should include estimated river velocities at the stream banks to evaluate the adequacy of the rip rap protection on Ash Pond #3 and whether bank armoring is needed on Ash Pond #4.

5.0 CLOSING

The information presented in this report is based on visual field observations, review of reports by others and this limited knowledge of the history of the R. Paul Smith Station surface impoundments. The recommendations presented are based, in part, on project information available at the time of this report. No other warranty, expressed or implied is made. Should additional information or changes in field conditions occur, the conclusions and recommendations provided in this report should be re-evaluated by an experienced engineer.

APPENDIX A

Completed EPA Coal Combustion Dam Inspection Checklist Forms

&

Completed EPA Coal Combustion Waste (CCW) Impoundment Inspection Forms

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: R. Paul Smith Power Station	Date: 10-20-09
Unit Name: Ash Pond #3	Operator's Name: Allegheny Energy
Unit I.D.: Ash Pond #3	Hazard Potential Classification: High **Significant** (circled) Low
Inspector's Name: Katherine Adnams & Khalid Abed, P.E.	

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?	Annually		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	See Note		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	368		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	NA		Is water entering inlet, but not exiting outlet?	See Note 2	X
5. Lowest dam crest elevation (operator records)?	379.4		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	NA		Is water exiting outlet flowing clear?	NA	
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)?	NA		From underdrain?	NA	
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?	See Note	
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 — N/A = Not Applicable/Available

2. Pond #3 is currently in the dredged state and is not in operation. Remaining water is below the lowest decant elevation. Pond #3 will return to service when Pond #4 is full. Highest decant elevation at 368.0

9. Trees were noted on the stone buttress not the original dike slope.

14. Routine maintenance item for Allegheny Energy includes clearing debris deposited at discharge channel/Potomac River confluence. Debris gets deposited during recession of high flows on the Potomac River.

21. A seepage area is monitored to the south of Ash Basin #3. No flow was observed in standing water. Allegheny Energy believes the wet area is related to stormwater drainage from hillside through adjacent wetland, but continue to monitor. No fines observed.

23. The toe of the stone buttress is approximately at the waters edge of the Potomac River. Flooding on the Potomac will rise against the dike.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW) Impoundment Inspection

Impoundment NPDES Permit # MD0000582 INSPECTOR Adnams/Abed
Date October 20, 2009

Impoundment Name Ash Pond #3
Impoundment Company Allegheny Energy
EPA Region 3
State Agency (Field Office) Addresss 1800 Washington Boulevard
Baltimore, MD 21230
Name of Impoundment Ash Pond #3
(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: Receives all CCW related waste water from the plant. Alternates use with Ash Pond #4

Nearest Downstream Town : Name Falling Water, WV
Distance from the impoundment Approx. 4.5 miles
Impoundment
Location: Longitude 77 Degrees 49 Minutes 51 Seconds
Latitude 39 Degrees 35 Minutes 51 Seconds
State WV County Berkeley

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

If So Which State Agency? MD Department of the Environment - NPDES
WV Department of Environmental Protection - Dam Safety

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.

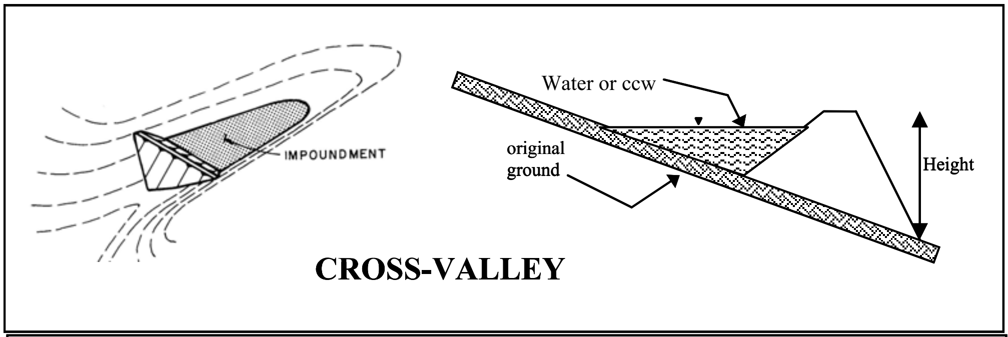
__X__ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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.

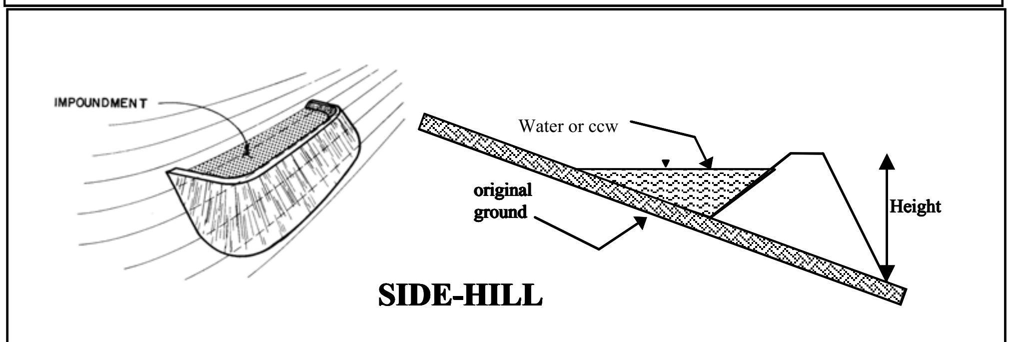
______ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

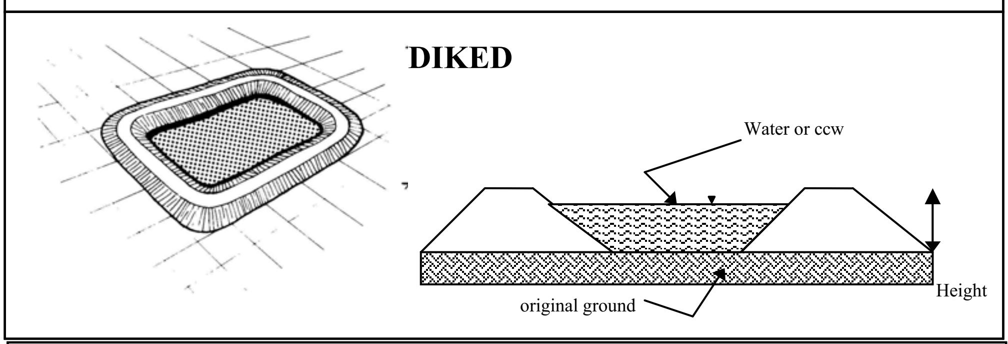
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

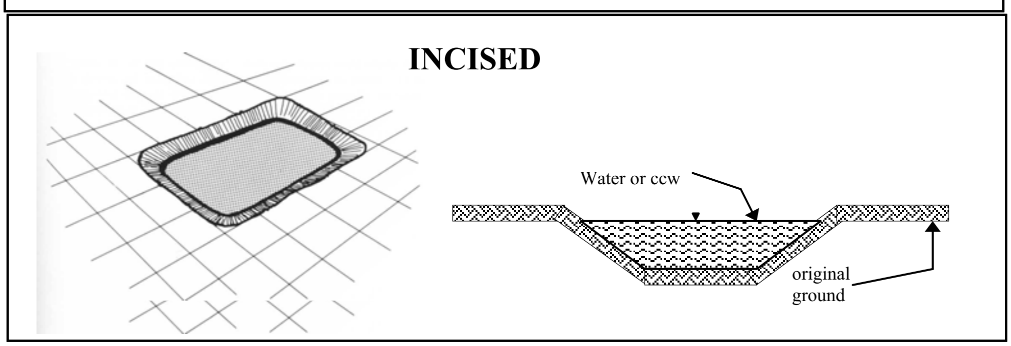
Relatively small impoundments compared to volume of the Potomac River and elevation of riverfront homes suggest loss of life is not a concern. However, environmental impacts to the Potomac River if a breach were to occur would cause environmental damage.

CONFIGURATION:









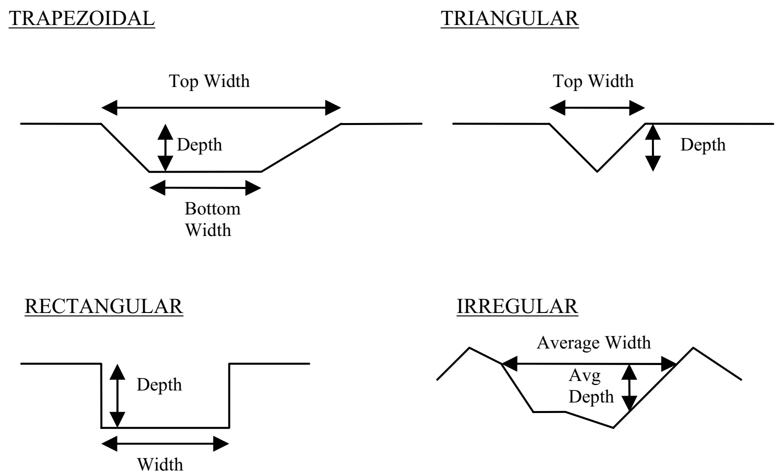
______ Cross-Valley
__X__ Side-Hill
______ Diked
______ Incised (form completion optional)
______ Combination Incised/Diked

Embankment Height 46 feet   Embankment Material Homogeneous compacted fill
Pool Area ~6 at maximum decant acres   Liner None
Current Freeboard 14 at max. decant feet   Liner Permeability NA

TYPE OF OUTLET (Mark all that apply)

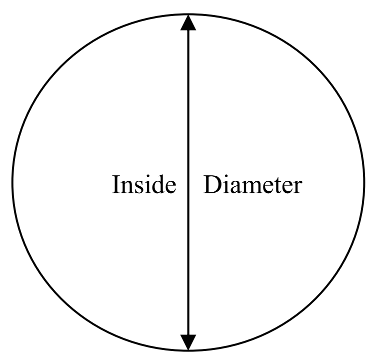
______ **Open Channel Spillway**
______ Trapezoidal
______ Triangular
______ Rectangular
______ Irregular

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



__X__ **Outlet**

__14-in.__ inside diameter



Material
______ corrugated metal
______ welded steel
______ concrete
______ plastic (hdpe, pvc, etc.)
X_____ other (specify) HDPE Sliplined CMP

Is water flowing through the outlet? YES _______ NO X_______

______ **No Outlet**

______ **Other Type of Outlet** (specify) ________________________________

The Impoundment was Designed By Unknown

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

If So When? December 1998

If So Please Describe :

In December 1998 a breach of the outlet pipe occurred. According to Allegheny Energy no release of impounded material occurred. This failure occured after a decant structure/outlet slip lining project had been performed at Pond #4 in 1997 under maintenance operations.

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

If So When? ____________________________

IF So Please Describe: ____

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 : ____________________

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: R. Paul Smith Power Station	Date: 10-20-09
Unit Name: Ash Pond #4	Operator's Name: Allegheny Energy
Unit I.D.: Ash Pond #4	Hazard Potential Classification: High **Significant** (circled) Low
Inspector's Name: Katherine Adnams & Khalid Abed, P.E.	

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?	Biennially		18. Sloughing or bulging on slopes?	X	
2. Pool elevation (operator records)?	367.7		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	367.7		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)?	378		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)?	NA		From underdrain?	NA	
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 — N/A = Not Applicable/Available.

9. Occasional small shrubs were noted on the south dike.

19. Surface soils on dike slopes are soft and prone to erosion. No serious areas of concern were noted.

18. .Small surface sloughs occur when walking on particularly soft surface soils. A few areas of possible bulges were noted, but were reported by Allegheny Energy to be observed during routine inspections and changes had not been observed in many years.

EPA FORM -XXXX

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # MD0000582 INSPECTOR Adnams/Abed
Date October 20, 2009

Impoundment Name Ash Pond #4
Impoundment Company Allegheny Energy
EPA Region 3
State Agency (Field Office) Addresss 1800 Washington Boulevard
Baltimore, MD 21230
Name of Impoundment Ash Pond #4
(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: Receives all CCW related waste water from the plant. Alternates use with Ash Pond #3

Nearest Downstream Town : Name Falling Water, WV
Distance from the impoundment Approx. 4.5 miles
Impoundment
Location: Longitude 77 Degrees 49 Minutes 51 Seconds
Latitude 39 Degrees 35 Minutes 51 Seconds
State WV County Berkeley

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

If So Which State Agency? MD Department of the Environment - NPDES
WV Department of Environmental Protection - Dam Safety

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.

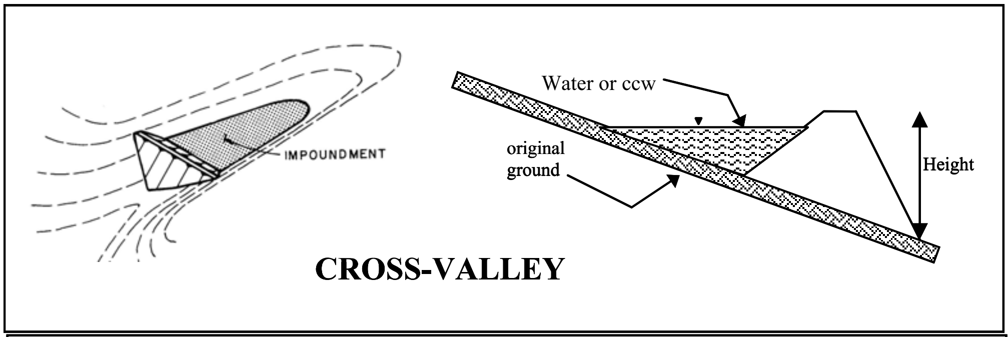
__X__ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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.

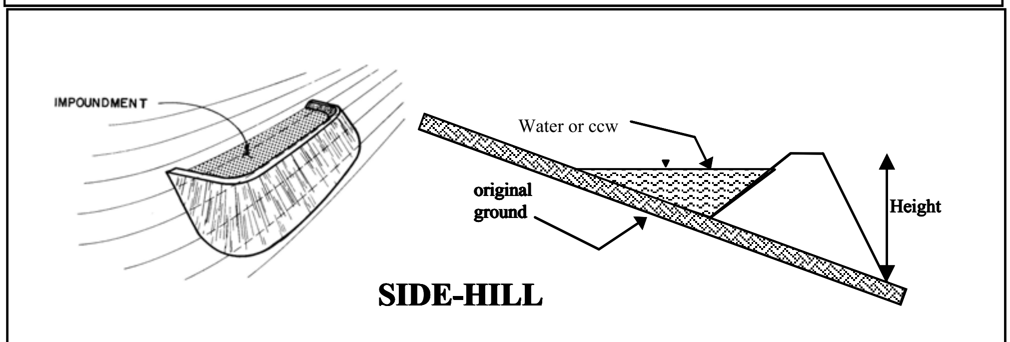
______ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

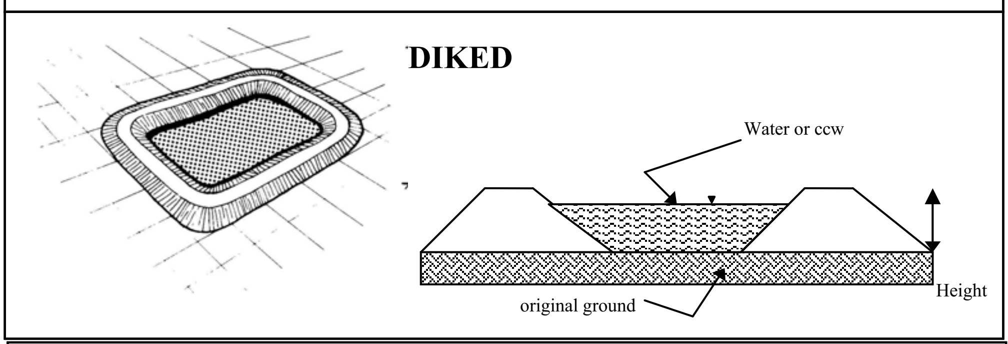
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

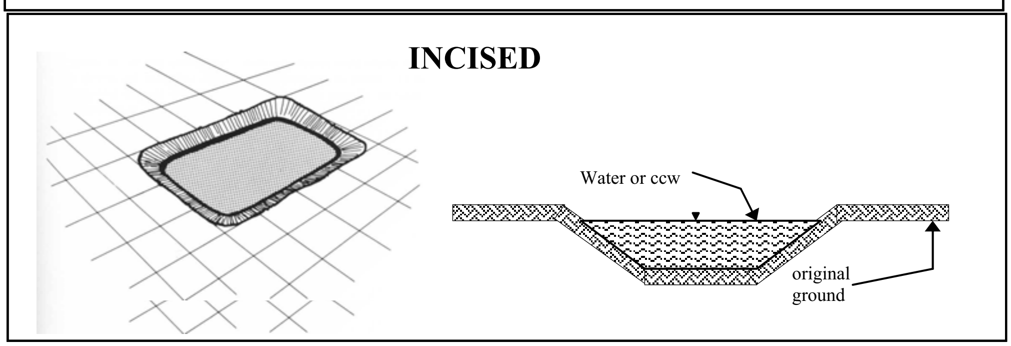
Relatively small impoundment compared to volume of the Potomac River and elevation of riverfront homes suggest loss of life is not a concern. However, environmental impacts to the Potomac River if a breach were to occur would cause environmental damage.

CONFIGURATION:









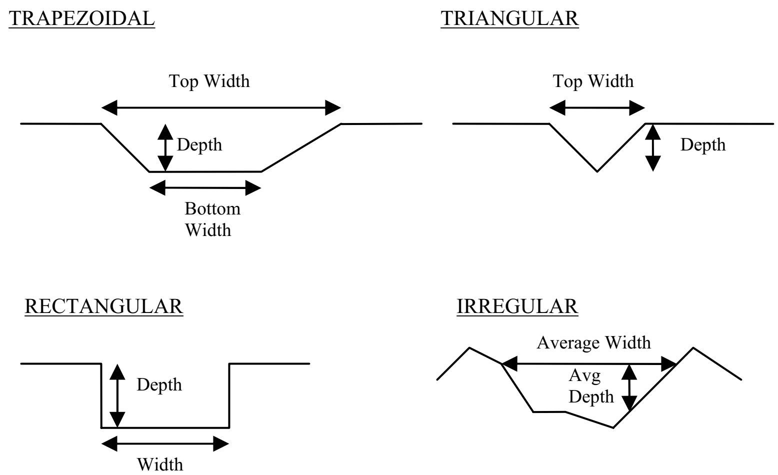
______ Cross-Valley
__X__ Side-Hill
______ Diked
______ Incised (form completion optional)
______ Combination Incised/Diked

Embankment Height ___41___ feet Embankment Material Homogeneous compacted fill
Pool Area ~11 at maximum deca acres Liner Hypalon
Current Freeboard 10 at max. decant feet Liner Permeability impermeable

TYPE OF OUTLET (Mark all that apply)

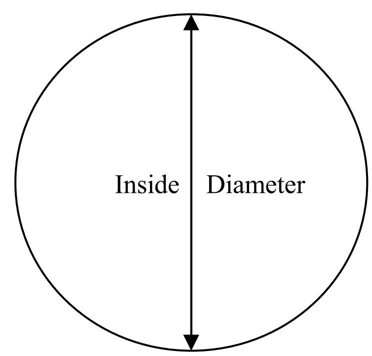
______ **Open Channel Spillway**
______ Trapezoidal
______ Triangular
______ Rectangular
______ Irregular

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



__X__ **Outlet**

__14-in.__ inside diameter



Material
______ corrugated metal
______ welded steel
______ concrete
______ plastic (hdpe, pvc, etc.)
X______ other (specify) HDPE Sliplined CMP

Is water flowing through the outlet? YES __X__ NO ________

______ **No Outlet**

______ **Other Type of Outlet** (specify) ______________________

The Impoundment was Designed By Unknown

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

If So When? ____________________________

If So Please Describe : ____

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

(Unknown)

If So When? ___________________________

IF So Please Describe: ___________________________

A Hypalon liner has been installed. Current employees of Allegheny Energy were uncertain the exact reasons the liner was installed, but suspect it was to reduce seepage and/or lower the phreatic water surface through the embankment.

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES X NO ________

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

If so Please Describe :

A Hypalon liner has been installed. Current employees of Allegheny Energy were uncertain the exact reasons the liner was installed, but suspect it was to reduce seepage and/or lower the phreatic water surface through the embankment.