aether dbs
elemental design build solutions

CONFIDENTIAL BUSINESS INFORMATION

February 3, 2011

Mr. William Skalitzky
Alliant Energy Corporate Services, Inc,
4902 N. Biltmore Lane
Madison, WI 53718

154.002.009

Re: Ash Pond Slope Stability and Hydraulic Analysis
Burlington Generating Station – Burlington, IA

Mr. Skalitzky;

Aether DBS, reports our findings from the Ash Pond Slope Stability and Hydraulic Analysis performed for the Burlington Generating Station. The purpose of the study is evaluation of the stability of the ash settling ponds under 100-year storm flow and for both seismic and rapid drawdown induced loadings. The analysis is based on existing data on the generating station subsurface conditions, ash pond dike conditions, and surface drainage arrangements and new data on the materials of construction for the pond embankments. The supporting information pertinent to the evaluation is provided in the attachments.

The ash ponds will route a SCS Type II, 24-hour, 100 year storm without overtopping. The ash pond embankments have a factor of safety above the standard acceptable factor of safety of 1.5 for static stability, with the exception of the Economizer Ash Pond, which is internal to the Upper Ash Pond. Saturated ash in the ponds will liquefy under a design earthquake causing reduced strengths in the ash and additional pressure on the embankments. The Upper Ash Pond and the Ash Seal Pond embankments have an acceptable factor of safety of 1.1 for pseudo-static earthquake analysis with liquefied ash. The Main Ash Pond and the Economizer Ash Pond pseudo-static earthquake analysis indicate that excessive deformation could lead to the release of the pond contents.

Background

Interstate Power and Light constructed the Burlington generating station in the 1960's for a current generating capacity of 212MW. The original ash handling operation included the ash seal water pond and the upper and lower ash ponds north of the entrance road, Figure 1. Ash was originally managed by settling in the Ash Seal Pond in 1968 and later the Upper and Lower Ash Ponds in 1971. In 1980, the Main Ash Pond south of the entrance road became the primary ash pond with the Upper and Lower Ponds being downstream receivers, Figure 1. The last addition to the ash handling system was the Economizer Ash Pond that was constructed in the southern and eastern part of the original Upper Ash Pond in 1986, Figure 1.

Presently the Generating Station handles fly ash in a dry condition with storage for off-site transport from an ash silo on the southern side of the generating station near the former Ash Seal Water Pond, which now operates as a storm water collection pond for the ash silo area. The other ponds are operated to contain storm water from the generating station and to handle sluicing water used to transport bottom ash and economizer ash from the Station operations. Details of the ponds provided to USEPA in May 2009[1] include:

1. Ash Seal Water Pond – The Ash Seal Water Pond is presently inactive and does not receive storm water from the plant site or ash sluicing water. Storm water from the plant site that originally entered the Ash Seal Pond, with the exception of a small area around the ash silo, is now routed directly to the Main Ash Pond. The Ash Pond will only receive operating water flow if there is an emergency overflow from the Bottom Ash handling system. The Pond covers 4.5 acres and IPL estimates a total ash volume of 73,000 cubic yards is within the pond.
2. Main Ash Pond – The Main Ash Pond is presently active as a receiver of bottom ash and fly ash. When not sent offsite, the dry ash is hydrated and placed in lifts in the southeast portion of the Main Ash Pond. The material is then ground and sold as aggregate materials under the AgPave brand name. The bottom ash is settled in a pond near the eastern end of the Main Ash Pond and is recovered for resale by IPL. Water from sluicing the bottom ash is routed in ditches just inside of the enclosing embankments on both the east and west sides of the Pond to a discharge through a 24-inch corrugated metal culvert under the entrance road at the Northwest corner of the Pond. The Pond covers 17 acres and IPL estimates a total ash volume of 137,000 cubic yards in the pond.
3. Economizer Ash Pond – The Economizer Ash Pond (actually a pile) is presently active and receives sluiced economizer ash that is settled in a small pond on top of the economizer ash pile. The separated economizer ash is processed and stockpile for resale as an aggregate substitute or landfilled offsite. Water from the sluicing is discharged to the Upper Ash Pond. The Pond covers 11 acres and rests on top of what was part of the original Upper Ash Pond. The Economizer Ash is nearly 20-feet above the embankment crest of the Upper Ash Pond. IPL estimates that the volume of ash in the Economizer Ash Pond is 250,000 cubic yards.
4. Upper Ash Pond – The Upper Ash Pond receives sluicing water from both the Main Ash Pond and the Economizer Ash Pond. The Pond also receives the storm water flow from the Generating Station, exclusive of the Coal Pile. No ash other than incidental solids that do not settle from the bottom ash or economizer ash operations enter the Upper Ash Pond. Water in the Pond discharges at the Northeast corner at a normal operating elevation of 528.3 feet. The discharge from the Upper Ash Pond is the NPDES regulated outfall during Mississippi River flooding events. The Upper Ash Pond is 13.3 acres and IPL estimates the volume of ash in the pond is 107,000 cubic yards.
5. Lower Ash Pond – The Lower Ash Pond outfalls to the Mississippi River through a culvert under the railroad spur from the Burlington Northern Main Line to the Generating Station. The water elevation in the Lower Ash Pond is at least the flat water elevation in Pool 19 on the Mississippi River, elevation 518.25 normal pool. The Lower Ash Pond is 23 acres and IPL estimates the volume of ash in the pond is 110,000 cubic yards.

The water balance diagram for the generating station is included in Attachment A.

In addition to the storm water from the Generating Station, storm water from the coal pile is routed north to a detention/retention basin that overflows to the Lower Ash Pond by opening a gate valve.

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[1] Alliant Energy, "Response to Request for Information Under Section 104(e) of CERCLA", May 22, 2009

Investigation Activities

Details for the construction of the various pond embankments are not available. The ash seal pond embankment was investigated by Aether DBS, formerly Hard Hat Services, in 2007 to determine the source of seepage through the embankment[2]. The embankment borings from that investigation are in Attachment B-1. In 2008 Hard Hat Services completed several deep soil borings in the northeast corner of the Ash Seal Water Pond as part of a foundation design investigation. The deep borings along with the deep borings taken in the early 1960's are included in Attachment B-2. Since there was no information on the materials of construction in the remaining pond embankments, Aether DBS installed borings on the embankments of the Main Ash Pond, the Economizer Ash Pond and the Upper Ash Pond at locations that were judged to be critical locations for stability. The results of the new borings are enclosed in Attachment B-3. Locations of the borings are indicated on Figure 1.

The natural soil stratigraphy at the site shows that refusal for a standard split spoon sampler occurs at approximately 80-feet below ground surface at the generating station (elevation 450-feet). Above the refusal the soil is very dense sand and gravel that grades to medium dense from approximately 20-60 feet below ground surface and is either a very loose silt or fine sand or in places soft clay overlying the medium dense sand. At the Generating Station a natural levee embankment and fill added during construction of the site lie over the loose sand and silt and or soft clay. In the areas further to the west where the ponds are located the very loose sands or silts and/or soft clay are at the original ground surface at elevations of 520-525 feet, Attachment C.

Borings taken to determine the materials of construction for the embankments forming the ponds indicated that most of the embankments are compacted clay. The only exception is the northeastern part of the Economizer Ash Pond where the embankment is ash. The compacted clay in the embankments was tested using a pocket penetrometer and the unconfined strength always equaled or exceeded 1 ton per square foot (TSF). When soft clay was found under the embankment, the pocket penetrometer readings indicated as little as 0.5 TSF and on some test no measureable reading. In some cases sand or silty sand was found directly under the compacted clay of the embankment. Since the investigations were using hydraulic pushed tubes the density or strength of the layers were not measured. Results from the borings in the northeast corner of the Ash Seal Pond in 2008 indicate that the soil under the embankments is likely loose to very loose sand or silt when clay is not present.

In the investigation of the economizer ash pond one of the borings indicated compacted clay overlying soft clay. The other two borings indicated that the face of the economizer ash pond is constructed of ash that appears solid when extruded from the sample sleeve, but liquefied when handled. Twenty-Four hour water elevation readings in these borings indicated that the phreatic water elevation is approximately 15-feet below the crest of the dike and that the saturation observed in the sample is likely from capillary rise in the ash.

Drainage

Drainage from the Generating Station which covers approximately 8.0 acres is routed to the Main Ash Pond. From the Main Ash Pond drainage runs down the inboard side of the south embankment of the

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[2] IPL. "Burlington Generating Station Berm/Seep Investigation", Hard Hat Services, August 31, 2007.

Main Ash Pond to form a pond at the West end of the Main Ash Pond. The pond discharges under the entrance road in two 18-inch diameter corrugated steel culverts with an invert elevation of 531.1. The drainage from the Generating Station and the Main Ash Pond is combined with the drainage from the Economizer Ash Pond in the Upper Ash Pond. Water in the Upper Ash Pond discharges into the Lower Ash Pond through a 15-inch diameter plastic outlet pipe with an invert elevation of 528.3.

The Lower Ash Pond is in direct hydraulic communication with Pool 19 on the Mississippi River.

Discharge from sluicing of bottom ash and economizer ash is 4.6 cubic feet per second (CFS) split between the two operations. Discharge rates from the Upper Ash Pond indicate that approximately one-third of this sluice water seeps into the soil below the pond (exfiltration).

Hydrology and Hydraulics

A 100-year, SCS Type 2, 24-hour storm for Des Moines County, Iowa is 6.8 inches of precipitation[3]. Runoff Curve Numbers of 91 for the generating station, 85 for the Main Pond and 100 for the Economizer Ash Pond and the Upper Ash Pond were used in the storm routing. The values were estimated based on assumed percentage of paved areas and the probable presence of unsaturated ash above the normal ground water elevation in filled ponds. Flow from the East to the West end of the Main Ash Pond was taken through a trapezoidal channel along the inboard slope of the South embankment. The base flow through the culverts from sluicing operations was generated by starting the pond routing at each discharge culvert at an elevation that results in 1 CFS and 3 CFS base discharge at the Main Ash Pond and the Upper Ash Pond, respectively.

Hydraflow by Intelisolve[4] was used to generate and route the storm hydrograph through the ponds. The results indicate that the discharge culverts at both locations convert from open channel flow to full pipe flow during the routing of the 100-year storm. Discharge from the Main Ash Pond peaks at a flow of 18 CFS with a corresponding freeboard of 0.8 foot. Discharge from the Upper Ash Pond peaks at a flow of 7 CFS with a corresponding freeboard of 0.75 foot. The analysis results are provided in Attachment D.

Ash Pond Embankment Stability – Static At Normal Operating Conditions

The static stability of the ash ponds is dependent on the geometry of the embankments and the strength of the embankment and base soils. The presence of soft clay and/or very loose silty sand immediately below the embankments is the likely failure plane for static stability under normal operating conditions. For strength, the soft clay was assigned cohesion of 500 pounds per square foot (PSF) unless conditions indicate otherwise. For a loose sand or silty sand a friction angle of 30° was used. Settled ash contained behind the embankments is assigned a friction angle of 25°. Compacted clay embankments are assigned a cohesive strength of 1000 PSF.

In the case of the southeast corner of the Main Ash Pond, a topographic map from early 2009, Attachment E, showed that AgPave was previously stacked steeply 30-feet above the embankment crest.

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[3] United States Department of Commerce, Rainfall Frequency Analysis of the United States,

[4] Intelisolve. Pond Routing Software Hydraflow, 2002

Consequent, the embankment has demonstrated considerable load carrying capacity in the past when the AgPave stockpile was in place.

For the Economizer Ash Pond embankment, the fly ash in the embankment was assigned a friction angle of 28° for loose ash and the ground water table was shown as percolating down from the ponded area approximately 30-feet south of the crest and then horizontally towards the Upper Ash Pond.

The embankment geometry and soil layers and strengths were used as input to the two dimensional limit-equilibrium slope stability analyses program STABL5M (1996)[5] to analyze hundreds of potential slip surfaces for each case. The program calculates a factor of safety based on the ratio of the driving forces to the resisting forces along each potential slip surface. A calculated factor of safety greater than one indicates stability along the surface analyzed. Both circular surfaces and block slides were investigated and showed similar results with the natural soil under the embankment controlling the stability.

The results for the static analysis are presented in Attachment F and are summarized as:

Ash Pond	Minimum Factor of Safety
Ash Seal	1.6
Main	2.1
Upper	2.1
Economizer	1.1

The Lower Ash Pond drains freely to the Mississippi River and the stability of the railroad embankment that separates the pond from the River was not assessed because of its mass and its location on the natural levee deposits along the edge of the River. For the Economizer Ash pond the embankment was analyzed as ash, but is likely to have an original clay embankment behind the crest. If clay is present, the Economizer Ash embankment should have a higher factor of safety due to a lack of seepage and/or the cohesive strength. In all cases the location of the critical sections on each embankment are shown on Figure 1.

Ash Pond Embankment Stability – Static with Rapid Drawdown Conditions

The Upper Ash Pond may experience rapid changes in water elevation if the Mississippi river were to drop quickly after a flood overtopped the embankment. The Upper Ash Pond was modified in 2010 to line the crest and upstream slopes with rip-rap to protect the embankment when high water elevations in pool 19 on the Mississippi River overtop the dike (i.e., the dike has a top elevation of 531 feet whereas the 100-year flood elevation in Pool 19 is 534 feet).

In addition, the Ash Seal Pond could experience rapid drawdown if emergency overflow goes to the pond and the pumping system quickly lowers the pond back to the normal water elevation.

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[5] STABL User Manual, By Ronald A. Siegel, Purdue University, June 4, 1975 and STABL5 …The SPENCER Method of Slices: Final Report, By J.R.Carpenter, Purdue University, August 28, 1985

Both embankments are constructed of clay so rapid drawdown will not create temporary unbalanced seepage forces in the embankments and rapid drawdown is not considered a destabilizing factor.

Ash Pond Embankment Stability – Earthquake with Normal Operating Conditions

The Main Ash Pond and the Economizer Ash Pond contain saturated ash that was deposited hydraulically in the ponds prior to converting the generating station to a dry ash handling system. The Main Pond is filled with ash close to its crest elevation and is wetted by flow of water from the bottom ash sluicing operation down the south side of the pond.   The Economizer Ash Pond is similarly wetted by flow of sluicing water over the northeast surface of the pond.

Since the fly ash in these ponds was deposited by hydraulic methods, the impact of an earthquake on the pond stability is determined by both the additional forces from the earthquake on the pond embankments and the possible liquefaction of the contained fly ash.

To determine the potential for liquefaction, Aether DBS determined the amplification of bedrock ground motion through a typical soil profile (under the main pond) and the cyclic shear stress experienced in the fly ash at the surface of the profile using the program SHAKE[6].

The soil profile above the bedrock was assigned maximum shear modulus values based on the Hardin[7] and a maximum material damping of 5%. The variations of shear modulus and damping with shear strain were selected from records available for soils of similar characteristics in the SHAKE library. Since no recorded bedrock earthquake motions exist for earthquakes on the New Madrid fault system approximately 300-miles south of Burlington, the Northridge 1994 record from California was chosen for its relatively long strong motion content.

The earthquake record was scaled to the peak bedrock earthquake acceleration with a 2% probability in 50 years (2475 year return period)[8] of 0.06g. The use of a 2% probability in 50 years is the standard set by the USEPA for design of Subtitle D landfills[9]. SHAKE performs a one-dimensional analysis of the earthquake motion traveling upward from rock at 80-feet below ground surface and produces an amplified and filtered earthquake response at other depths. SHAKE also determines the peak acceleration in each layer and the ratio of the maximum shear stress to confining pressure at strains that are 65% of the maximum shear strain determined in the analysis. The results of the SHAKE analysis are presented graphically in Attachment G and summarized below:

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[6] GeoMotions, LLC, "SHAKE 2000 A Computer Program for the 1-D Analysis of Geotechnical Earthquake Engineering Problems"' November 2007.

[7] Hardin Bobby, and Vincent Drenevich, "Shear Modulus and Damping of Soils Measurement and Parameter Effects"' College of Engineering University of Kentuckey, 1970.

[8] International Code Council, "International Building Code, 2006

[9] EPA (1995), "RCRA Subtitle D (258) Seismic design Guidance for Municipal Solid Waste Landfill Facilities". EPA/600/R-95/051

Layer	Depth (ft)	Peak Acceleration (g)	Depth (ft)	Cyclic Stress Ratio (τ/α)
Fly Ash	0	0.22	2.5	0.29
Fly Ash	5	0.16	7.5	0.25
Soft Clay	10	0.13	12.5	0.20
Medium Dense Sand	15	0.105	20	0.175

The cyclic stress ratio (CSR) produced by the earthquake is compared to the cyclic resistance ratio (CRR) measured in the field or laboratory tests on remolded samples. Since no in-situ measurements were available for the fly ash, the CRR measured by Behrad[10] for fly ash at a dry density of 70 lb/ft^3 and for more than 10 cycles of strong motion was selected to represent ash in the Burlington Ponds (CRR = 0.1).

The results indicate that a design level earthquake will result in liquefaction of the fly ash so that it will have virtually no shear strength and will act as a heavy viscous fluid with hydrostatic pressure pushing on the clay embankments of the ponds. These conditions are used in the analysis of the embankment stability to determine if the liquefied ash will move the embankments.

In addition to ash liquefaction during the design earthquake, the very loose sand and/or sandy silt underlying the clay embankments may liquefy during the earthquake. If the underlying layer were to liquefy the entire embankment could be pushed over the base soil resulting in a release of the pond contents. The Factor of Safety results presented by Aether DBS do not account for the potential of embankment foundation liquefaction.

The earthquake acceleration at the base of the embankment, 0.13g, was used as the horizontal earthquake coefficient for a pseudo-static addition to the static limit equilibrium analysis using STABL. The vertical component of the earthquake was taken as $^2/_3$ of the horizontal acceleration as recommended by Newmark[11]. During the earthquake, the ash in the pond was assumed to have liquefied and was assigned a residual cohesion of 100PSF to produce a viscous fluid shear effect with no strength due to particle friction.

The results for the pseudo-static analysis are presented in Attachment H and are summarized as:

Ash Pond	Minimum Factor of Safety
Ash Seal	1.2
Main	1.0
Upper	1.5
Economizer	0.7

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[10] Behrad Zand, Wei Tu, Pedro J Amaya, William Wolfe, Tarunjit Butalia, “Evaluation of Liquefaction Potential of Impounded Fly Ash”2007 World of Coal Ash, May 7-10, 2007.

[11] Newmark, N. M. and W. J. Hall, “Earthquake Spectra and Design”, EERI Monograph, Earthquake Engineering Research Institute, Berkeley California, 1982

Results that are 1.0 or less indicate that substantial deformation may occur in the embankment and the deformation could lead to a release of the pond contents.

Conclusion

One Hundred Year Storm Routing – The 100-year storm will route through the Main Ash Pond and the Upper Ash Pond without overtopping of the embankments. Based on the conservative approach to the analysis, a freeboard of one foot is judged to be acceptable. However, both ponds have less than one foot of freeboard and remedial measures to improve storage and/or drainage rate should be considered. The Upper Ash Pond was modified in 2010 to reduce erosion from crest overtopping that occurs whenever Pool 19 of the Mississippi River rises above 531. It has survived overtopping in the past and should survive overtopping without failure of the embankment in the future.

Static Embankment Stability – The Ash Seal Pond, Main Pond, and Upper Ash Pond all have static factors of safety greater than the 1.5 standard for embankments. The Economizer Ash Pond has a static safety factor less than 1.5, because the outer slope of the pond is constructed of ash and the ash is saturated by the ponding operation close to the crest of the slope. A static failure of the Economizer Ash Pile slope could lead to static liquefaction of the pile with flow into the Upper Ash Pond. If such a flow occurred, the flowing material could possibly overtop or push the Upper Ash Pond embankment into the Lower Ash Pond. The failure could have an economic impact, but would remain within the Ash Pond system and would not have an environmental impact to the Mississippi River.

Earthquake Liquefaction – A Subtitle D (Part 258) design earthquake magnitude will result in liquefaction of the saturated ash. The liquefied ash will have a low residual strength and will push on the embankments with a hydrostatic force that could deform the embankments. In addition, the susceptibility to liquefaction of the base soil under the embankments could be an issue for embankment stability.

Pseudo-Static Earthquake Stability -- In the case of the Economizer Ash Pond the embankment could deform or liquefy and the contents of the pond flow into the Upper Ash Pond. If the velocity of the flow was significant, the contents of the Economizer Ash Pond could overtop the Upper Ash Pond embankment and flow into the Lower Ash Pond. Because of the size of the Lower Ash Pond it is unlikely that anything other than water would flow to the Mississippi River.

In the case of the Main Ash Pond, movement of the embankment could release some of its contents into the lowland south of the pond. With the low height of the pond and the volume of the contents relative to the distance to the Mississippi River, an embankment failure is unlikely to result in movement of the pond contents to the river. Consequent damages would be economic with minor environmental impacts to the adjacent lowland.

Recommendations

Aether DBS recommends that Interstate Power and Light consider the following actions and/or assessment.

1. Aether DBS understands that Interstate Power and Light is planning to modify the outlet of the Upper Ash Pond in calendar year 2011. The outlet pipe should be increased to a diameter that allows the pond to maintain a freeboard greater than one-foot under the 100-year flood flow.
2. The sluicing water in both the Main Ash Pond and the Economizer Ash Pond should be rerouted to flow down the center of the ash fill in the pond. A free water surface as far from the pond embankments as possible will reduce the probability of the ash liquefying near the embankment in the event of an earthquake or in the case of the Economizer Ash Pile due to the slumping of the outer face of the pile. The volume of the pond at the West end of the Main Ash Pond should be increased by removing ash to increase the freeboard during storm flow.
3. Further assessment of the potential for liquefaction of the soils directly under the Main Ash embankment and in the Economizer Ash embankment should be completed to determine if the embankments could fail due to failure of the base materials.
4. Further assessment of the critical section of the Economizer Ash pond should be considered to confirm if a buried clay embankment is found south of the ash crested area. A clay embankment would restrict flow liquefaction from a static slump in the ash face that has a safety factor less than 1.5.

Aether DBS believes that the ash piles overall are in fair condition and only extreme hydrologic and/or seismic events could lead to economic or environmental impacts to areas outside of the ash ponds.

We appreciate the opportunity to perform an assessment of the Burlington Generating Station Ash ponds.

If you have any questions, please call.

Thomas C Wells

Thomas C. Wells, P.E.

Timothy J. Harrington, P.E.

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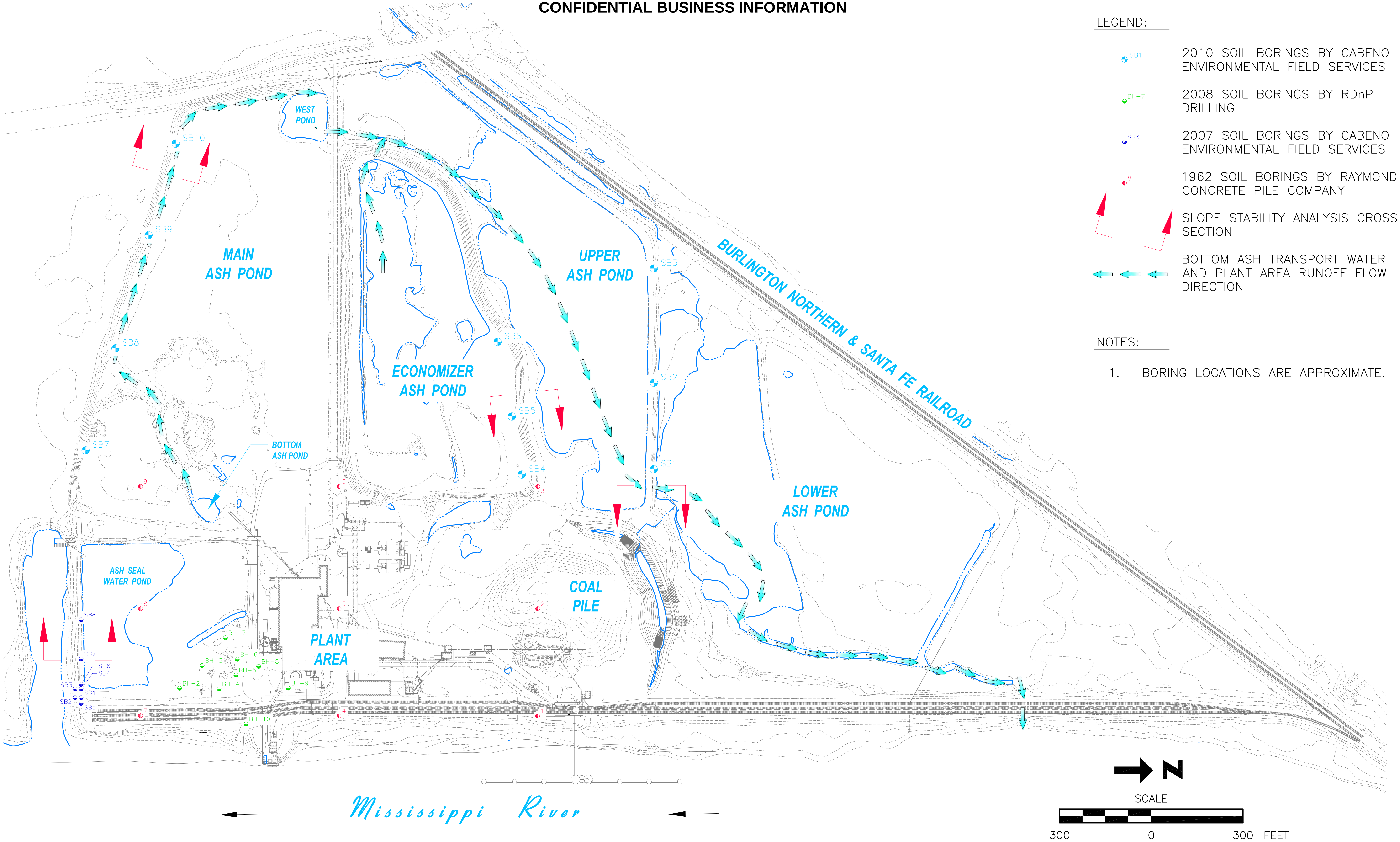

LEGEND:

SB1	2010 SOIL BORINGS BY CABENO ENVIRONMENTAL FIELD SERVICES
BH-7	2008 SOIL BORINGS BY RDnP DRILLING
SB3	2007 SOIL BORINGS BY CABENO ENVIRONMENTAL FIELD SERVICES
8	1962 SOIL BORINGS BY RAYMOND CONCRETE PILE COMPANY
	SLOPE STABILITY ANALYSIS CROSS SECTION
⇐ ⇐ ⇐	BOTTOM ASH TRANSPORT WATER AND PLANT AREA RUNOFF FLOW DIRECTION

NOTES:

1. BORING LOCATIONS ARE APPROXIMATE.

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REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

aether dbs
www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	01-21-11
DRAWN BY:	MM
CHKD. BY:	TCW
APPROVED:	01-21-11

CLIENT / LOCATION
ALLIANT ENERGY
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

DRAWING DESCRIPTION
SITE PLAN

JOB 154.002.009
SHT. 1
DWG. SITE PLAN

Attachment A

Water Balance Diagram

US EPA
Steam Electric Questionnaire
Part D - Pond/Impoundment Systems and Other Wastewater Treatment Operations

Source:
Alliant Energy, US EPA Approved May 20, 2010

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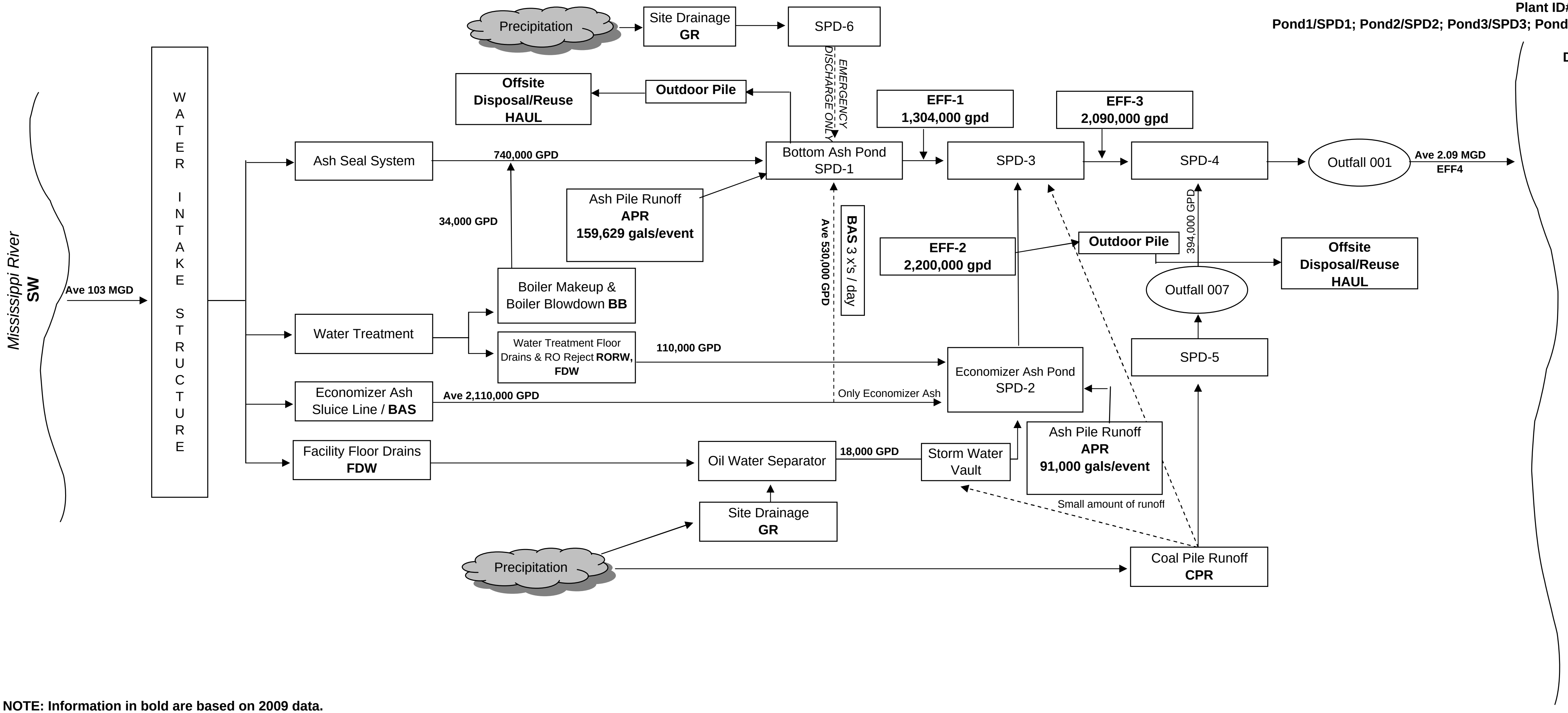
IPL - Burlington Generating Station
Plant ID# 00189
Pond1/SPD1; Pond2/SPD2; Pond3/SPD3; Pond4/SPD4
D3-1
D-1, D-2



NOTE: Information in bold are based on 2009 data.

Attachment B-1

Boring Logs

Burlington Generating Station Berm/Seep Investigation

Source:
Hard Hat Services, August 31, 2007

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

PROJECT: Alnt - Burlington

BORING NO.: *SB-1*

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *8-7-07*
DATE FINISHED: *8-7-07*
GROUND SURFACE ELEVATION: *100.36*

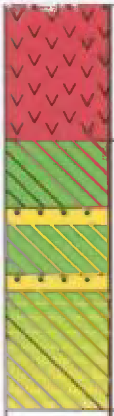
TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	PID READINGS (PPM)	PID vs. DEPTH	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								0		ASH; well graded; fine to coarse grained; dry.
	SP1	3.5'/5'								
						2.75				CLAY; dark grayish brown; low to high plasticity; moist; trace sand, gravel and organic matter.
						2.0				@ 4.5' and 5.0' are thin (1/16" thick) sand seams, wet.
						4.0		-5		
∇										
						1.0				
						1.0				
	SP2	5'/5'								
						1.25				
						1.0				
								-10		SAND; black; medium to coarse grained; graded; wet.
	SP3	5'/5'								
						1.25				CLAY; black; high plasticity; moist; trace to some organic matter.
						2.0		-15		Bottom of boring @ 15'. Boring advanced w/ track mounted Geoprobe Model 6610DT using Macrocore soil sampling system (60"long x 1.5" wide). Boring backfilled to groundsurface w/ bentonite chips and hydrated on 8-7-07.
								-20		

CABENO
Environmental Field Services, LLC

BORING LOG

CLIENT: Hard Hat
COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED
PROJECT: Alnt - Burlington
BORING NO.: *SB-2*
page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *8-7-07*
DATE FINISHED: *8-7-07*
GROUND SURFACE ELEVATION: *99.26*



TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	PID READINGS (PPM)	PID vs. DEPTH	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								0		ASH; well graded; fine to coarse grained; dry.
	SP1	3'/4'				2.5				CLAY; dark grayish brown; low to high plasticity; moist; trace sand, gravel and organic matter.
						2.75				@ 3' and 4' are a thin 1/16" thick sand seams, wet, trace satl deopsit in sand.
∇						2.75				
	SP2	2'/2'				2.75		-5		
						2.75				
										Bottom of boring @ 6'. Boring advanced w/ track mounted Geoprobe Model 6610DT using Macrocore soil sampling system (60"long x 1.5" wide). 1-inch PVC temp. well installed to 6-feet bgs w/ 5' screen on 8-7-07. TOC elevation = 102.98
								-10		
								-15		
								-20		

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

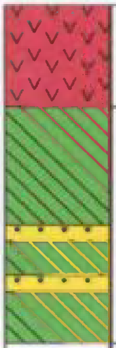
COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

PROJECT: **Alnt - Burlington**

BORING NO.: ***SB-3***

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *8-7-07*
DATE FINISHED: *8-7-07*
GROUND SURFACE ELEVATION: *99.47*

TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	PID READINGS (PPM)	PID vs. DEPTH	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								0		ASH; well graded; fine to coarse grained; dry.
	SP1	4'/5'				4.0 3.5 3.0				CLAY; dark grayish brown; low to high plasticity; moist to wet; trace sand, gravel and organic matter. @ 1.5' water is present and confined to an approximate 1-inch seam. @ 3.5' to 4.0' are three 1/16-inch thin sand seams, wet.
								-5 -10 -15 -20		Bottom of boring @ 5'. Boring advanced w/ track mounted Geoprobe Model 6610DT using Macrocore soil sampling system (60"long x 1.5" wide). 1-inch PVC temp. well installed to 5-feet bgs w/ 5' screen on 8-7-07. TOC elevation = 101.07

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

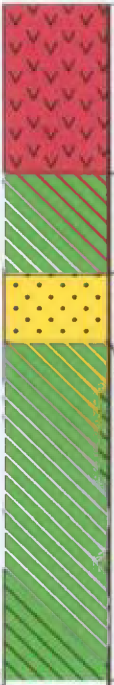
COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

PROJECT:Alnt - Burlington

BORING NO.: ***SB-4***

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *8-7-07*
DATE FINISHED: *8-7-07*
GROUND SURFACE ELEVATION: *101.21*



O WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	PID READINGS (PPM)	PID vs. DEPTH	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								0		ASH; well graded; fine to coarse grained; dry.
	SP1	4'/5'								CLAY; dark grayish brown; low to high plasticity; moist; trace sand, gravel and organic matter.
Z										
										SAND, GRAVEL & ASH; brown to black; fine to coarse grained; graded; wet; trace to some silt and clay.
						1.0		-5		
										CLAY; dark grayish brown; low to high plasticity; moist; trace sand, gravel and organic matter.
						0.5				
						0.5				
	SP2	4'/5'								
						1.0				
						1.5				
						2.0		-1		
										Bottom of boring @ 10'.
										Boring advanced w/ track mounted Geoprobe Model 6610DT using Macrocore soil sampling system (60"long x 1.5" wide).
								-15		1-inch PVC temp. well installed to 10-feet bgs w/ 5' screen on 8-7-07. TOC elevation = 102.22
								-2		

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Hard Hat

COORDINATES: N NOT SURVEYED
E NOT SURVEYED

PROJECT: Alnt - Burlington

BORING NO.: SB-5

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *8-7-07*
DATE FINISHED: *8-7-07*
GROUND SURFACE ELEVATION: *99.76*

TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	PID READINGS (PPM)	PID vs. DEPTH	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								0		ASH; well graded; fine to coarse grained; dry.
	SP1	4'/5'								
▽										CLAY; dark grayish brown; low to high plasticity; moist; trace sand, gravel and organic matter.
						3.0				
						1.5		-5		@ 4.5' is a 2-inch brown, fine sand, moist.
						1.25				
						1.0				
	SP2	4'/5'								
						0.5				
						1.5				
▽										
								-10		SAND; black; med to coarse grained; graded; wet.
	SP3	5'/5'								
										CLAY; black; high plasticity; some (high) organic matter.
						2.0				
						2.0		-15		Bottom of boring @ 15'. Boring advanced w/ track mounted Geoprobe Model 6610DT using Macrocore soil sampling system (60"long x 1.5" wide).
								-20		

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Hard Hat

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alnt - Burlington

BORING NO.: *SB-6*

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *8-7-07*
DATE FINISHED: *8-7-07*
GROUND SURFACE ELEVATION: *102.28*

TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	PID READINGS (PPM)	PID vs. DEPTH	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								0	🟥	ASH; well graded; fine to coarse grained; dry.
	SP1	4'/5'							🟥	
∇ ∇						2.5			🟩 🟨	
						2.5		-5	🟨 🟩	CLAY; dark grayish brown; low to high plasticity; moist; trace sand, gravel and organic matter.
						2.5			🟩	@ 4.5' and 5' is a 1-inch brown, fine sand, wet.
						2.5			🟩	
	SP2	4'/5'							🟩	
						2.5			🟩	
						2.0			🟩 🟨	SAND; black; med to coarse grained; graded; wet.
								-10		Bottom of boring @ 10'.
										Boring advanced w/ track mounted Geoprobe Model 6610DT using Macrocore soil sampling system (60"long x 1.5" wide).
								-15		Boring backfilled w/ bentonite chips from 10' bgs to 5' bgs. 1-inch PVC screen set to 5' bgs on 8-7-07. TOC Elevation = 104.92.
								-20		

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Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: [redacted]

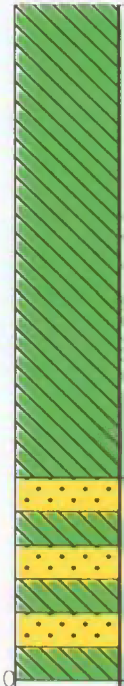
COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

PROJECT:Alnt - Burlington

BORING NO.: ***SB-7***

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *8-7-07*
DATE FINISHED: *8-7-07*
GROUND SURFACE ELEVATION: *101.90*

TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	PID READINGS (PPM)	PID vs. DEPTH	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								0		CLAY; dark brown to black; non-plastic to low plasticity; dry to moist; trace sand, gravel and ash.
	SP1	4'/5'								
∇										
								-5		
	SP2	4'/5'								Interbedded SAND & CLAY
								-10		Bottom of boring @ 10'. Boring advanced w/ track mounted Geoprobe Model 6610DT using Macrocore soil sampling system (60"long x 1.5" wide).
								-15		1-inch PVC screen set to 10' bgs w/ 5' screen on 8-7-07. TOC Elevation = 105.02.
								-20		

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Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Hard Hat

COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

PROJECT: Alnt - Burlington

BORING NO.: *SB-8*

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *8-7-07*
DATE FINISHED: *8-7-07*
GROUND SURFACE ELEVATION: *101.62*

TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	PID READINGS (PPM)	PID vs. DEPTH	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								0	▨	CLAY; dark brown to black; non-plastic to low plasticity; dry to moist; trace sand, gravel and ash.
	SP1	4'/5'							▨	
∇									▨	
								-5	▨	
						2.5			▨	
						2.25			▨	
						2.25			▨	
∇	SP2	4'/5'							▨	
									⁘	SAND; 1st 1.5-inches stained orange-red then grades gray to black; fine to coarse grained; well graded; wet.
								-10		Bottom of boring @ 10'.
										Boring advanced w/ track mounted Geoprobe Model 6610DT using Macrocore soil sampling system (60"long x 1.5" wide).
								-15		1-inch PVC screen set to 10' bgs w/ 5' screen on 8-7-07. TOC Elevation = 104.60.
								-20		

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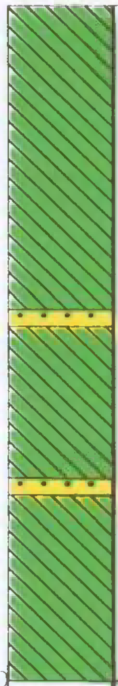
Environmental Field Services, LLC

BORING LOG

CLIENT: Hard Hat
COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED
PROJECT: Alnt - Burlington
BORING NO.: *SB-9*
page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Lorep*
DATE BEGAN: *8-7-07*
DATE FINISHED: *8-7-07*
GROUND SURFACE ELEVATION: *102.10*



TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	PID READINGS (PPM)	PID vs. DEPTH	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
								0		CLAY; dark brown to black; non-plastic to low plasticity; dry to moist; trace sand, gravel and ash.
						0.5				
						1.25				
	SP1	4'/5'								
						1.0				
						1.0				
▽										@ 4.5' is a wet seam, approx. 1-inch thick.
						0.5		-5		
						0.5				
						0				@ 7' is a wet seam, approx. 1.5-inch thick.
	SP2	4'/5'								
						0				
						1.0				
						1.25		-10		
										Bottom of boring @ 10'.
										Boring advanced w/ track mounted Geoprobe Model 6610DT using Macrocore soil sampling system (60"long x 1.5" wide).
								-15		1-inch PVC screen set to 10' bgs w/ 5' screen on 8-7-07. TOC Elevation = 103.00.
								-20		

Attachment B-2

DEEP BORINGS

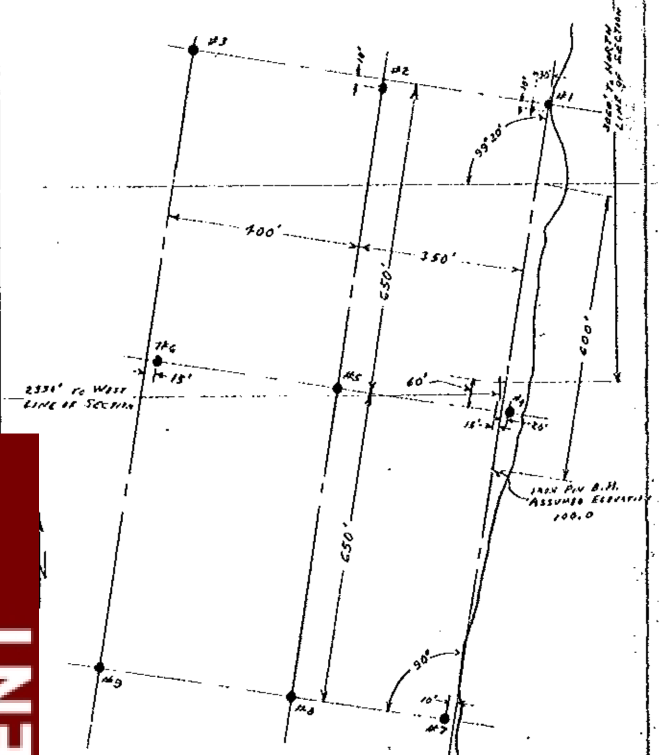
Proposed Burlington Plant Site
Test Boring Reports

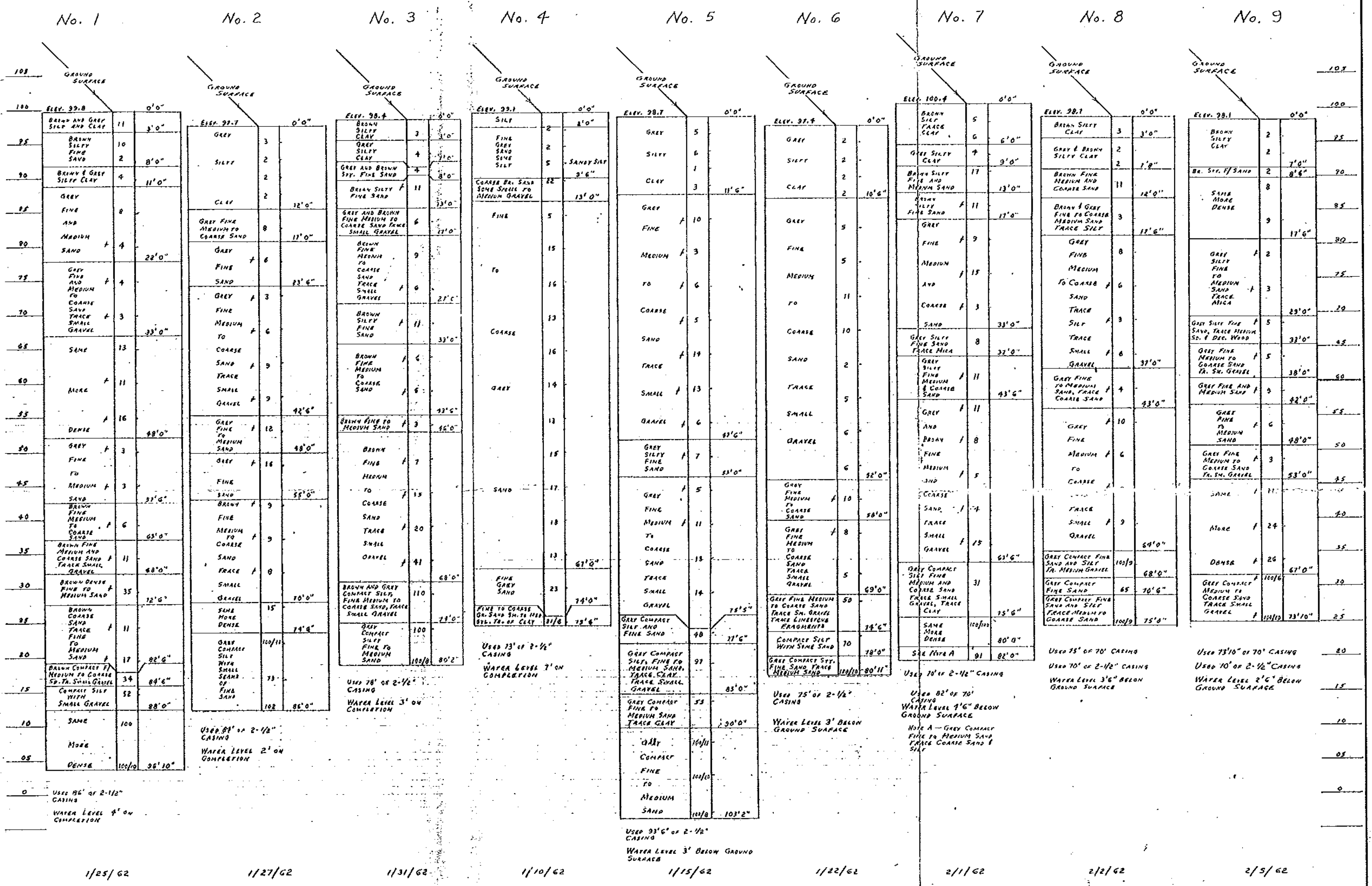
Source: Iowa Southern Utilities Co, March 15, 1962

Geotechnical Report and
Foundation Design Guidance

Source: Hard Hat Services, February 13, 2009

CONFIDENTIAL BUSINESS INFORMATION





No. 1:
Used 86' of 2-1/2" Casing
Water Level 4' on Completion

No. 2:
Used 61' of 2-1/2" Casing
Water Level 2' on Completion

No. 3:
Used 78' of 2-1/2" Casing
Water Level 3' on Completion

No. 4:
Used 13' of 2-1/2" Casing
Water Level 7' on Completion

No. 5:
Used 93'6" of 2-1/2" Casing
Water Level 3' Below Ground Surface

No. 6:
Used 75' of 2-1/2" Casing
Water Level 3' Below Ground Surface

No. 7:
Used 10' of 2-1/2" Casing
Used 82' of 70' Casing
Water Level 1'6" Below Ground Surface
Note A — Grey Compact Fine to Medium Sand Trace Coarse Sand & Silt

No. 8:
Used 75' of 70' Casing
Used 70' of 2-1/2" Casing
Water Level 3'6" Below Ground Surface

No. 9:
Used 73'10" of 70' Casing
Used 10' of 2-1/2" Casing
Water Level 2'6" Below Ground Surface

Figures in Right Hand Column Shown as Fractions — Numerator = No. of Blows / Denominator = Penetration in Inches

ƒ Indicates Wash Sample Recovered

Classifications are made by visual inspection. Figures in right hand column indicate number of blows required to drive 2" O.D. sampling pipe one foot, using 140-lb. weight falling 30 inches.

References:
See D-467 For Boring Locations.
ƒ Test Boring Report - February 13, 1962, By Raymond Concrete Pile Company, Soil Division, Job No. C8-998-KC Sheets 1 through 4

IOWA SOUTHERN UTILITIES CO.
CENTERVILLE, IOWA
Proposed Burlington Plant Site
Test Boring Reports
SCALE 1" = 8' Vertical DATE 3-15-62
SKETCH DHN DWN TRCD LLA CHKD
D-484 APPROVED

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-2**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.13
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/11/2008 FINISH 12/12/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	INTERVAL (ft) TO	BLOW COUNT 0"-6"	BLOW COUNT 6"-12"	BLOW COUNT 12"-18"	BLOW COUNT 18"-24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	2	3	4	4	14.0		0.75			CL	Black and brown mottled SILTY CLAY, little fine to medium sand, medium plasticity, medium stiff, wet
											4'3"	529.88		
5	SS-2	4.0	6.0	1	6	5	3	17.0						Grey SILT, trace fine sand, medium dense, moist
	SS-3	6.0	8.0	1	8	15	7	17.5						medium dense
	SS-4	8.0	10.0	1	6	50/5		18.0					ML	very dense
10														
	SS-5	13.0	15.0	1	1	1	1	13.0	49	0.75	13'5"	520.71		Dark brown and black mottled CLAY, trace silt, high plasticity, medium stiff, wet
15														
	SS-6	18.0	20.0	2	2	3	3	15.0	48	0.25 0.50			CH	soft (LL=52, PI=27)
20														
	SS-7	23.0	25.0	4	5	7	12	20.0			23'6"	510.63		Brown fine to medium SAND, medium dense, wet
25														
	SS-8	28.0	30.0	3	12	17	18	9.0						brownish-grey
30														
	SS-9	33.0	35.0	8	10	11	12	11.5					SP	
35														
	SS-10	38.0	40.0	7	7	10	12	10.0						some coarse sand and wood pieces
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

CONFIDENTIAL BUSINESS INFORMATION

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-2**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.13
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/11/2008 FINISH 12/12/2008

DEPTH	SAMPLE			BLOW COUNT				REC	WC	qu	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
		INTERVAL (ft)		0"	6"	12"	18"	(in)	(%)	(TSF)				
	No.	FROM	TO	6"	12"	18"	24"							
														Brownish-grey fine to medium sand, some coarse sand, medium dense, wet (cont.)
	SS-11	43.0	45.0	3	6	12	14	15.5					SP	2" of black silt at 44'1"
45														
											46'6"	487.63		Brownish-grey fine to coarse SAND, medium dense, wet
	SS-12	48.0	50.0	6	7	8	12	16.0						
50														
	SS-13	53.0	55.0	10	11	12	19	21.0					SW	
55														
	SS-14	58.0	60.0	15	22	32	42	24.0						medium to coarse sand, trace fine sand and fine gravel, very dense
60											60'	474.13		EOB 60' - Sand was causing hole to collapse and would have needed to be cased to 60' to continue.
65														
70														
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

PROJECT No. 154.002.008.001
BORING No. BH-B-1 **(BH-3)**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
DRILLER RDnP Drilling - Chris
DATE: START 7/15/2008 FINISH 7/21/2008

DEPTH	SAMPLE No.	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0"-6"	BLOW COUNT 6"-12"	BLOW COUNT 12"-18"	BLOW COUNT 18"-24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	USCS SOIL TYPE	SOIL DESCRIPTION
	SS-1	0.0	2.0	5	10	10	12	12	23				Brown and black silty clay FILL, medium dense, dry
	SS-2	2.0	4.0	10	11	11	15	9.5		2.0			Coarse sand and fine gravel FILL, trace grey fines, medium dense, dry
5	SS-3	4.0	6.0	5	10	2	2	10	14	4.0		FILL	some silt
	SS-4	6.0	8.0	1	10	16	12	22		6.0			Grey-black sand and gravel FILL with silt, medium dense wet.
10	SS-5	8.0	10.0	6	10	22	32	24	24		10.0		
	SS-6	10.0	12.0	3	8	3	2	14					Grey sandy SILT, trace coarse sand, loose, saturated
	SS-7	12.0	14.0	1	0	1	0	18	50				Grey SILT, little fine sand, very loose, saturated
15	SS-8	14.0	16.0	Rod Weight				17				ML	
20	SS-9	18.0	20.0	1	1	1	1	16	33				trace low plasticity clay, trace fine sand
											22'6"		
													Dark grey SILTY CLAY, trace fine sand, medium to high plasticity, soft, wet
25	SS-10	23.0	25.0	1	2	2	1	18				CL	
											26.5		
													Grey fine to medium grained SAND, trace coarse sand, very loose, saturated
30	SS-11	28.0	30.0	1	0	0	0	3	18				
35	SS-12	33.0	35.0	5	8	12	14	11				SP	medium dense
40	SS-13	38.0	40.0	8	10	11	12	11	13				

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

PROJECT No. 154.002.008.001
BORING No. BH-B-1 **(BH-3)**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
DRILLER RDnP Drilling - Chris
DATE: START 7/15/2008 FINISH 7/21/2008

DEPTH	SAMPLE			BLOW COUNT				REC	WC	qu	CONTACT DEPTH	USCS SOIL TYPE	SOIL DESCRIPTION
	No.	INTERVAL FROM	TO	0" 6"	6" 12"	12" 18"	18" 24"	(in)	(%)	(TSF)			
													Grey fine to medium SAND, trace coarse sand, medium dense, saturated
	SS-14	43.0	45.0	5	10	14	22	11					
45													
	SS-15	48.0	50.0	9	14	16	16	12	15				
50													
												SP	
	SS-16	53.0	55.0	8	12	14	15	11					
55													
													several pieces of coarse grained gravel at 58.5'
	SS-17	58.0	60.0	10	11	18	24	10	13				
60													
	SS-18	63.0	65.0	15	24	26	36	10					dense
65													
											66.5		Grey fine to coarse SAND and fine grained gravel, very dense, saturated
	SS-19	68.0	70.0	32	32	38		12	9				
70													
												SW	
	SS-20	73.0	75.0	32	75/3			4					
75													
											76.5	GP	Fine GRAVEL with fine to coarse sand, very dense, saturated
	SS-21	78.0	80.0	50	100/3			4	8		79.5		Spoon bounced at 79.5'
80													EOB at 80'

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-4**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.43
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/2/2008 FINISH 12/3/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	INTERVAL (ft) TO	BLOW COUNTS 0"-6"	BLOW COUNTS 6"-12"	BLOW COUNTS 12"-18"	BLOW COUNTS 18"-24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	3	4	5	15	16.0					FILL	Black and brown silty clay FILL, some fine sand, dry
5	SS-2	4.0	6.0	9	8	11	12	17.0						Black and brown fine to coarse sand and fine gravel FILL, trace fines, wet
	SS-3	6.0	8.0	10	5	12	15	20.0			6'6"	527.93	ML	Grey SILT, little fine sand, medium dense, saturated loose 4" fine sand seam at 9'6"
	SS-4	8.0	10.0	2	2	3	20	24.0						
10														
											11'6"	522.93	CL	Grey SILTY-CLAY, trace fine sand, medium plasticity, soft, moist to wet
	SS-5	13.0	15.0	2	2	3	4	14.0	50	2.00				
15														
	SS-6	18.0	20.0	7	9	8	11	15.0			18'4"	516.10	SP	Grey-brown fine to coarse SAND, medium dense, wet
20														
	SS-7	23.0	25.0	10	11	15	15	12.0	18					
25														
	SS-8	28.0	30.0	6	10	12	14	11.0						
30														
														trace fine gravel
	SS-9	33.0	35.0	6	7	9	11	11.0	19					
35														
											36'6"	497.93	SW	Brown fine to coarse SAND, little fine gravel, trace silt, medium dense, wet
	SS-10	38.0	40.0	7	9	7	10	10.0						
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-4**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.43
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/2/2008 FINISH 12/3/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	INTERVAL (ft) TO	BLOW COUNT 0"-6"	BLOW COUNT 6"-12"	BLOW COUNT 12"-18"	BLOW COUNT 18"-24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														(cont.) Brown fine to coarse SAND, little fine gravel, medium dense, wet
	SS-11	43.0	45.0	5	6	6	8	11.0	14					
45														
	SS-12	48.0	50.0	12	12	16	19	10.0						
50														
	SS-13	53.0	55.0	8	9	11	14	12.0	13				SW	
55														
	SS-14	58.0	60.0	10	8	10	13	12.0						
60														
	SS-15	63.0	65.0	18	21	32	50/5	16.0	11					very dense
65														
											64'6"	469.93		Grey silty CLAY, trace fine sand, medium plasticity, hard, wet
	SS-16	68.0	70.0	21	32	42	44	24.0		+4.5				
70													CL	
	SS-17	73.0	75.0	10	17	22	23	20.0	25					
75											75'	459.43		EOB 75'
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

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CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-5**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.71
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/4/2008 FINISH 12/5/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	INTERVAL (ft) TO	BLOW COUNT 0"-6"	BLOW COUNT 6"-12"	BLOW COUNT 12"-18"	BLOW COUNT 18"-24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	15	19	22	23	12.0						Black and brown sand and gravel FILL, some fines, wet
5	SS-2	4.0	6.0	10	19	34	50/3	16.0					FILL	
	SS-3	6.0	8.0	32	32	22	8	18.0						Brown-grey silt with sand FILL
	SS-4	8.0	10.0	9	12	23	14	20.0						6" brown-red fine to coarse sand FILL
10	SS-5	10.0	12.0	1	2	4	1	24.0			10'	524.71	ML	Grey SILT, little fine sand, loose, wet
	SS-6	13.0	15.0	1	1	2	3	21.0	36		13'	521.71		Mottled green, black, and light grey SILTY CLAY, little fine sand, trace silt and wood pieces, medium stiff, wet
15														
	SS-7	18.0	20.0	2	2	3	3	13.0	34	1.00			CL	
20														
	SS-8	23.0	25.0	5	7	7	9	14.5			23'2"	511.54		
25														Black and brown fine to medium SAND, trace coarse sand, medium dense, wet 23'7" grey
	SS-9	28.0	30.0	3	4	6	7	13.0	19					
30														
													SP	
	SS-10	33.0	35.0	7	7	9	11	12.0						
35														
	SS-11	38.0	40.0	7	10	11	14	14.0	22					5" fine sand seam 2" coarse sand and fine gravel seam
40														

Drilled with Dietrich -120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

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CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-5**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.71
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/4/2008 FINISH 12/5/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	INTERVAL (ft) TO	BLOW COUNT 0" 6"	BLOW COUNT 6" 12"	BLOW COUNT 12" 18"	BLOW COUNT 18" 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														(cont.) Grey fine to medium SAND, trace coarse sand, wet
	SS-12	43.0	45.0	12	15	22	26	13.5						dense
45														
	SS-13	48.0	50.0	10	12	12	15	12	17				SP	medium dense
50														
	SS-14	53.0	55.0	5	15	21	15	13						dense, 53'6" - 1" gravel piece
55														
														medium dense
	SS-15	58.0	60.0	6	8	11	15	10	12		58'7"	476.13		Grey fine to coarse SAND, some fine gravel, very dense
60														
	SS-16	63.0	65.0	50/0				0					SW	
65														(rig was grinding heavily to get from 65' to 68')
	SS-17	68.0	70.0	50/4				4						
70											70'	464.71		EOB 70'
75														
80														

Drilled with Dietrich -120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

CONFIDENTIAL BUSINESS INFORMATION

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BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-6**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.33
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/4/2008 FINISH 12/5/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	INTERVAL (ft) TO	BLOW COUNT 0"-6"	BLOW COUNT 6"-12"	BLOW COUNT 12"-18"	BLOW COUNT 18"-24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	10	11	15	17	17.0						Brown silty sand FILL, trace medium sand, medium dense
5	SS-2	4.0	6.0	1	3	5	11	13.0					FILL	
	SS-3	6.0	8.0	50/5				7.5						(possibly gravel inhibiting sampling)
	SS-4	8.0	10.0	41	50/3			5.5						
											10'	524.33		
10	SS-5	10.0	12.0	3	2	1	4	20.0	49					Brownish-grey SILT, trace fine sand, very loose, saturated
	SS-6	13.0	15.0	3	4	4	5	24.0	53				ML	loose
15														
											16'6"	517.83		Brownish-grey SILTY CLAY, trace fine sand, soft, wet
	SS-7	18.0	20.0	1	1	1	2	17.0	49	0.50				
20													CL	
											24'	510.33		
	SS-8	23.0	25.0	1	3	4	5	16.0						Brown fine to medium SAND, trace coarse sand, medium dense, wet
25														
	SS-9	28.0	30.0	6	7	9	11	15.5	18					
30													SP	
	SS-10	33.0	35.0	10	11	14	14	12.0						
35														
											36'6"	497.83		Brown fine to coarse SAND, little fine gravel, medium dense, wet
	SS-11	38.0	40.0	6	8	9	12	12.5	9				SW	
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

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BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-6**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.33
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/4/2008 FINISH 12/5/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	INTERVAL (ft) TO	BLOW COUNT 0" 6"	BLOW COUNT 6" 12"	BLOW COUNT 12" 18"	BLOW COUNT 18" 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
													SW	Brown fine to coarse SAND, little fine gravel, medium dense, wet (cont.)
											42'6"	491.83		Brown fine to medium sand, trace fine sand, medium dense to dense, wet (cont.)
	SS-12	43.0	45.0	8	10	14	17	12.0						
45														
	SS-13	48.0	50.0	8	9	12	14	12.0	14					little coarse sand
50														
													SP	
	SS-14	53.0	55.0	10	17	17	15	12.5						
55														
	SS-15	58.0	60.0	10	12	14	14	10.0	14					
60														
											62' 6"	472.00		Grey SILTY CLAY, little fine to medium sand, medium plasticity, hard, wet 1" fine to medium sand seam at 63'6" 1" gravel piece at 6'8"
	SS-16	63.0	65.0	17	31	36	42	22.0	14	4.5+ 4.5+				
65													CL	
										4.5+				
	SS-17	68.0	70.0	21	50/3			9.0						
70											70'	464.33		EOB 70'
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

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BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-7**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 536.51
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/5/2008 FINISH 12/8/2008

DEPTH	SAMPLE			BLOW COUNT				REC	WC	qu	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
		INTERVAL (ft)		0"	6"	12"	18"	(in)	(%)	(TSF)				
	No.	FROM	TO	6"	12"	18"	24"							
														Frozen ground
	SS-1	2.0	4.0	6	7	10	12	22.5		1.00			FILL	Black sand, gravel, and silt FILL 6" alternating brown and black fine sand and silt at 3'
5	SS-2	4.0	6.0	1	3	10	14	15.0		0.75				6"grey clay, medium stiff, moist at 4'
											6'	530.51		
	SS-3	6.0	8.0	10	31	21	33	18.0						Dark grey SILT, some fine sand, very dense, wet
	SS-4	8.0	10.0	15	21	18	15	17.0						
10	SS-5	10.0	12.0	10	22	32	44	21.0					ML	trace fine sand
	SS-6	13.0	15.0	3	4	1	5	23.0	67					loose
15														
											16'6"	520.01		Grey SILTY CLAY, trace fine sand, very soft, wet
	SS-7	18.0	20.0	1	2	1	2	24.0					CL	
20														
											23'6"	513.01		Grey fine to medium SAND with clay, loose, wet
	SS-8	23.0	25.0	1	2	4	12	16.0	19				SP-SC	
25														
											26'6"	510.01		Grey fine to medium SAND, medium dense, wet
	SS-9	28.0	30.0	2	5	8	8	18.0						
30														
														trace coarse sand
	SS-10	33.0	35.0	8	14	16	15	12.0	17				SP	
35														
														medium dense
	SS-11	38.0	40.0	8	14	10	8	12.0						
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

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CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-7**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 536.51
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/5/2008 FINISH 12/8/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	INTERVAL (ft) TO	BLOW COUNT 0"-6"	BLOW COUNT 6"-12"	BLOW COUNT 12"-18"	BLOW COUNT 18"-24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Grey fine to medium SAND, trace coarse sand medium dense, wet
	SS-12	43.0	45.0	5	8	10	11	12.0	15					
45														
	SS-13	48.0	50.0	8	10	15	18	14.0					SP	
50														
	SS-14	53.0	55.0	10	12	15	16	10.0	15					
55														
											56'6"	480.01		Brown fine to coarse SAND, trace fine gravel, medium dense, wet
	SS-15	58.0	60.0	8	11	15	17	24.0						
60													SW	
														very dense
	SS-16	63.0	65.0	18	23	50/4		10.0	7					
65											65'	471.51		EOB 65'
70														
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
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CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-8**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.72
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/15/2008 FINISH 12/17/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	INTERVAL (ft) TO	BLOW COUNT 0" 6"	BLOW COUNT 6" 12"	BLOW COUNT 12" 18"	BLOW COUNT 18" 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	8	12	10	12	18.0						Brown and grey mottled silty clay FILL, little fine to coarse sand, medium dense, frozen
5	SS-2	4.0	6.0	3	4	6	6	16.0		1.75			FILL	
	SS-3	6.0	8.0	3	5	7	10	10.0						fine gravel pieces mixed in clay
	SS-4	8.0	10.0	3	4	6	9	15.0	17	2.50				
10	SS-5	10.0	12.0	4	5	7	4	14.0	23	3.00	10'6"	524.22		Grey SILT, trace fine sand, medium dense to loose, wet
	SS-6	13.0	15.0	2	3	3	3	8.0	26				ML	alternating silt and brown silty clay, stiff
15														
											16'6	518.22		Grey SILTY CLAY, medium plasticity, medium stiff, mois to wet (LL=46, PI=24)
	SS-7	18.0	20.0	1	2	3	2	10.0	34	1.25				
20													CL	
											23'3"	511.47		Brown fine to medium SAND, loose, wet
	SS-8	23.0	25.0	5	6	7	7	12.0						
25														
	SS-9	28.0	30.0	2	5	4	5	24.0	20					
30														
													SP	trace coarse sand
	SS-10	33.0	35.0	2	3	4	5	12.0						
35														
	SS-11	38.0	40.0	4	5	5	7	11.5	12					
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-8**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.72
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/15/2008 FINISH 12/17/2008

DEPTH	SAMPLE			BLOW COUNT				REC	WC	qu	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
		INTERVAL (ft)		0"	6"	12"	18"	(in)	(%)	(TSF)				
	No.	FROM	TO	6"	12"	18"	24"							
														Brown fine to medium SAND, trace coarse sand, medium dense, wet (cont.)
	SS-12	43.0	45.0	9	10	11	15	11.0						
45													SP	
	SS-13	48.0	50.0	14	17	9	7	13.0	16					
50														
											49'6"	485.22		Brown fine to coarse SAND, trace fine gravel, medium dense, wet
	SS-14	53.0	55.0	4	8	7	6	13.0						
55														
														dense
	SS-15	58.0	60.0	8	15	19	22	15.0	8					
60													SW	
														little fine gravel
	SS-16	63.0	65.0	5	15	24	26	17.0						
65														
											66'6"	468.22		Grey sandy SILTY CLAY, hard, moist to wet
	SS-17	68.0	70.0	48	50/4			13.0	14				CL	
70											70'	464.72		EOB 70'
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
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BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-9**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 534.67
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/17/2008 FINISH 12/18/2008

DEPTH	SAMPLE			BLOW COUNT				REC	WC	qu	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
		INTERVAL (ft)		0"	6"	12"	18"	(in)	(%)	(TSF)				
	No.	FROM	TO	6"	12"	18"	24"							
														Frozen ground
	SS-1	2.0	4.0	3	4	2	2	14.0		2.50				Grey and brown mottled silty clay FILL, some fine to medium sand, very stiff, moist
5	SS-2	4.0	6.0	3	4	6	5	17.0		4.00			FILL	
	SS-3	6.0	8.0	4	5	5	8	17.0		2.50				Alternating grey, brown, and orange clay and silt
	SS-4	8.0	10.0	4	5	10	10	17.0		2.00	8'11"	525.75		
10	SS-5	10.0	12.0	5	7	9	12	16.0		4.00			CL	Grey SILTY CLAY, trace fine sand, medium plasticity, very stiff, moist
	SS-6	13.0	15.0	3	4	6	6	21.0			13'	521.67		Dark grey CLAY, high plasticity, stiff, wet
15														
	SS-7	18.0	20.0	3	3	4	5	21.0	51	1.00				(LL=64, PI=34)
20													CH	
	SS-8	23.0	25.0	5	6	8	9	0.0						
25														(hole is taking a lot of water)
											24'6"	510.17		Grey fine to medium SAND, medium dense, wet
	SS-9	28.0	30.0	8	10	12	14	10.0	25					
30														
	SS-10	33.0	35.0	8	15	19	22	16.0					SP	trace coarse sand, dense
35														
	SS-11	38.0	40.0	10	16	17	19	11.0	18					
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
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CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-9**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/17/2008 FINISH 12/18/2008

DEPTH	SAMPLE			BLOW COUNT				REC	WC	qu	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
		INTERVAL (ft)		0"	6"	12"	18"	(in)	(%)	(TSF)				
	No.	FROM	TO	6"	12"	18"	24"							
														Grey fine to medium SAND, trace coarse sand, dense, wet
														trace fine gravel
	SS-12	43.0	45.0	10	17	24	29	8.0						
45														
	SS-13	48.0	50.0	8	16	20	21	12.0	17				SP	
50														
	SS-14	53.0	55.0	9	11	15	19	13.0						
55														
											56'6"	478.17		Grey-brown fine to coarse SAND, trace fine gravel, dense, wet
	SS-15	58.0	60.0	10	12	18	17	16.0	17					
60														
													SW	
	SS-16	63.0	65.0	12	15	24	26	15.0						dense
65														
											66'6"	468.17		Grey CLAY, little fine to medium sand, medium plasticity, hard, moist to wet
	SS-17	68.0	70.0	37	50/4			10.0					CL	
70											70'	464.67		EOB 70'
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
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BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-10**
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PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 531.92
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/12/2008 FINISH 12/15/2008

DEPTH	SAMPLE			BLOW COUNT				REC	WC	qu	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
		INTERVAL (ft)		0"	6"	12"	18"	(in)	(%)	(TSF)				
	No.	FROM	TO	6"	12"	18"	24"							
														Frozen ground
	SS-1	2.0	4.0	4	5	5	4	13.0	17	2.00				Grey and brown mottled SILTY CLAY, trace fine sand, medium plasticity, stiff, moist
5	SS-2	4.0	6.0	3	4	5	6	15.0	15	2.50				little fine to coarse sand, very stiff
	SS-3	6.0	8.0	4	4	5	6	15.0	13	2.50			CL	
	SS-4	8.0	10.0	3	6	8	8	15.0	24	2.50 1.50				Brown, silt content increasing, thin brown silt seams
10														
	SS-5	13.0	15.0	1	2	3	4	15.0		0.75 1.00	13'	518.92		Dark grey CLAY, high plasticity, medium stiff, wet
15														
	SS-6	18.0	20.0	4	6	5	7	13.5		1.25				stiff
20													CH	
	SS-7	23.0	25.0	3	4	5	5	6.0		1.00				
25														
	SS-8	28.0	30.0	8	9	11	12	0.0			29'	502.92		Grey-brown fine to medium SAND, medium dense, wet
30														
	SS-9	33.0	35.0	6	8	5	5	10.0						
35														
														trace coarse sand
	SS-10	38.0	40.0	8	9	11	12	11.0						
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

CONFIDENTIAL BUSINESS INFORMATION

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-10**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
SURFACE ELEVATION 531.92
DRILLER RDnP Drilling - Kris Norwick
DATE: START 12/12/2008 FINISH 12/15/2008

DEPTH	SAMPLE			BLOW COUNT				REC	WC	qu	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
		INTERVAL (ft)		0"	6"	12"	18"	(in)	(%)	(TSF)				
	No.	FROM	TO	6"	12"	18"	24"							
														Grey-brown fine to medium SAND, trace coarse sand, medium dense, wet (cont.)
	SS-11	43.0	45.0	3	6	9	15	15.0						
45														
														dense
	SS-12	48.0	50.0	8	15	21	30	15.0						
50														
													SP	
	SS-13	53.0	55.0	50/0				0.0						(spoon bouncing, possibly on a cobble or boulder)
55														
														trace fine gravel
	SS-14	58.0	60.0	14	17	17	15	16.0						
60														
	SS-15	63.0	65.0	50/1				0.0			64'	467.92		Grey CLAY, little fine sand, hard, moist to wet
65														
													CL	
	SS-16	68.0	70.0	32	50/3			10.0		4.5+				(spoon bouncing)
70											70'	461.92		EOB 70'
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

Attachment B-3

Boring Logs

Source:
CABENO Environmental Field Services, December 2010

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

PROJECT: Burlington, IA

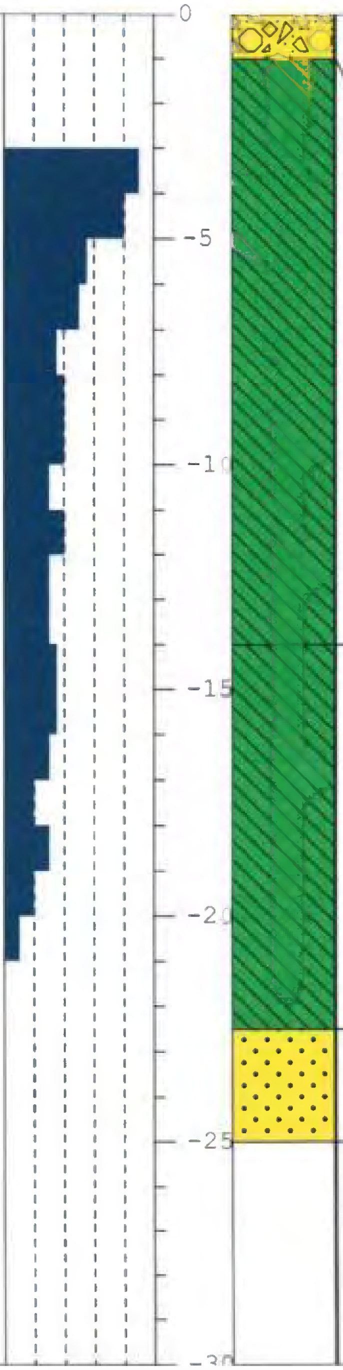
BORING NO.: *SB1*

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Loerop*
DATE BEGAN: *12-16-10*
DATE FINISHED: *12-16-10*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)
	SP1	4.5'/5'		
				4.5
				4.0
				2.75
				2.5
				1.75
	SP2	5'/5'		
				2.0
				2.0
				1.5
				2.0
				1.5
	SP3	5'/5'		
				1.5
				1.75
				1.75
				1.5
				1.0
	SP4	5'/5'		
				1.5
				1.5
∇				
				1.0
				0.5
				0
	SP5	5'/5'		

CONSISTENCY vs. DEPTH | **DEPTH IN FEET** | **PROFILE**



DESCRIPTION

GRAVEL; white; well graded; fine to coarse grained; wet/frozen. (Fill)

CLAY; brown to olive; stiff to hard; low to high plasticity; moist; trace organics. (CL)

CLAY; olive to black; soft to firm; high plasticity; moist; some organics. (CL)

@ 20' grades wet.

SAND; black to gray; well graded; fine to coarse grained; wet; trace silt. (SW)

Bottom of boring @ 22.5'.
Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. 1-inch PVC temp well set to 20'bgs. 1-hr W.L. = 10.1'bgs. 24-hr W.L. = 9.54'bgs. Temp well removed and boring backfilled to groundsurface w/ bentonite chips on 12-17-10.

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

PROJECT: Burlington, IA

BORING NO.: *SB2*

page 1 of 1

LOGGED BY: *John Noyes*

EDITED BY: *John Noyes*

CHECKED BY: *Mark Loerop*

DATE BEGAN: *12-16-10*

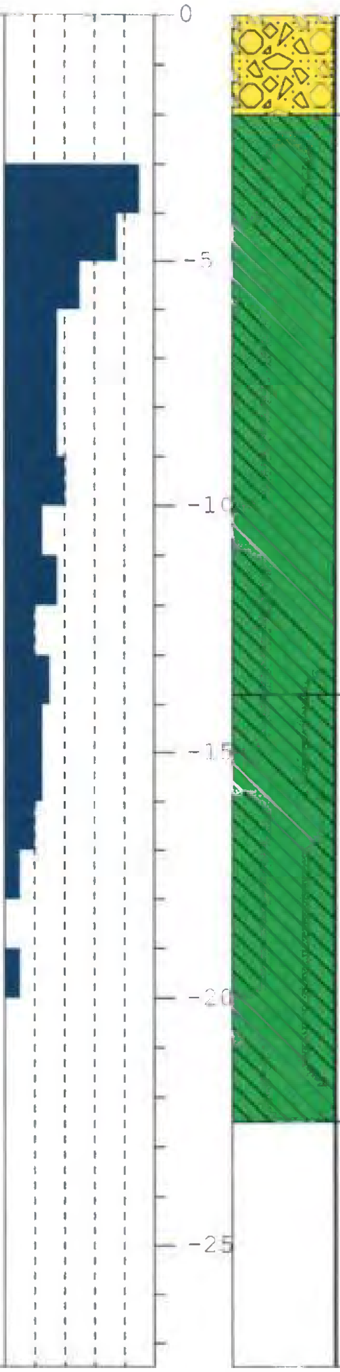
DATE FINISHED: *12-16-10*

GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION
	SP1	4.5'/5'	
	SP2	5'/5'	
	SP3	5'/5'	
∇	SP4	5'/5'	
	SP5	2.5'/2.5'	

POCKET PENETROMETER (TSF)
>4.5
3.75
2.5
1.75
1.75
1.75
2.0
1.25
1.75
1.0
1.5
1.25
1.25
1.0
0.5
0.5
0
0.5
0
0

CONSISTENCY vs. DEPTH / **DEPTH IN FEET** / **PROFILE**



DESCRIPTION

GRAVEL; white; well graded; fine to coarse grained; wet/frozen. (Fill)

CLAY; brown to olive; stiff to hard; low to high plasticity; moist; trace organics. (CL)

CLAY; olive to black; soft to firm; high plasticity; moist; some organics. (CL)

@ 18' grades Sandy CLAY and wet.

@ 20' grades intermitent 1-inch peat lenses.

Bottom of boring @ 22.5'.

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 12-16-10.

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

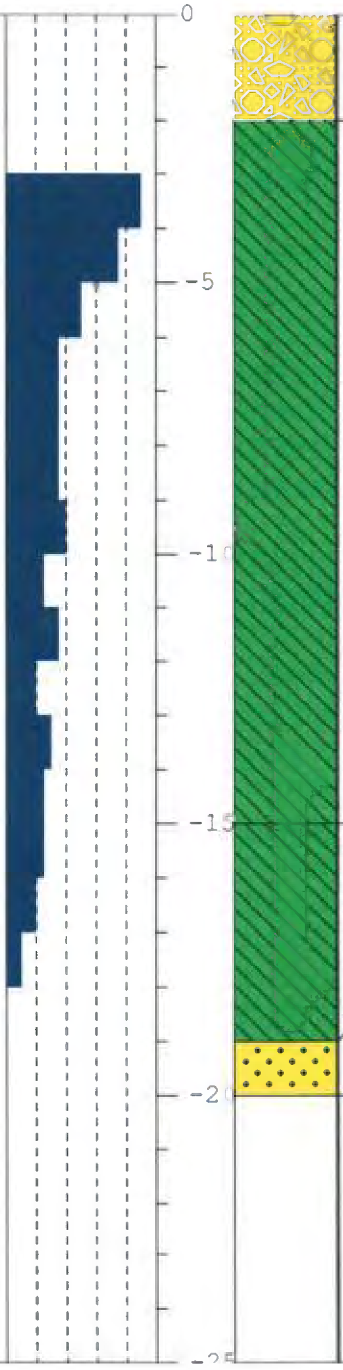
PROJECT: Burlington, IA

BORING NO.: *SB3*

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Loerop*
DATE BEGAN: *12-16-10*
DATE FINISHED: *12-16-10*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)
	SP1	5'/5'		
				>4.5
				3.75
				2.5
				1.75
	SP2	5'/5'		1.75
				1.75
				2.0
				1.25
				1.75
	SP3	5'/5'		1.0
				1.5
				1.25
				1.25
				1.0
	SP4	5'/5'		0.5
				0.5
∇				0



DESCRIPTION

GRAVEL; white; well graded; fine to coarse grained; wet/frozen. (Fill)

CLAY; brown to olive; stiff to hard; low to high plasticity; moist; trace organics. (CL)

CLAY; olive to black; soft to firm; high plasticity; moist; some organics. (CL)

SAND; black; poorly graded; fine grained; wet. (SP)

Bottom of boring @ 20'.
Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. 1-inch PVC temp well set to 20'bgs. 1-hr W.L. = 13.5'bgs. 24-hr W.L. = 8.61'bgs. Temp well removed and boring backfilled to groundsurface w/ bentonite chips on 12-17-10.

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB4*

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Loerop*
DATE BEGAN: *12-17-10*
DATE FINISHED: *12-17-10*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
						0	▨	ASH; yellow to gray; soft; moist to wet. (Fill)
▽	SP1	5'/5'					▨	
						-5	▨	(ash is wet but holds form in core, when handled or tapped will liquify)
	SP2	5'/5'					▨	
						-10	▨	
	SP3	5'/5'					▨	
						-15		Bottom of boring @ 15'. Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. 1-inch PVC temp well set to 15'bgs. 1-hr W.L. = dry. 24-hr W.L. = dry. Temp well removed and boring backfilled to groundsurface w/ bentonite chips on 12-17-10.
						-20		

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

PROJECT: Burlington, IA

BORING NO.: ***SB5***

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Loerop*
DATE BEGAN: *12-17-10*
DATE FINISHED: *12-17-10*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
						0		ASH; yellow to gray; soft; moist to wet. (Fill)
	SP1	2.5'/5'						
▽						-5		(ash is wet but holds form in core, when handled or tapped will liquify)
	SP2	4'/5'						
						-10		
	SP3	3'/5'						
						-15		Bottom of boring @ 15'. Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. 1-inch PVC temp well set to 15'bgs. 1-hr W.L. = dry. 24-hr W.L. = 15.0'bgs. Temp well removed and boring backfilled to groundsurface w/ bentonite chips on 12-17-10.
						-20		

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED*
 E NOT SURVEYED

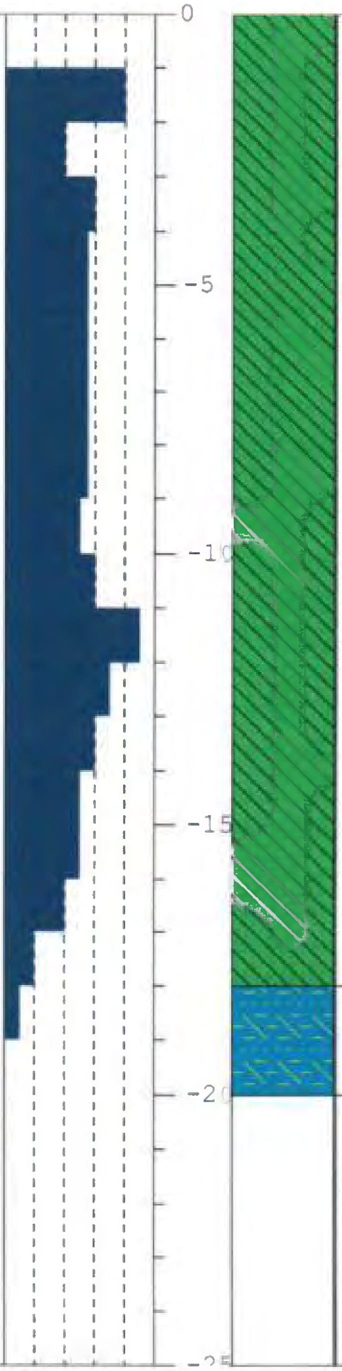
PROJECT:Burlington, IA

BORING NO.: ***SB6***

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Loerop*
DATE BEGAN: *12-17-10*
DATE FINISHED: *12-17-10*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)
				4.0
	SP1	5'/5'		2.0
				3.0
				2.75
				2.75
				2.75
	SP2	5'/5'		2.75
				2.75
				2.5
				3.0
				4.5
	SP3	5'/5'		3.5
				3.0
				2.5
				2.5
				2.0
▽	SP4	5'/5'		1.0
				0.5
				0



DESCRIPTION

CLAY; yellowish brown; very stiff to hard; low to high plasticity; moist (top 2' frozen); trace sand & gravel. (Fill)

@ 5' bgs grades olive.

@ 10' bgs grades brown and it appears to grade from Fill to Native soils.

Sandy CLAY; black; soft; low plasticity; wet; some organics. (SC)

Bottom of boring @ 20'
Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. 1-inch PVC temp well set to 20'bgs. 1-hr W.L. = 15.1'bgs. 24-hr W.L. = 15.1'bgs. Temp well removed and boring backfilled to groundsurface w/ bentonite chips on 12-17-10.

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

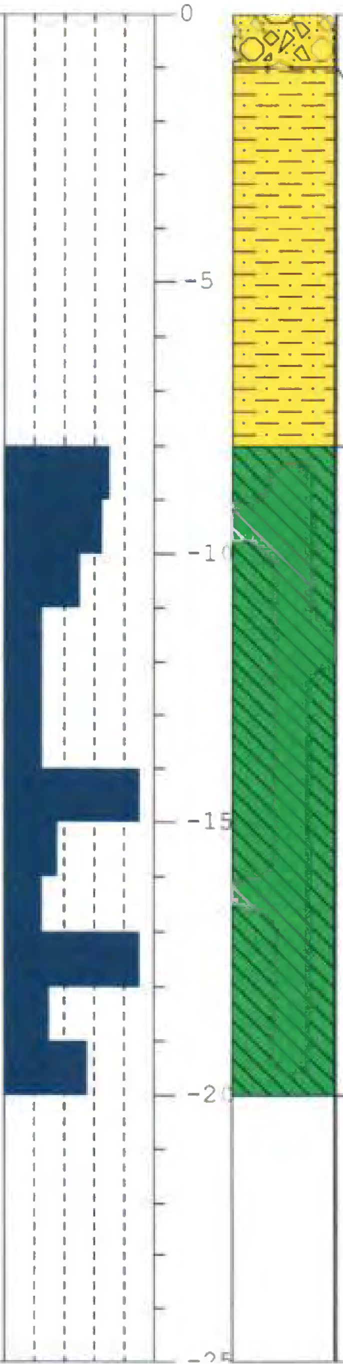
PROJECT: Burlington, IA

BORING NO.: *SB7*

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Loerop*
DATE BEGAN: *12-17-10*
DATE FINISHED: *12-17-10*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)
	SP1	5'/5'		
	SP2	5'/5'		
				3.5
				3.25
				2.5
				1.25
				1.25
	SP3	5'/5'		
				1.25
				>4.5
				1.75
				1.25
				>4.5
▽	SP4	5'/5'		
				1.5
				2.75



DESCRIPTION

GRAVEL; white; well graded; fine to coarse grained; wet/frozen. (Fill)

ASH; brown; poorly graded; fine grained; moist/frozen. (Fill)

@ 5' bgs grades brown, coarse grained.

CLAY; brown to olive; stiff to hard; low to high plasticity; dry to moist; trace to some organics. (CL)

@ 18' bgs grades wet.

Bottom of boring @ 20'
Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. 1-inch PVC temp well set to 20'bgs. 1-hr W.L. = 19.65'bgs. Temp well removed and boring backfilled to groundsurface w/ bentonite chips on 12-17-10.

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

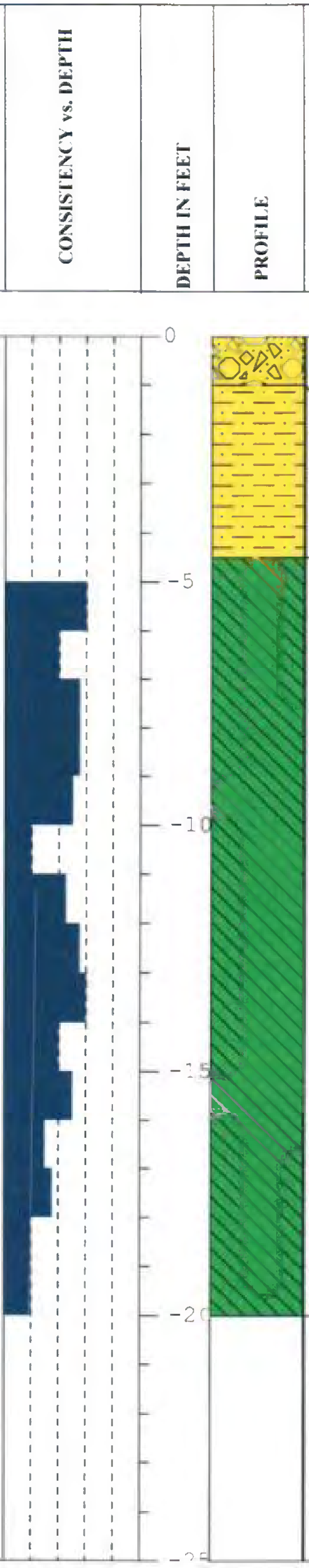
PROJECT: Burlington, IA

BORING NO.: *SB8*

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Loerop*
DATE BEGAN: *12-17-10*
DATE FINISHED: *12-17-10*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)
	SP1	5'/5'		
				3.0
				2.0
				2.75
	SP2	5'/5'		
				2.75
				2.5
				1.0
				2.25
				2.75
	SP3	5'/5'		
				3.0
				2.0
				2.5
				1.5
				1.75
▽	SP4	5'/5'		
				1.0
				1.0



DESCRIPTION

```
GRAVEL; white to gray; well graded; fine to
coarse grained; wet/frozen. (Fill)

ASH; olive to brown; poorly graded; fine
grained; moist. (Fill)

CLAY; brown to olive; stiff to very stiff; low
to high plasticity; dry to moist; trace to some
organics. (CL)

@ 18' bgs grades wet.

Bottom of boring @ 20'
Boring advanced W/ Geoprobe Model 6610DT using
60-inch Macrocore sampling system.  Boring
backfilled to groundsurface w/ bentonite chips on
12-17-10.
```

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: N NOT SURVEYED
E NOT SURVEYED

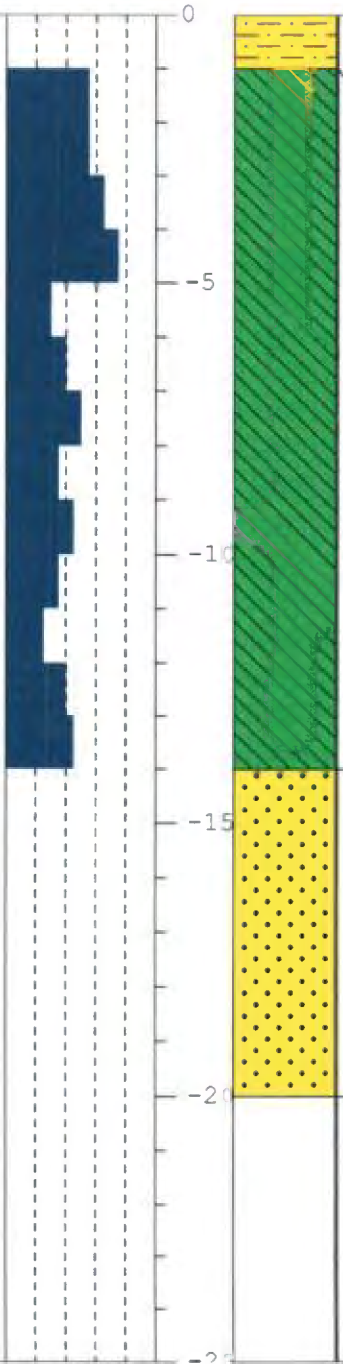
PROJECT: Burlington, IA

BORING NO.: SB9

page 1 of 1

LOGGED BY: John Noyes
EDITED BY: John Noyes
CHECKED BY: Mark Loerop
DATE BEGAN: 12-17-10
DATE FINISHED: 12-17-10
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)
				2.75
				2.75
	SP1	4.5'/5'		
				3.25
				3.75
				1.5
				2.0
				2.5
	SP2	5'/5'		
				1.75
				2.25
				1.75
				1.25
				2.0
	SP3	5'/5'		
				2.25
▽				
	SP4	5'/5'		



DESCRIPTION

ASH; brown; poorly graded; fine grained; moist/frozen. (Fill)

CLAY; brown to olive; stiff to very stiff; low to high plasticity; dry to moist; trace to some organics. ~~(Fill)~~ CL

SAND; gray; poorly graded; medium grained; wet; trace to some silt. (SP)

Bottom of boring @ 20'
Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. 1-inch PVC temp well set to 16'bga. 1-hr W.L. = 14.45'bgs. Temp well removed and boring backfilled to groundsurface w/ bentonite chips on 12-17-10.

CABENO

Environmental Field Services, LLC

BORING LOG

CONFIDENTIAL BUSINESS INFORMATION

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED*
E NOT SURVEYED

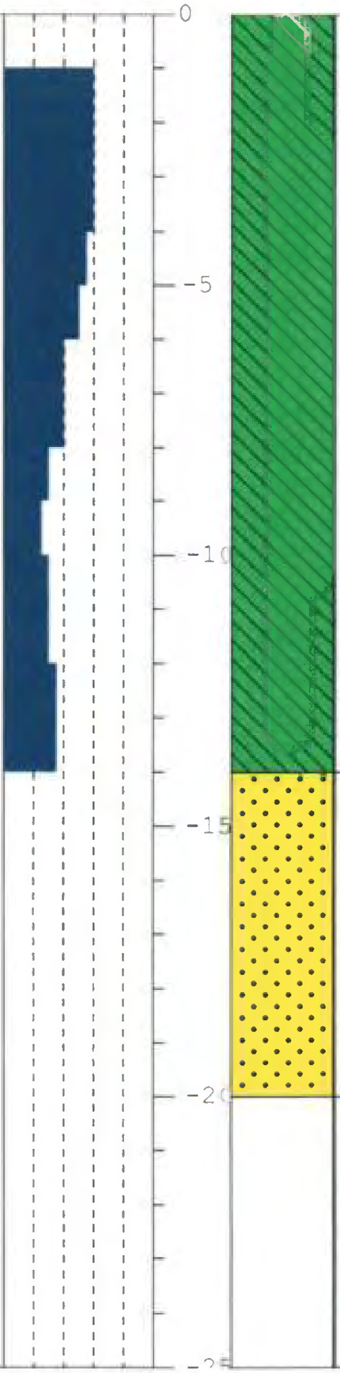
PROJECT: Burlington, IA

BORING NO.: *SB10*

page 1 of 1

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Mark Loerop*
DATE BEGAN: *12-17-10*
DATE FINISHED: *12-17-10*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TSF)
				3.0
				3.0
	SP1	5'/5'		
				3.0
				2.75
				2.5
				2.0
				2.0
	SP2	5'/5'		
				1.5
				1.25
				1.5
				1.5
				1.75
	SP3	5'/5'		
				1.75
▽				
	SP4	5'/5'		



DESCRIPTION

CLAY; brown to olive; stiff to very stiff; low to high plasticity; dry to moist; trace to some organics. (~~Fill~~) CL

SAND; gray; well graded; fine to medium grained; wet; trace to some silt. (SW)

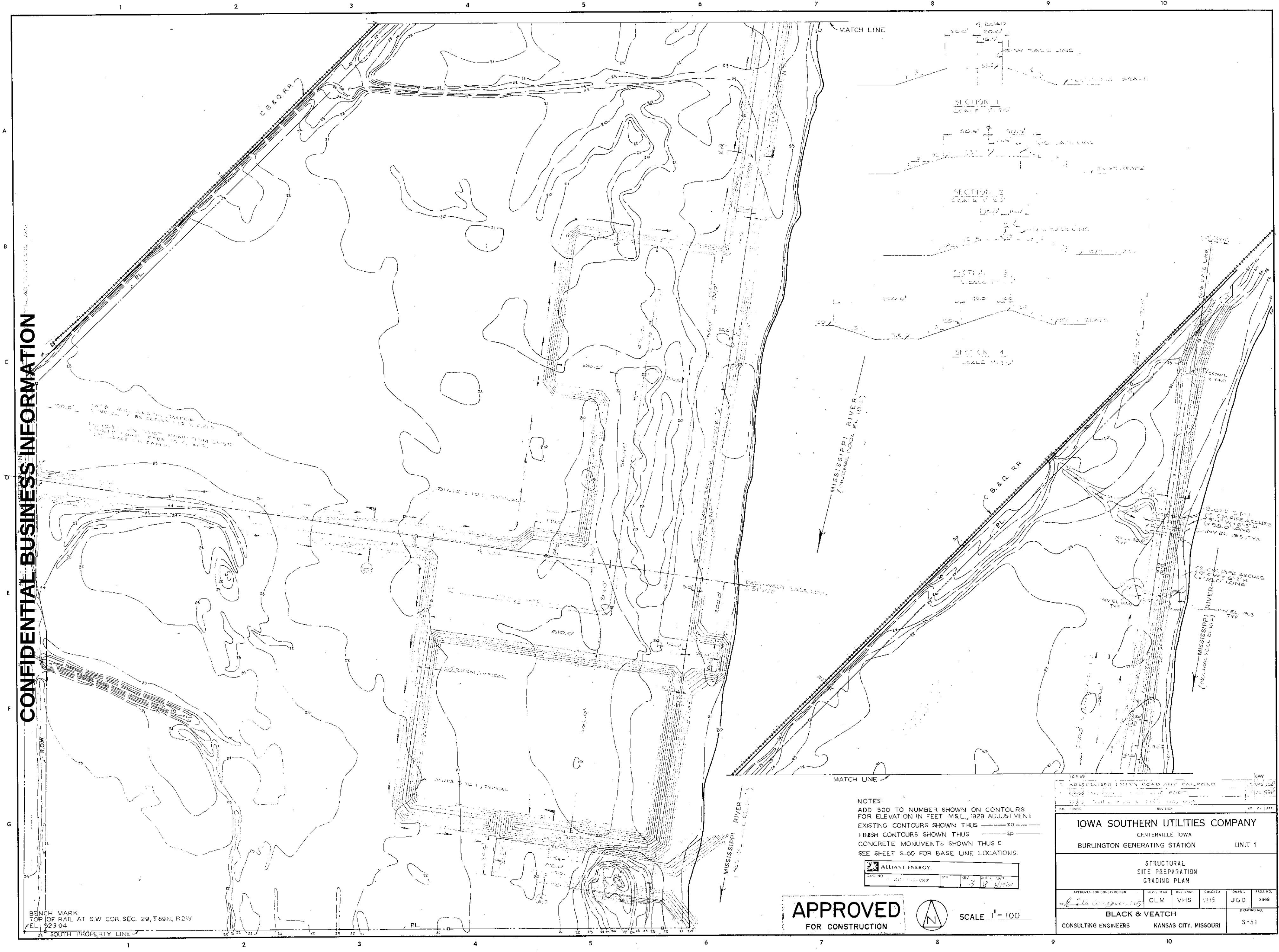
Bottom of boring @ 20'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 12-17-10.

Attachment C

Structural Site Preparation
Grading Plan
Drawing No. S-51

Source:
Black & Veatch, January 29, 1965



NOTES:
ADD 500 TO NUMBER SHOWN ON CONTOURS FOR ELEVATION IN FEET M.S.L., 1929 ADJUSTMENT
EXISTING CONTOURS SHOWN THUS ——— 20 ———
FINISH CONTOURS SHOWN THUS - - - - 20 - - - -
CONCRETE MONUMENTS SHOWN THUS □
SEE SHEET S-50 FOR BASE LINE LOCATIONS.

ALLIANT ENERGY.

DWG NO	SHT	REV	INITIAL DATE
[illegible]		3	[illegible]

APPROVED
FOR CONSTRUCTION

SCALE 1" = 100'

NO.	DATE	REVISION	BY	CK	APP.
	12-11-69	REVISED ENTRY ROAD AND RAILROAD	KAY		

IOWA SOUTHERN UTILITIES COMPANY
CENTERVILLE, IOWA
BURLINGTON GENERATING STATION UNIT 1

STRUCTURAL
SITE PREPARATION
GRADING PLAN

APPROVED FOR CONSTRUCTION	DEPT. HEAD	DES. ENGR.	CHECKED	DRAWN	PROJ. NO.
BY	CLM	VHS	VHS	JGD	3849

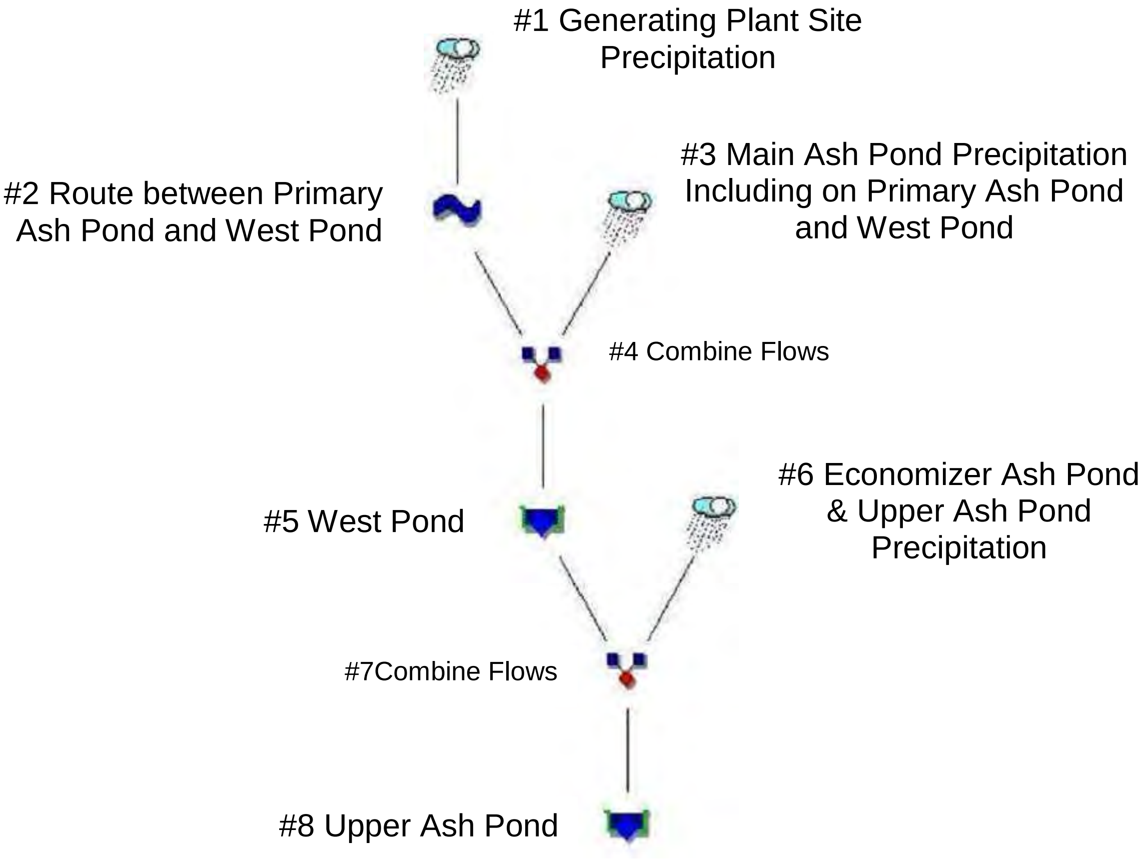
BLACK & VEATCH
CONSULTING ENGINEERS KANSAS CITY, MISSOURI

DRAWING NO.
S-51

Attachment D

Hydrological and Hydraulics Study

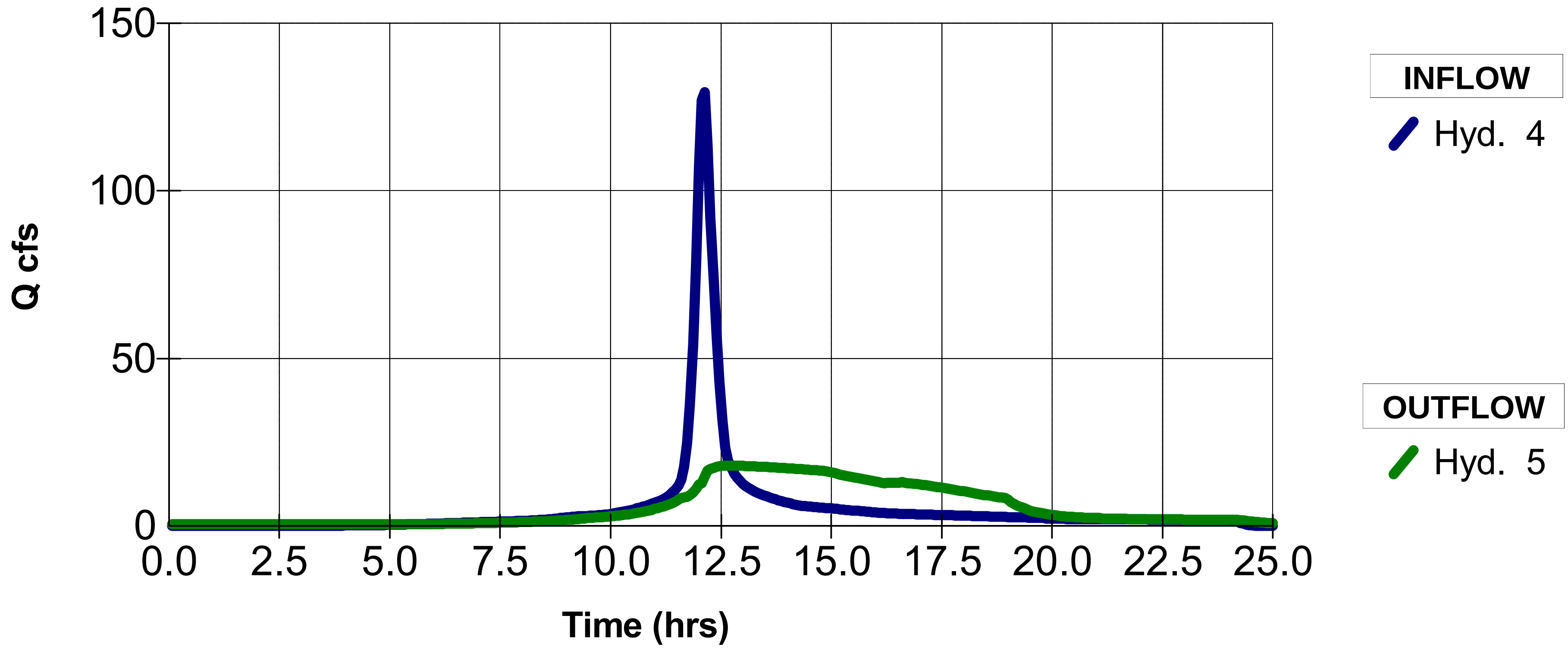
Aether dbs, February, 2011


#1 Generating Plant Site Precipitation
#2 Route between Primary Ash Pond and West Pond
#3 Main Ash Pond Precipitation Including on Primary Ash Pond and West Pond
#4 Combine Flows
#5 West Pond
#6 Economizer Ash Pond & Upper Ash Pond Precipitation
#7Combine Flows
#8 Upper Ash Pond

CONFIDENTIAL BUSINESS INFORMATION

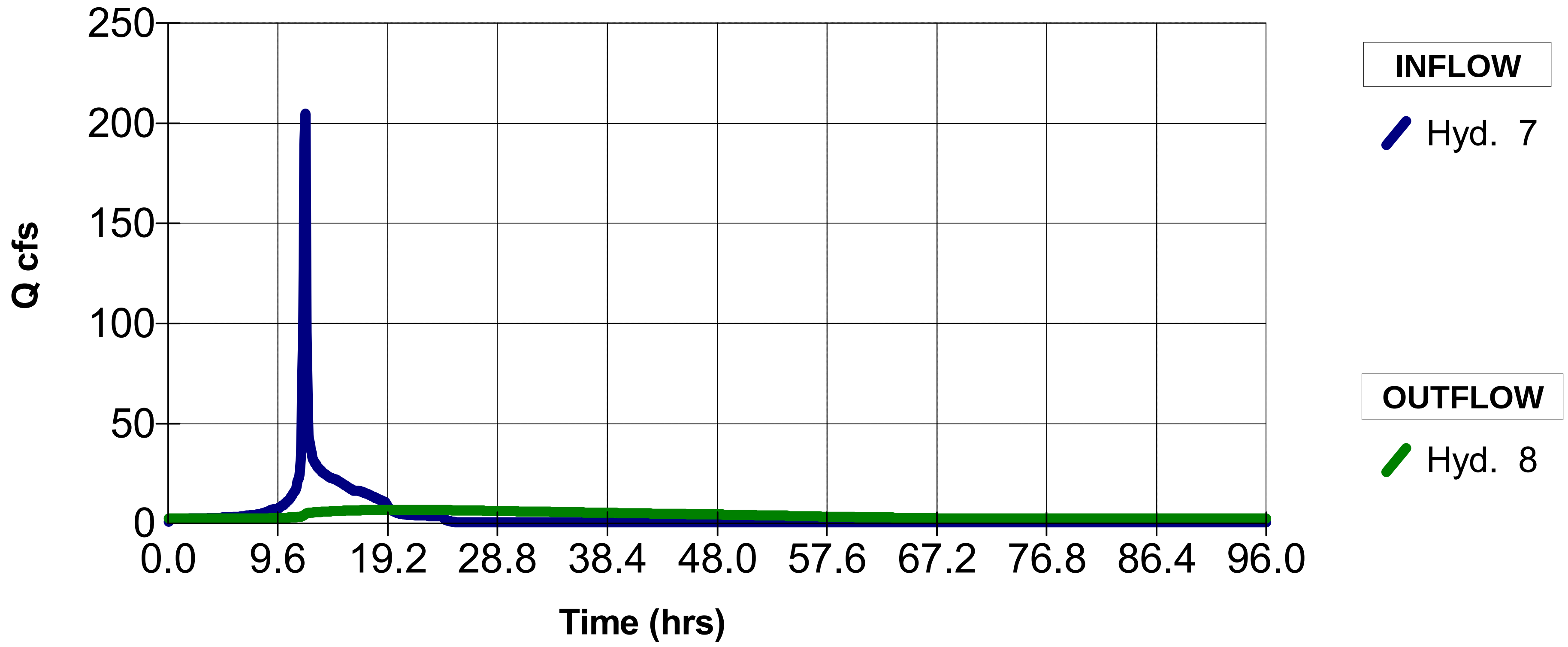
Main Pond Routing

Hydrograph(s) 4 to 5



Upper Ash Pond Routing

Hydrograph(s) 7 to 8



Hydrograph Summary Report

CONFIDENTIAL BUSINESS INFORMATION

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	58.30	4	720	3.589	----	------	------	Power Plant Area
2	Reach	46.49	4	724	3.589	1	------	------	Route to Western Pond
3	SCS Runoff	84.07	4	728	7.395	----	------	------	Main Ash Pond Runoff
4	Combine	129.44	4	728	10.983	2, 3	------	------	Inflow to West Pond
5	Reservoir	18.04	4	764	14.666	4	533.19	4.812	Through Western Pond
6	SCS Runoff	192.20	4	720	13.281	----	------	------	Economizer Pond Runoff
7	Combine	204.68	4	720	27.947	5, 6	------	------	Upper Ash Pond Inflow
8	Reservoir	6.95	4	1172	32.071	7	530.31	16.096	Through UPPER Ash Pond

Proj. file: Burlington-3.gpw	Return Period: 100 yr	Run date: 02-09-2011

Hyd. No. 1

Power Plant Area

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 8.00 ac
Basin Slope = 1.0 %
Tc method = LAG
Total precip. = 6.80 in
Storm duration = 24 hrs

Peak discharge = 58.30 cfs
Time interval = 4 min
Curve number = 91
Hydraulic length = 500 ft
Time of conc. (Tc) = 12.3 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 3.589 acft

Hydrograph Discharge Table

Time (hrs	-- Outflow cfs)	Time (hrs	-- Outflow cfs)
7.33	0.59	18.67	0.84
7.67	0.64	19.00	0.80
8.00	0.69	19.33	0.76
8.33	0.79	19.67	0.71
8.67	0.93	20.00	0.67
9.00	1.09	20.33	0.65
9.33	1.17	20.67	0.64
9.67	1.24	21.00	0.63
10.00	1.47	21.33	0.63
10.33	1.80	21.67	0.62
10.67	2.21	22.00	0.61
11.00	2.83	22.33	0.60
11.33	4.00	22.67	0.59
11.67	11.50	23.00	0.58
12.00	58.30 <<		
12.33	7.61		
12.67	4.33	*...End*	
13.00	3.37		
13.33	2.76		
13.67	2.32		
14.00	1.98		
14.33	1.78		
14.67	1.67		
15.00	1.55		
15.33	1.43		
15.67	1.32		
16.00	1.20		
16.33	1.13		
16.67	1.09		
17.00	1.05		
17.33	1.01		
17.67	0.96		
18.00	0.92		
18.33	0.88		

Hyd. No. 2

Route to Western Pond

Hydrograph type	= Reach	Peak discharge	= 46.49 cfs
Storm frequency	= 100 yrs	Time interval	= 4 min
Inflow hyd. No.	= 1	Section type	= Trapezoidal
Reach length	= 1560.0 ft	Channel slope	= 0.27 %
Manning's n	= 0.030	Bottom width	= 5.00 ft
Side slope	= 2.0:1	Max. depth	= 2.00 ft
Rating curve x	= 0.882	Rating curve m	= 1.346
Ave. velocity	= 2.59 ft/s	Routing coeff.	= 0.4227

Modified Att-Kin routing method used.

Hydrograph Volume = 3.589 acft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Outflow cfs
6.67	0.49	0.47
7.00	0.54	0.52
7.33	0.59	0.57
7.67	0.64	0.61
8.00	0.69	0.66
8.33	0.79	0.73
8.67	0.93	0.87
9.00	1.09	1.01
9.33	1.17	1.14
9.67	1.24	1.19
10.00	1.47	1.36
10.33	1.80	1.63
10.67	2.21	2.00
11.00	2.83	2.54
11.33	4.00	3.26
11.67	11.50	5.73
12.00	58.30 <<	37.84
12.33	7.61	18.78
12.67	4.33	6.29
13.00	3.37	3.89
13.33	2.76	3.03
13.67	2.32	2.52
14.00	1.98	2.14
14.33	1.78	1.86
14.67	1.67	1.72
15.00	1.55	1.61
15.33	1.43	1.49
15.67	1.32	1.37
16.00	1.20	1.26
16.33	1.13	1.16
16.67	1.09	1.11
17.00	1.05	1.07
17.33	1.01	1.03
17.67	0.96	0.98

Continues on next page...

Hyd. No. 3

Main Ash Pond Runoff

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 17.00 ac
Basin Slope = 1.5 %
Tc method = LAG
Total precip. = 6.80 in
Storm duration = 24 hrs

Peak discharge = 84.07 cfs
Time interval = 4 min
Curve number = 85
Hydraulic length = 1250 ft
Time of conc. (Tc) = 26.3 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 7.395 acft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
7.87	0.85
8.20	0.96
8.53	1.15
8.87	1.41
9.20	1.69
9.53	1.87
9.87	2.09
10.20	2.53
10.53	3.17
10.87	4.06
11.20	5.22
11.53	7.85
11.87	36.10
12.20	77.03
12.53	22.67
12.87	9.98
13.20	7.45
13.53	6.11
13.87	5.16
14.20	4.42
14.53	3.99
14.87	3.73
15.20	3.47
15.53	3.21
15.87	2.95
16.20	2.70
16.53	2.54
16.87	2.45
17.20	2.36
17.53	2.26
17.87	2.17
18.20	2.08
18.53	1.98
18.87	1.89
19.20	1.80
19.53	1.70
19.87	1.61
20.20	1.52
20.53	1.47
20.87	1.45
21.20	1.43
21.53	1.42
21.87	1.40
22.20	1.38
22.53	1.36
22.87	1.34
23.20	1.32
23.53	1.30
23.87	1.29
24.20	0.92

...End

Hyd. No. 4

Inflow to West Pond

Hydrograph type = Combine
Storm frequency = 100 yrs
Inflow hyds. = 2, 3

Peak discharge = 129.44 cfs
Time interval = 4 min

Hydrograph Volume = 10.983 acft

Hydrograph Discharge Table

Time (hrs)	Hyd. 2 + (cfs)	Hyd. 3 = (cfs)	Outflow (cfs)
7.67	0.61	0.79	1.41
8.00	0.66	0.89	1.56
8.33	0.73	1.03	1.76
8.67	0.87	1.25	2.12
9.00	1.01	1.52	2.53
9.33	1.14	1.77	2.91
9.67	1.19	1.93	3.12
10.00	1.36	2.24	3.60
10.33	1.63	2.76	4.40
10.67	2.00	3.48	5.48
11.00	2.54	4.52	7.06
11.33	3.26	6.01	9.27
11.67	5.73	11.94	17.67
12.00	37.84	68.97	106.81
12.33	18.78	54.03	72.81
12.67	6.29	13.25	19.54
13.00	3.89	8.68	12.57
13.33	3.03	6.84	9.87
13.67	2.52	5.70	8.22
14.00	2.14	4.84	6.98
14.33	1.86	4.21	6.07
14.67	1.72	3.88	5.61
15.00	1.61	3.62	5.23
15.33	1.49	3.36	4.85
15.67	1.37	3.10	4.48
16.00	1.26	2.84	4.10
16.33	1.16	2.62	3.78
16.67	1.11	2.51	3.62
17.00	1.07	2.41	3.48
17.33	1.03	2.32	3.35
17.67	0.98	2.23	3.21
18.00	0.94	2.13	3.08
18.33	0.90	2.04	2.94
18.67	0.86	1.95	2.81
19.00	0.82	1.85	2.67
19.33	0.78	1.76	2.53
19.67	0.73	1.66	2.40
20.00	0.69	1.57	2.26

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Hyd. No. 5

Through Western Pond

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 4
Max. Elevation = 533.19 ft

Peak discharge = 18.04 cfs
Time interval = 4 min
Reservoir name = Western Pond
Max. Storage = 4.812 acft

Storage Indication method used.

Outflow hydrograph volume = 14.666 acft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.33	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
0.67	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
1.00	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
1.33	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
1.67	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
2.00	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
2.33	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
2.67	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
3.00	0.02	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
3.33	0.05	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
3.67	0.09	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
4.00	0.13	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
4.33	0.16	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
4.67	0.23	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
5.00	0.33	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
5.33	0.45	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
5.67	0.57	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
6.00	0.70	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.61
6.33	0.84	531.31	0.33	0.33	-----	-----	-----	-----	-----	-----	-----	0.66
6.67	0.97	531.32	0.36	0.36	-----	-----	-----	-----	-----	-----	-----	0.73
7.00	1.11	531.33	0.41	0.41	-----	-----	-----	-----	-----	-----	-----	0.82
7.33	1.26	531.35	0.47	0.47	-----	-----	-----	-----	-----	-----	-----	0.93
7.67	1.41	531.36	0.52	0.52	-----	-----	-----	-----	-----	-----	-----	1.05
8.00	1.56	531.38	0.60	0.60	-----	-----	-----	-----	-----	-----	-----	1.20
8.33	1.76	531.40	0.68	0.68	-----	-----	-----	-----	-----	-----	-----	1.36
8.67	2.12	531.42	0.78	0.78	-----	-----	-----	-----	-----	-----	-----	1.57
9.00	2.53	531.45	0.93	0.93	-----	-----	-----	-----	-----	-----	-----	1.85
9.33	2.91	531.49	1.10	1.10	-----	-----	-----	-----	-----	-----	-----	2.20
9.67	3.12	531.52	1.27	1.27	-----	-----	-----	-----	-----	-----	-----	2.53
10.00	3.60	531.55	1.43	1.43	-----	-----	-----	-----	-----	-----	-----	2.87
10.33	4.40	531.60	1.68	1.68	-----	-----	-----	-----	-----	-----	-----	3.36
10.67	5.48	531.66	2.03	2.03	-----	-----	-----	-----	-----	-----	-----	4.07
11.00	7.06	531.74	2.54	2.54	-----	-----	-----	-----	-----	-----	-----	5.08
11.33	9.27	531.85	3.23	3.23	-----	-----	-----	-----	-----	-----	-----	6.47
11.67	17.67	532.02	4.24	4.24	-----	-----	-----	-----	-----	-----	-----	8.49
12.00	106.81	532.40	6.24	6.24	-----	-----	-----	-----	-----	-----	-----	12.48
12.33	72.81	533.11	8.71	8.71	-----	-----	-----	-----	-----	-----	-----	17.41
12.67	19.54	533.19	9.02	9.02	-----	-----	-----	-----	-----	-----	-----	18.04

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
13.00	12.57	533.18	8.98	8.98	-----	-----	-----	-----	-----	-----	-----	17.96
13.33	9.87	533.16	8.89	8.89	-----	-----	-----	-----	-----	-----	-----	17.77
13.67	8.22	533.13	8.77	8.77	-----	-----	-----	-----	-----	-----	-----	17.53
14.00	6.98	533.09	8.63	8.63	-----	-----	-----	-----	-----	-----	-----	17.25
14.33	6.07	533.05	8.47	8.47	-----	-----	-----	-----	-----	-----	-----	16.94
14.67	5.61	533.01	8.31	8.31	-----	-----	-----	-----	-----	-----	-----	16.62
15.00	5.23	532.93	7.96	7.96	-----	-----	-----	-----	-----	-----	-----	15.92
15.33	4.85	532.83	7.53	7.53	-----	-----	-----	-----	-----	-----	-----	15.07
15.67	4.48	532.74	7.10	7.10	-----	-----	-----	-----	-----	-----	-----	14.20
16.00	4.10	532.65	6.67	6.67	-----	-----	-----	-----	-----	-----	-----	13.34
16.33	3.78	532.47	6.45	6.45	-----	-----	-----	-----	-----	-----	-----	12.90
16.67	3.62	532.48	6.47	6.47	-----	-----	-----	-----	-----	-----	-----	12.94
17.00	3.48	532.40	6.23	6.23	-----	-----	-----	-----	-----	-----	-----	12.46
17.33	3.35	532.32	5.90	5.90	-----	-----	-----	-----	-----	-----	-----	11.79
17.67	3.21	532.24	5.53	5.53	-----	-----	-----	-----	-----	-----	-----	11.06
18.00	3.08	532.17	5.16	5.16	-----	-----	-----	-----	-----	-----	-----	10.31
18.33	2.94	532.11	4.79	4.79	-----	-----	-----	-----	-----	-----	-----	9.58
18.67	2.81	532.05	4.44	4.44	-----	-----	-----	-----	-----	-----	-----	8.87
19.00	2.67	531.97	3.94	3.94	-----	-----	-----	-----	-----	-----	-----	7.87
19.33	2.53	531.77	2.70	2.70	-----	-----	-----	-----	-----	-----	-----	5.41
19.67	2.40	531.66	2.03	2.03	-----	-----	-----	-----	-----	-----	-----	4.06
20.00	2.26	531.59	1.65	1.65	-----	-----	-----	-----	-----	-----	-----	3.30
20.33	2.15	531.55	1.42	1.42	-----	-----	-----	-----	-----	-----	-----	2.83
20.67	2.11	531.52	1.27	1.27	-----	-----	-----	-----	-----	-----	-----	2.54
21.00	2.08	531.51	1.18	1.18	-----	-----	-----	-----	-----	-----	-----	2.36
21.33	2.06	531.49	1.12	1.12	-----	-----	-----	-----	-----	-----	-----	2.25
21.67	2.03	531.49	1.08	1.08	-----	-----	-----	-----	-----	-----	-----	2.17
22.00	2.00	531.48	1.05	1.05	-----	-----	-----	-----	-----	-----	-----	2.11
22.33	1.98	531.48	1.03	1.03	-----	-----	-----	-----	-----	-----	-----	2.06
22.67	1.95	531.47	1.01	1.01	-----	-----	-----	-----	-----	-----	-----	2.02
23.00	1.92	531.47	0.99	0.99	-----	-----	-----	-----	-----	-----	-----	1.99
23.33	1.90	531.47	0.98	0.98	-----	-----	-----	-----	-----	-----	-----	1.96
23.67	1.87	531.46	0.96	0.96	-----	-----	-----	-----	-----	-----	-----	1.93
24.00	1.84	531.46	0.95	0.95	-----	-----	-----	-----	-----	-----	-----	1.90
24.33	0.64	531.44	0.84	0.84	-----	-----	-----	-----	-----	-----	-----	1.68
24.67	0.00	531.38	0.58	0.58	-----	-----	-----	-----	-----	-----	-----	1.16
25.00	0.00	531.33	0.40	0.40	-----	-----	-----	-----	-----	-----	-----	0.81
25.33	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
25.67	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
26.00	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
26.33	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
26.67	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
27.00	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
27.33	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
27.67	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
28.00	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
28.33	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
28.67	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
29.00	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
29.33	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59
29.67	0.00	531.30	0.30	0.30	-----	-----	-----	-----	-----	-----	-----	0.59

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Reservoir No. 1 - Western Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	531.30	24,000	0.000	0.000
0.70	532.00	24,000	0.386	0.386
1.70	533.00	235,000	2.973	3.359
2.70	534.00	427,000	7.599	10.957

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 18.0	18.0	0.0	0.0
Span in	= 18.0	18.0	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 531.10	531.10	0.00	0.00
Length ft	= 60.0	60.0	0.0	0.0
Slope %	= 1.00	1.00	0.00	0.00
N-Value	= .015	.015	.000	.000
Orif. Coeff.	= 0.86	0.86	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.00	0.00	0.00	0.00
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0.000	531.30	0.31	0.31	---	---	---	---	---	---	---	0.61
0.70	0.386	532.00	4.15	4.15	---	---	---	---	---	---	---	8.30
1.70	3.359	533.00	8.27	8.27	---	---	---	---	---	---	---	16.53
2.70	10.957	534.00	11.69	11.69	---	---	---	---	---	---	---	23.38

Hydrograph Report

Hyd. No. 6

Economizer Pond Runoff

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 25.00 ac
Basin Slope = 1.0 %
Tc method = LAG
Total precip. = 6.80 in
Storm duration = 24 hrs

Peak discharge = 192.20 cfs
Time interval = 4 min
Curve number = 100
Hydraulic length = 500 ft
Time of conc. (Tc) = 7.6 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 13.281 acft

Hydrograph Discharge Table

Time -- (hrs	Outflow cfs)
2.13	1.93
2.47	1.98
2.80	2.04
3.13	2.09
3.47	2.14
3.80	2.20
4.13	2.26
4.47	2.36
4.80	2.47
5.13	2.57
5.47	2.68
5.80	2.79
6.13	2.90
6.47	3.00
6.80	3.11
7.13	3.22
7.47	3.32
7.80	3.43
8.13	3.58
8.47	4.09
8.80	4.62
9.13	5.11
9.47	5.14
9.80	5.60
10.13	6.50
10.47	7.76
10.80	9.50
11.13	10.98
11.47	16.88
11.80	89.43
12.13	80.81
12.47	19.68
12.80	12.50
13.13	9.84
13.47	8.25
13.80	6.98
14.13	5.98
14.47	5.56
14.80	5.18
15.13	4.81
15.47	4.43
15.80	4.06
16.13	3.71
16.47	3.56
16.80	3.42
17.13	3.29
17.47	3.16
17.80	3.02
18.13	2.89
18.47	2.75
18.80	2.62
19.13	2.49
19.47	2.35
19.80	2.22
20.13	2.10
20.47	2.06
20.80	2.03
21.13	2.01
21.47	1.98
21.80	1.95
22.13	1.93

...End

Hyd. No. 7

Upper Ash Pond Inflow

Hydrograph type = Combine
Storm frequency = 100 yrs
Inflow hyds. = 5, 6

Peak discharge = 204.68 cfs
Time interval = 4 min

Hydrograph Volume = 27.947 acft

Hydrograph Discharge Table

Time (hrs)	Hyd. 5 + (cfs)	Hyd. 6 = (cfs)	Outflow (cfs)
0.33	0.59	1.64	2.23
0.67	0.59	1.69	2.29
1.00	0.59	1.75	2.34
1.33	0.59	1.80	2.39
1.67	0.59	1.86	2.45
2.00	0.59	1.91	2.50
2.33	0.59	1.96	2.55
2.67	0.59	2.02	2.61
3.00	0.59	2.07	2.66
3.33	0.59	2.12	2.71
3.67	0.59	2.18	2.77
4.00	0.59	2.23	2.82
4.33	0.59	2.32	2.91
4.67	0.59	2.42	3.02
5.00	0.59	2.53	3.12
5.33	0.59	2.64	3.23
5.67	0.59	2.75	3.34
6.00	0.61	2.85	3.46
6.33	0.66	2.96	3.62
6.67	0.73	3.07	3.80
7.00	0.82	3.17	4.00
7.33	0.93	3.28	4.21
7.67	1.05	3.39	4.44
8.00	1.20	3.50	4.69
8.33	1.36	3.87	5.23
8.67	1.57	4.41	5.98
9.00	1.85	4.95	6.80
9.33	2.20	5.14	7.34
9.67	2.53	5.29	7.82
10.00	2.87	6.11	8.98
10.33	3.36	7.24	10.60
10.67	4.07	8.67	12.74
11.00	5.08	10.79	15.87
11.33	6.47	14.83	21.30
11.67	8.49	40.89	49.38
12.00	12.48	192.20 <<	204.68 <<
12.33	17.41	24.57	41.98
12.67	18.04	13.92	31.96

Continues on next page...

Hydrograph Discharge Table

Time (hrs)	Hyd. 5 + (cfs)	Hyd. 6 = (cfs)	Outflow (cfs)
13.00	17.96	10.82	28.79
13.33	17.77	8.85	26.63
13.67	17.53	7.42	24.96
14.00	17.25	6.34	23.59
14.33	16.94	5.71	22.65
14.67	16.62	5.33	21.96
15.00	15.92	4.96	20.88
15.33	15.07	4.58	19.65
15.67	14.20	4.21	18.41
16.00	13.34	3.83	17.18
16.33	12.90	3.61	16.51
16.67	12.94	3.48	16.42
17.00	12.46	3.34	15.81
17.33	11.79	3.21	15.00
17.67	11.06	3.08	14.13
18.00	10.31	2.94	13.26
18.33	9.58	2.81	12.39
18.67	8.87	2.67	11.55
19.00	7.87	2.54	10.41
19.33	5.41	2.41	7.81
19.67	4.06	2.27	6.33
20.00	3.30	2.14	5.43
20.33	2.83	2.07	4.91
20.67	2.54	2.05	4.59
21.00	2.36	2.02	4.38
21.33	2.25	1.99	4.24
21.67	2.17	1.97	4.13
22.00	2.11	1.94	4.05
22.33	2.06	1.91	3.97
22.67	2.02	1.88	3.91
23.00	1.99	1.86	3.85
23.33	1.96	1.83	3.79
23.67	1.93	1.80	3.73
24.00	1.90	1.78	3.68

...End

Hyd. No. 8

Through UPPER Ash Pond

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 7
Max. Elevation = 530.31 ft

Peak discharge = 6.95 cfs
Time interval = 4 min
Reservoir name = Upper Ash Pond
Max. Storage = 16.096 acft

Storage Indication method used.

Outflow hydrograph volume = 32.071 acft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.33	2.23	529.10	2.52	-----	-----	-----	-----	-----	-----	-----	-----	2.52
0.67	2.29	529.10	2.52	-----	-----	-----	-----	-----	-----	-----	-----	2.52
1.00	2.34	529.10	2.52	-----	-----	-----	-----	-----	-----	-----	-----	2.52
1.33	2.39	529.10	2.52	-----	-----	-----	-----	-----	-----	-----	-----	2.52
1.67	2.45	529.10	2.52	-----	-----	-----	-----	-----	-----	-----	-----	2.52
2.00	2.50	529.10	2.52	-----	-----	-----	-----	-----	-----	-----	-----	2.52
2.33	2.55	529.10	2.52	-----	-----	-----	-----	-----	-----	-----	-----	2.52
2.67	2.61	529.10	2.53	-----	-----	-----	-----	-----	-----	-----	-----	2.52
3.00	2.66	529.10	2.53	-----	-----	-----	-----	-----	-----	-----	-----	2.53
3.33	2.71	529.10	2.53	-----	-----	-----	-----	-----	-----	-----	-----	2.53
3.67	2.77	529.10	2.53	-----	-----	-----	-----	-----	-----	-----	-----	2.53
4.00	2.82	529.10	2.53	-----	-----	-----	-----	-----	-----	-----	-----	2.53
4.33	2.91	529.10	2.54	-----	-----	-----	-----	-----	-----	-----	-----	2.54
4.67	3.02	529.10	2.54	-----	-----	-----	-----	-----	-----	-----	-----	2.54
5.00	3.12	529.10	2.55	-----	-----	-----	-----	-----	-----	-----	-----	2.55
5.33	3.23	529.11	2.55	-----	-----	-----	-----	-----	-----	-----	-----	2.55
5.67	3.34	529.11	2.56	-----	-----	-----	-----	-----	-----	-----	-----	2.56
6.00	3.46	529.11	2.57	-----	-----	-----	-----	-----	-----	-----	-----	2.57
6.33	3.62	529.11	2.58	-----	-----	-----	-----	-----	-----	-----	-----	2.58
6.67	3.80	529.11	2.59	-----	-----	-----	-----	-----	-----	-----	-----	2.59
7.00	4.00	529.12	2.61	-----	-----	-----	-----	-----	-----	-----	-----	2.61
7.33	4.21	529.12	2.62	-----	-----	-----	-----	-----	-----	-----	-----	2.62
7.67	4.44	529.12	2.64	-----	-----	-----	-----	-----	-----	-----	-----	2.64
8.00	4.69	529.13	2.66	-----	-----	-----	-----	-----	-----	-----	-----	2.66
8.33	5.23	529.13	2.69	-----	-----	-----	-----	-----	-----	-----	-----	2.69
8.67	5.98	529.14	2.72	-----	-----	-----	-----	-----	-----	-----	-----	2.72
9.00	6.80	529.14	2.76	-----	-----	-----	-----	-----	-----	-----	-----	2.76
9.33	7.34	529.15	2.81	-----	-----	-----	-----	-----	-----	-----	-----	2.81
9.67	7.82	529.16	2.86	-----	-----	-----	-----	-----	-----	-----	-----	2.86
10.00	8.98	529.17	2.92	-----	-----	-----	-----	-----	-----	-----	-----	2.92
10.33	10.60	529.19	3.00	-----	-----	-----	-----	-----	-----	-----	-----	3.00
10.67	12.74	529.21	3.09	-----	-----	-----	-----	-----	-----	-----	-----	3.09
11.00	15.87	529.23	3.21	-----	-----	-----	-----	-----	-----	-----	-----	3.21
11.33	21.30	529.26	3.37	-----	-----	-----	-----	-----	-----	-----	-----	3.37
11.67	49.38	529.31	3.64	-----	-----	-----	-----	-----	-----	-----	-----	3.64
12.00	204.68 <<	529.56	4.72	-----	-----	-----	-----	-----	-----	-----	-----	4.72
12.33	41.98	529.75	5.36	-----	-----	-----	-----	-----	-----	-----	-----	5.36
12.67	31.96	529.81	5.56	-----	-----	-----	-----	-----	-----	-----	-----	5.56

Continues on next page...

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
13.00	28.79	529.86	5.72	-----	-----	-----	-----	-----	-----	-----	-----	5.72
13.33	26.63	529.91	5.86	-----	-----	-----	-----	-----	-----	-----	-----	5.86
13.67	24.96	529.95	5.98	-----	-----	-----	-----	-----	-----	-----	-----	5.98
14.00	23.59	529.99	6.09	-----	-----	-----	-----	-----	-----	-----	-----	6.09
14.33	22.65	530.02	6.19	-----	-----	-----	-----	-----	-----	-----	-----	6.19
14.67	21.96	530.06	6.28	-----	-----	-----	-----	-----	-----	-----	-----	6.28
15.00	20.88	530.09	6.37	-----	-----	-----	-----	-----	-----	-----	-----	6.37
15.33	19.65	530.12	6.45	-----	-----	-----	-----	-----	-----	-----	-----	6.45
15.67	18.41	530.14	6.52	-----	-----	-----	-----	-----	-----	-----	-----	6.52
16.00	17.18	530.17	6.58	-----	-----	-----	-----	-----	-----	-----	-----	6.58
16.33	16.51	530.19	6.63	-----	-----	-----	-----	-----	-----	-----	-----	6.63
16.67	16.42	530.21	6.69	-----	-----	-----	-----	-----	-----	-----	-----	6.69
17.00	15.81	530.23	6.74	-----	-----	-----	-----	-----	-----	-----	-----	6.74
17.33	15.00	530.24	6.78	-----	-----	-----	-----	-----	-----	-----	-----	6.78
17.67	14.13	530.26	6.82	-----	-----	-----	-----	-----	-----	-----	-----	6.82
18.00	13.26	530.27	6.86	-----	-----	-----	-----	-----	-----	-----	-----	6.86
18.33	12.39	530.29	6.89	-----	-----	-----	-----	-----	-----	-----	-----	6.89
18.67	11.55	530.30	6.92	-----	-----	-----	-----	-----	-----	-----	-----	6.92
19.00	10.41	530.31	6.94	-----	-----	-----	-----	-----	-----	-----	-----	6.94
19.33	7.81	530.31	6.95	-----	-----	-----	-----	-----	-----	-----	-----	6.95
19.67	6.33	530.31	6.95	-----	-----	-----	-----	-----	-----	-----	-----	6.95
20.00	5.43	530.31	6.95	-----	-----	-----	-----	-----	-----	-----	-----	6.95
20.33	4.91	530.30	6.94	-----	-----	-----	-----	-----	-----	-----	-----	6.94
20.67	4.59	530.30	6.93	-----	-----	-----	-----	-----	-----	-----	-----	6.93
21.00	4.38	530.29	6.91	-----	-----	-----	-----	-----	-----	-----	-----	6.91
21.33	4.24	530.29	6.90	-----	-----	-----	-----	-----	-----	-----	-----	6.90
21.67	4.13	530.28	6.88	-----	-----	-----	-----	-----	-----	-----	-----	6.88
22.00	4.05	530.28	6.87	-----	-----	-----	-----	-----	-----	-----	-----	6.87
22.33	3.97	530.27	6.85	-----	-----	-----	-----	-----	-----	-----	-----	6.85
22.67	3.91	530.27	6.84	-----	-----	-----	-----	-----	-----	-----	-----	6.84
23.00	3.85	530.26	6.82	-----	-----	-----	-----	-----	-----	-----	-----	6.82
23.33	3.79	530.25	6.81	-----	-----	-----	-----	-----	-----	-----	-----	6.81
23.67	3.73	530.25	6.79	-----	-----	-----	-----	-----	-----	-----	-----	6.79
24.00	3.68	530.24	6.78	-----	-----	-----	-----	-----	-----	-----	-----	6.78
24.33	1.68	530.23	6.75	-----	-----	-----	-----	-----	-----	-----	-----	6.75
24.67	1.16	530.22	6.72	-----	-----	-----	-----	-----	-----	-----	-----	6.72
25.00	0.81	530.21	6.69	-----	-----	-----	-----	-----	-----	-----	-----	6.69
25.33	0.59	530.20	6.66	-----	-----	-----	-----	-----	-----	-----	-----	6.66
25.67	0.59	530.18	6.63	-----	-----	-----	-----	-----	-----	-----	-----	6.63
26.00	0.59	530.17	6.59	-----	-----	-----	-----	-----	-----	-----	-----	6.59
26.33	0.59	530.16	6.56	-----	-----	-----	-----	-----	-----	-----	-----	6.56
26.67	0.59	530.15	6.53	-----	-----	-----	-----	-----	-----	-----	-----	6.53
27.00	0.59	530.13	6.50	-----	-----	-----	-----	-----	-----	-----	-----	6.50
27.33	0.59	530.12	6.46	-----	-----	-----	-----	-----	-----	-----	-----	6.46
27.67	0.59	530.11	6.43	-----	-----	-----	-----	-----	-----	-----	-----	6.43
28.00	0.59	530.10	6.40	-----	-----	-----	-----	-----	-----	-----	-----	6.40
28.33	0.59	530.09	6.37	-----	-----	-----	-----	-----	-----	-----	-----	6.37
28.67	0.59	530.07	6.33	-----	-----	-----	-----	-----	-----	-----	-----	6.33
29.00	0.59	530.06	6.30	-----	-----	-----	-----	-----	-----	-----	-----	6.30
29.33	0.59	530.05	6.27	-----	-----	-----	-----	-----	-----	-----	-----	6.27
29.67	0.59	530.04	6.23	-----	-----	-----	-----	-----	-----	-----	-----	6.23

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Reservoir No. 2 - Upper Ash Pond

Pond Data

Pond storage is based on known values

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	529.10	00	0.000	0.000
1.00	530.10	00	13.300	13.300
2.00	531.10	00	13.300	26.600
3.00	532.10	00	13.300	39.900

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 15.0	0.0	0.0	0.0
Span in	= 15.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 528.30	0.00	0.00	0.00
Length ft	= 11.0	0.0	0.0	0.0
Slope %	= 5.00	0.00	0.00	0.00
N-Value	= .009	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.00	0.00	0.00	0.00
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

---

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

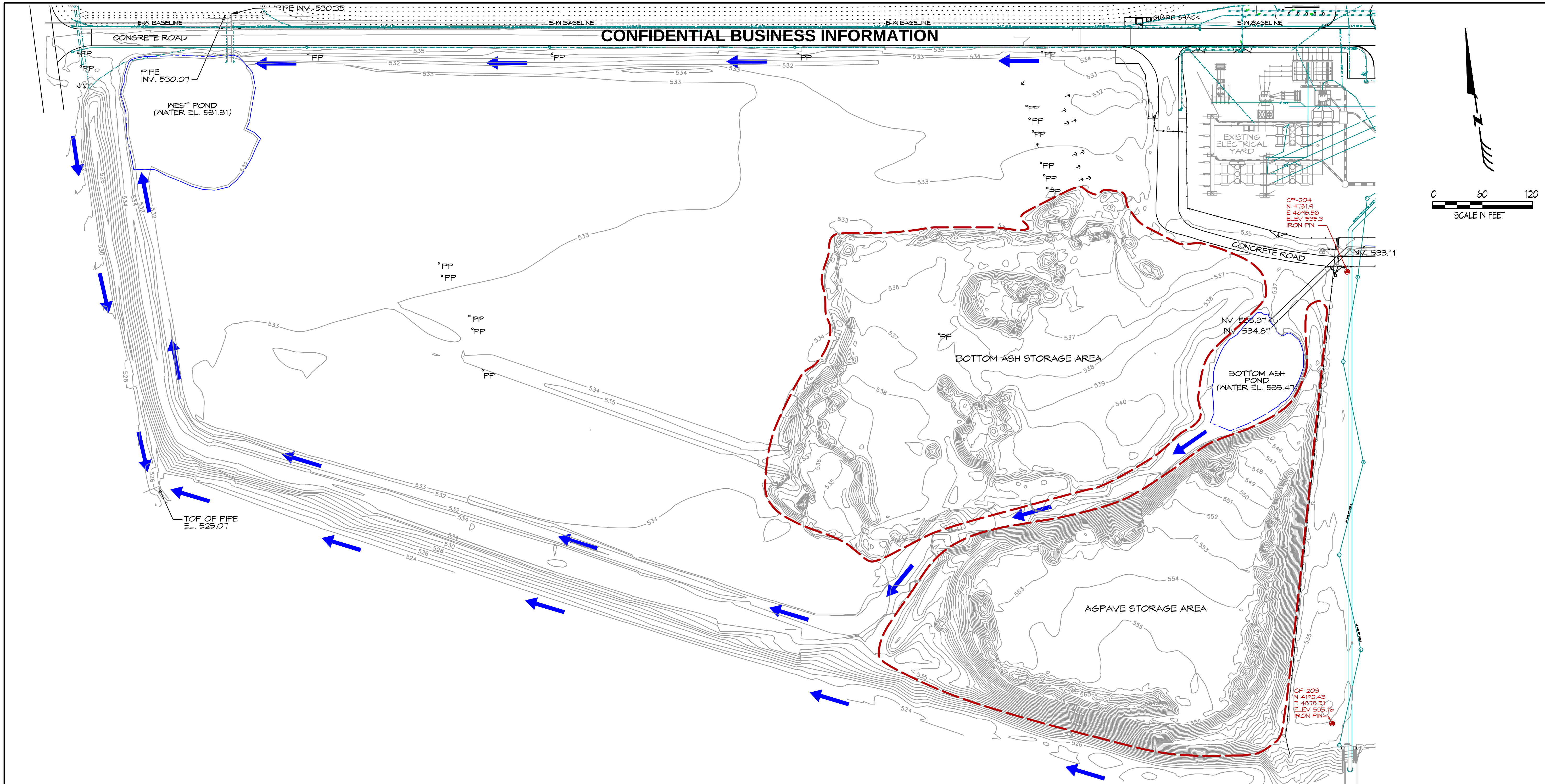
Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0.000	529.10	2.53	---	---	---	---	---	---	---	---	2.53
1.00	13.300	530.10	6.40	---	---	---	---	---	---	---	---	6.40
2.00	26.600	531.10	8.71	---	---	---	---	---	---	---	---	8.71
3.00	39.900	532.10	10.53	---	---	---	---	---	---	---	---	10.53

Attachment E

Existing Conditions - West Burlington Generating Station

Source:
Hard Hat Services, March 27, 2009

CONFIDENTIAL BUSINESS INFORMATION



LEGEND:

──	UTILITY LOCATIONS FROM ORIGINAL BLACK & VEATCH DESIGN DRAWINGS
──	SURVEYED UTILITY LOCATIONS
- - — - - —	EDGE OF WATER
· · · · · · · ·	ESTIMATED CONTOURS SUPPLIED BY ALLIANT ENERGY
——536——	SURVEYED CONTOURS
— — — — —	GRAVEL ROAD
°PP	POWER POLE
▲	CONTROL POINT / MONUMENT
⬅	OVERLAND FLOW DIRECTION

NOTES:

1. APPROXIMATE BOTTOM ASH QUANTITY ABOVE ELEVATION 534.0' IS 23,653 CU. YDS.
2. APPROXIMATE AGPAVE QUANTITY ABOVE ELEVATION 534.0' IS 80,493 CU. YDS.

EXISTING CONDITIONS - WEST

BURLINGTON GENERATING STATION
BURLINGTON, IOWA
PREPARED FOR
ALLIANT ENERGY

HARD HAT SERVICES™
Engineering, Construction and Management Solutions
940 East Diehl Road, Suite 150 Naperville, Illinois 60563
www.hardhatinc.com

DATE: 3-27-09
SCALE: AS SHOWN
SHEET 2
DRAWING NUMBER 154.002.D2

Attachment F

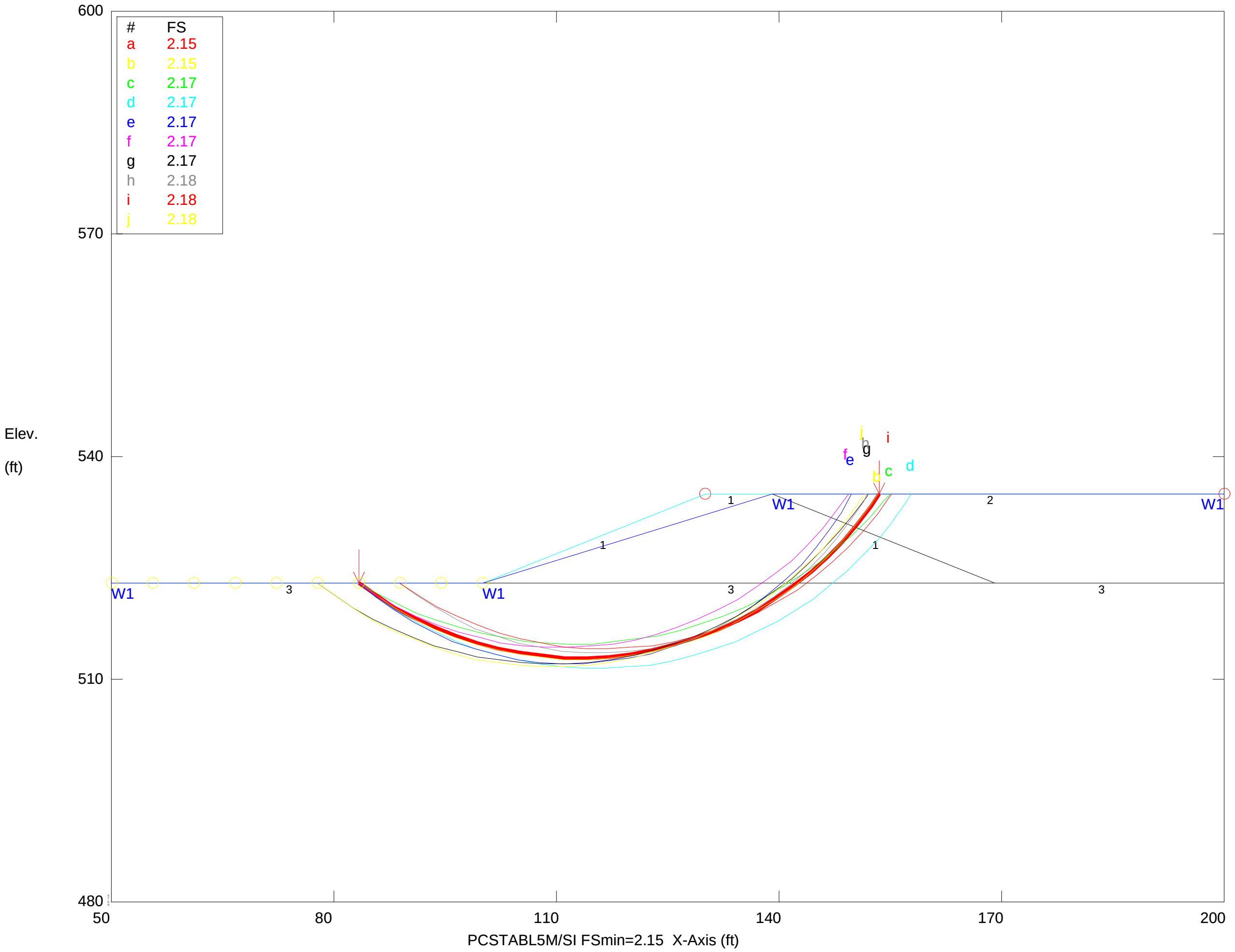
Static Slope Stability Analyses Results
Ten Most Critical Surfaces Per Analysis
Burlington Generating Station

Source:
Program PCSTABLE5M/SI output by Aether dbs, January 2011

CONFIDENTIAL BUSINESS INFORMATION

Alliant Burlington Main Ash Pond South Dike - Static Case

Ten Most Critical. C:BURL20C.PLT By: TCW 01-14-11 1:33pm

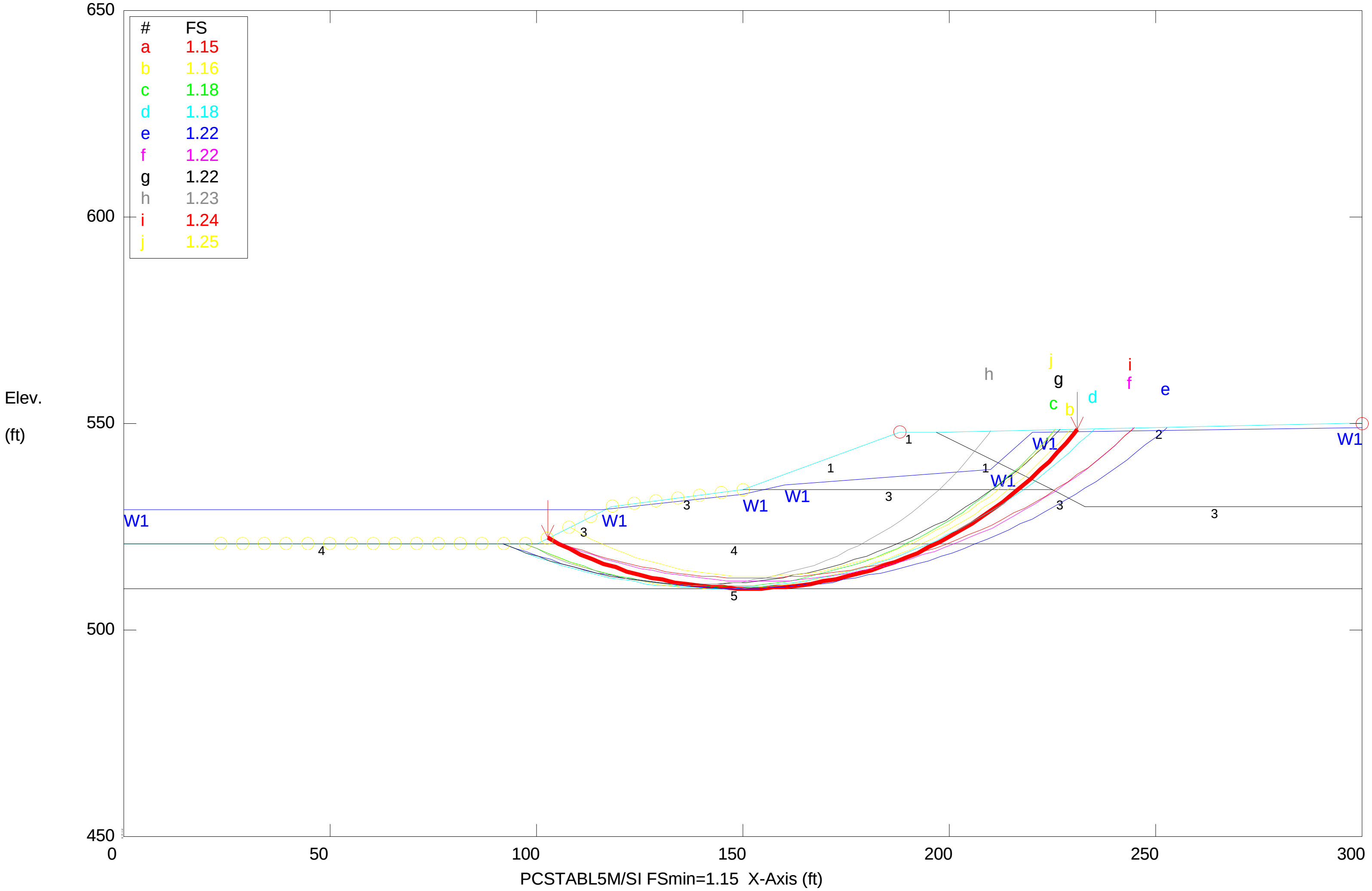


Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Dike	125	125	1000	0	0	0	W1
2 Ash	120	120	0	25	0	0	W1
3 Natural	120	120	0	30	0	0	W1

CONFIDENTIAL BUSINESS INFORMATION

Alliant Burlington Economizer Pond North Ash Slope - Static Case

Ten Most Critical. C:BURL30C4.PLT By: TCW 01-17-11 1:38pm

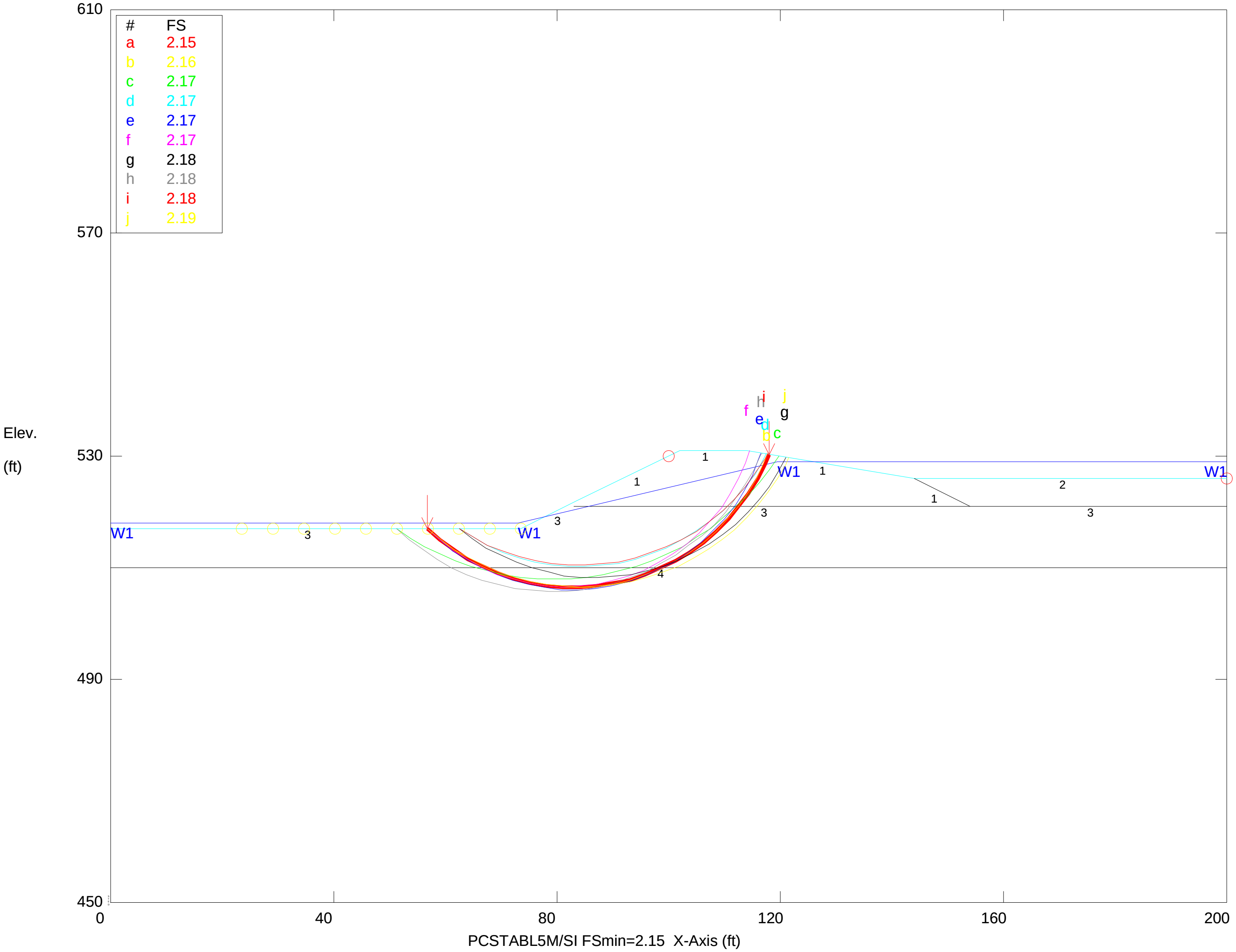


Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	130	130	0	28	0	0	W1
2	Ash	120	120	0	25	0	0	W1
3	Clay	125	125	500	0	0	0	W1
4	Clay	125	125	500	0	0	0	W1
5	Sand	125	125	0	30	0	0	W1

CONFIDENTIAL BUSINESS INFORMATION

Alliant Burlington Between the Ash Ponds North Dike Slope - Static Case

Ten Most Critical. E:BURL40C2.PLT By: Tom Wells 01-15-11 10:03am

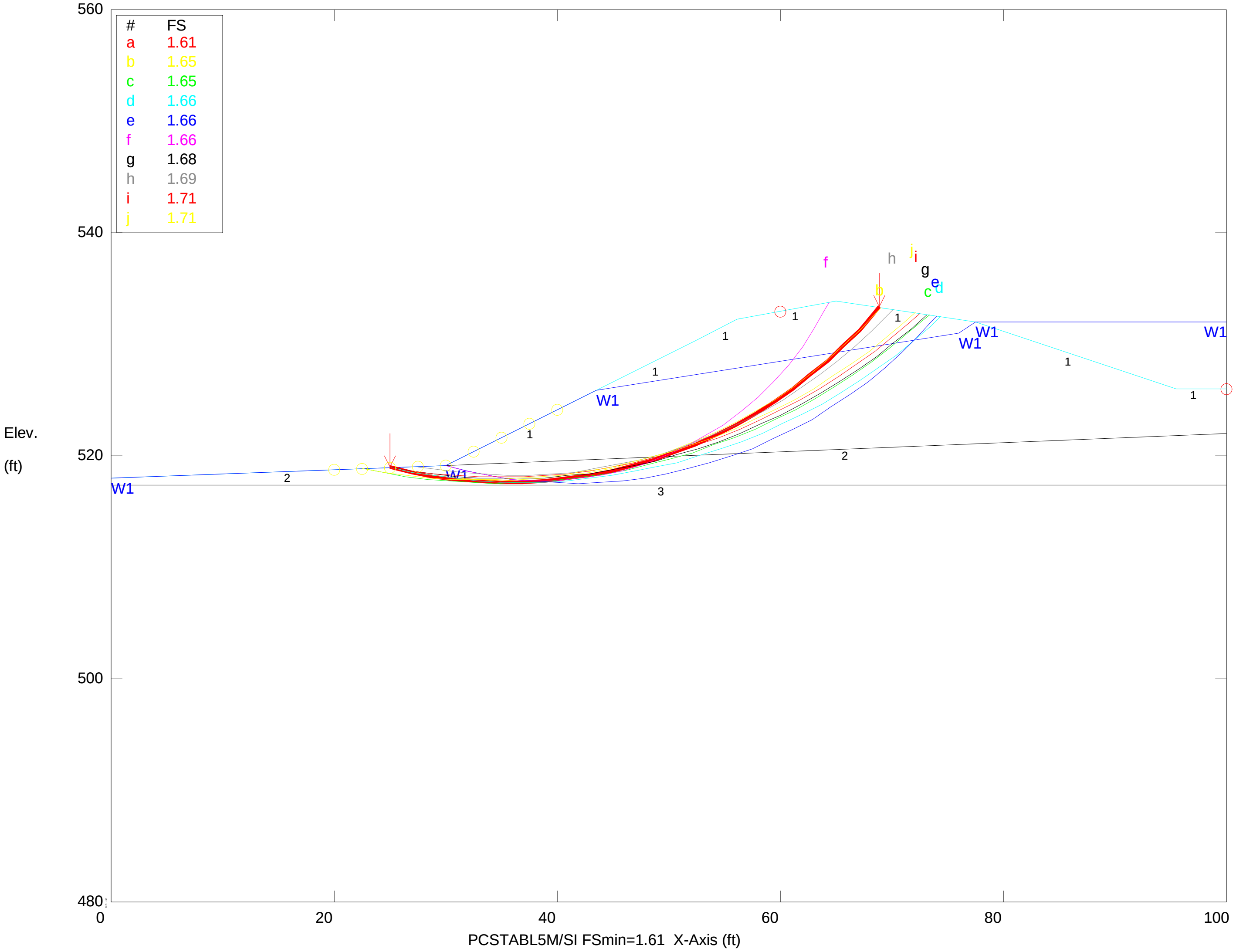


Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	130	130	1000	0	0	0	W1
2	Ash	120	120	0	25	0	0	W1
3	Clay	125	125	500	0	0	0	W1
4	Sand	125	125	0	30	0	0	W1

CONFIDENTIAL BUSINESS INFORMATION

Alliant Burlington Ash Seal Pond South Dike - Static Case

Ten Most Critical. C:BURL50C.PLT By: TCW 01-18-11 11:01am



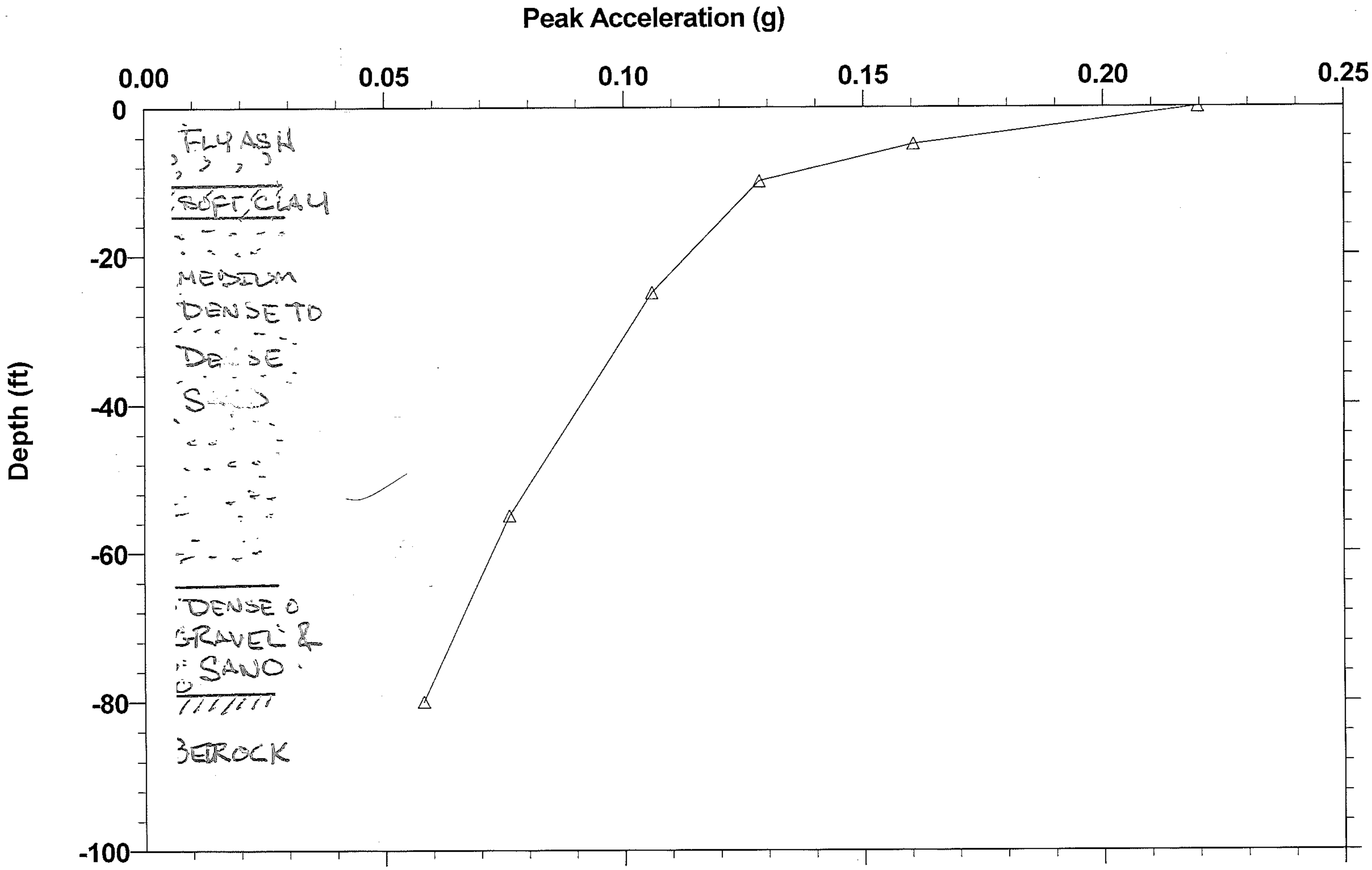
Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Clay	120	120	500	0	0	0	W1
2	Sand	130	130	0	30	0	0	W1
3	Clay	125	125	1250	0	0	0	W1

Attachment G

Earthquake Amplification Results

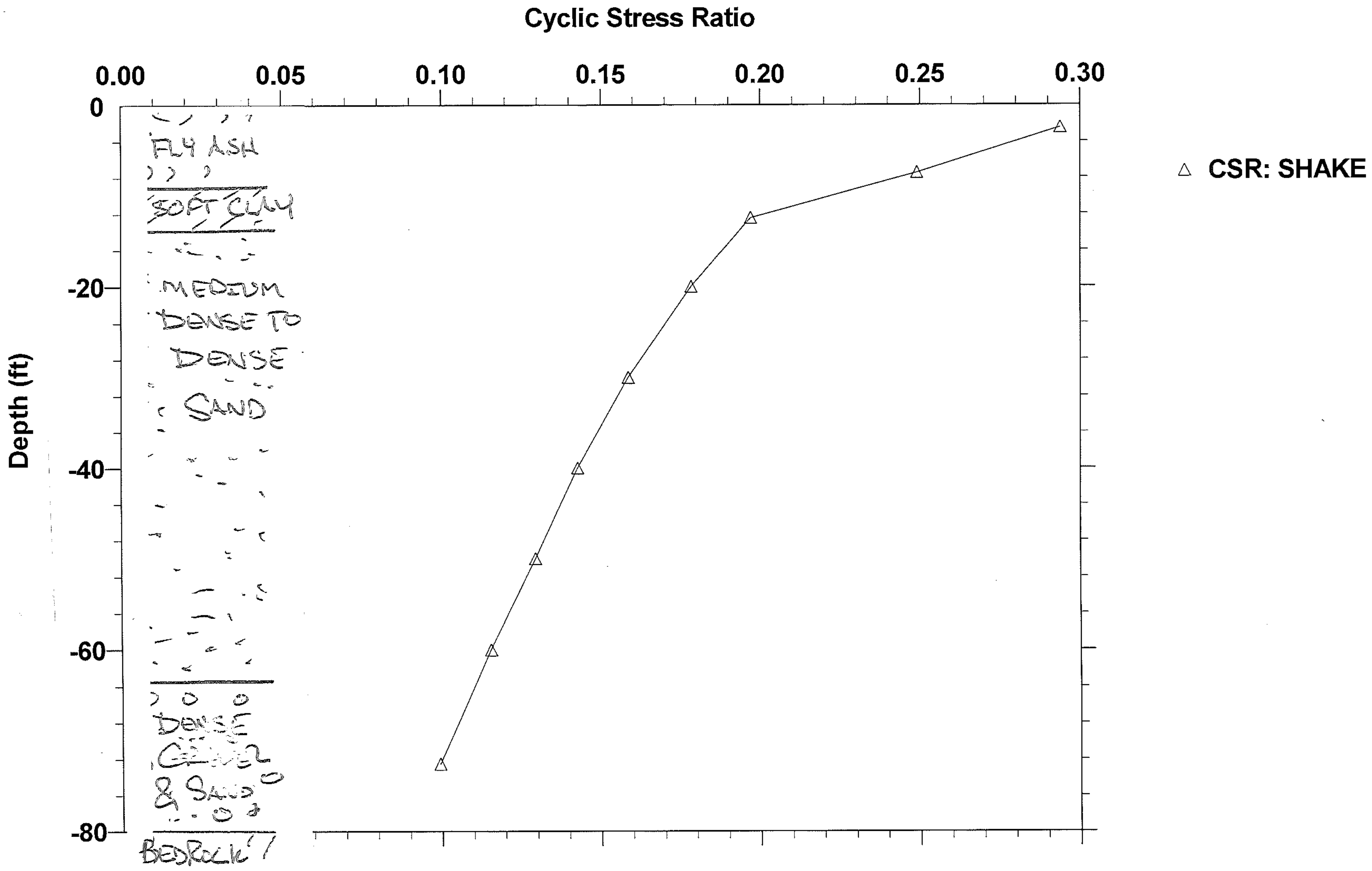
Source:
Program SHAKE 2000 output by Aether dbs, January 2011

CONFIDENTIAL BUSINESS INFORMATION



Acceleration with Depth (2500 year return 0.06 g bedrock acceleration)

CONFIDENTIAL BUSINESS INFORMATION



Cyclic Stress Ratio with Depth (2500 year return 0.06 g bedrock acceleration)

Attachment H

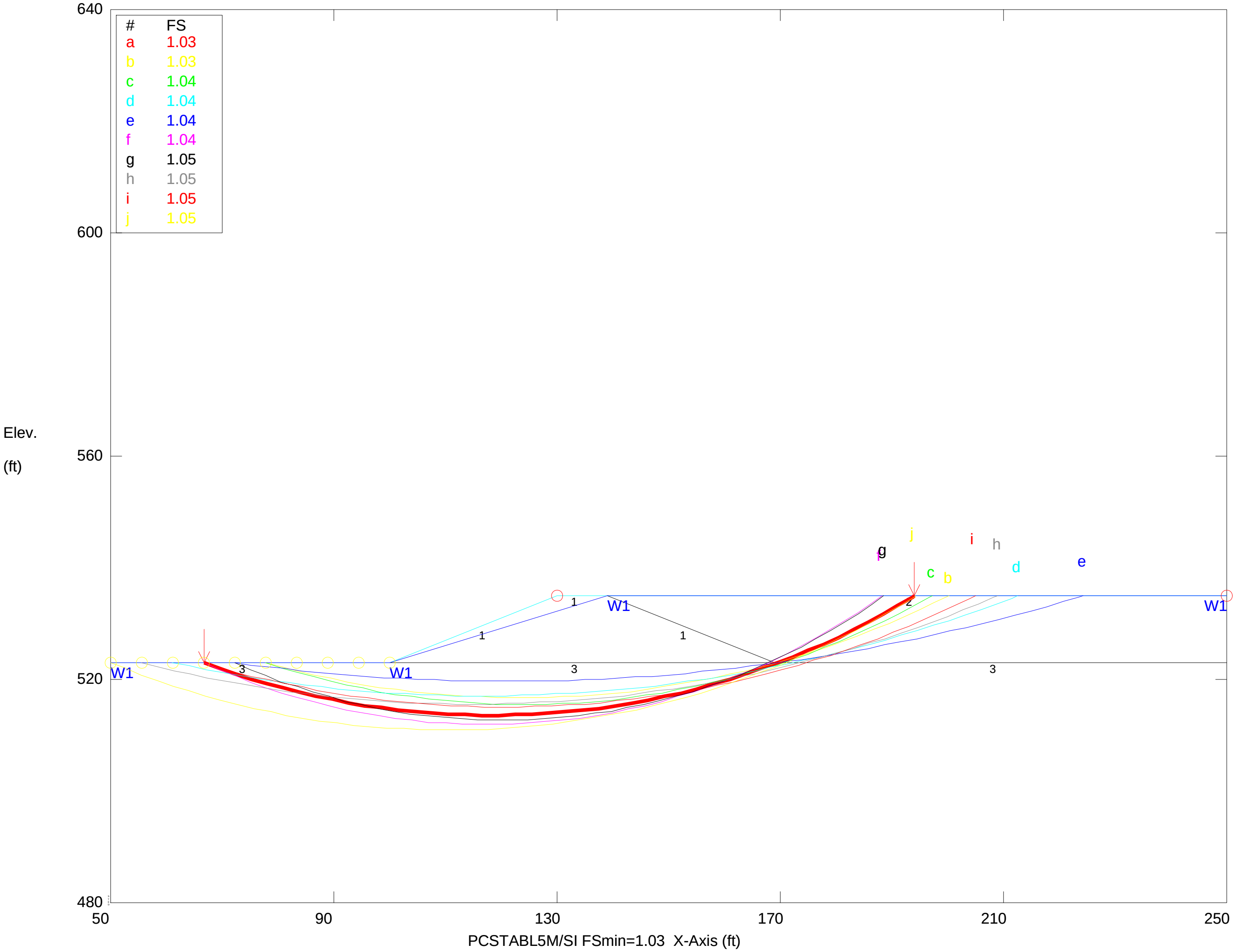
Earthquake Pseudo-Static Slope Stability Analyses Results
Ten Most Critical Surfaces Per Analysis
Burlington Generating Station

Source:
Program PCSTABLE5M/SI output by Aether dbs, January 2011

CONFIDENTIAL BUSINESS INFORMATION

Alliant Burlington Main Ash Pond South Dike - Earthquake Case

Ten Most Critical. E:BURL22C.PLT By: Tom Wells 01-22-11 11:46am

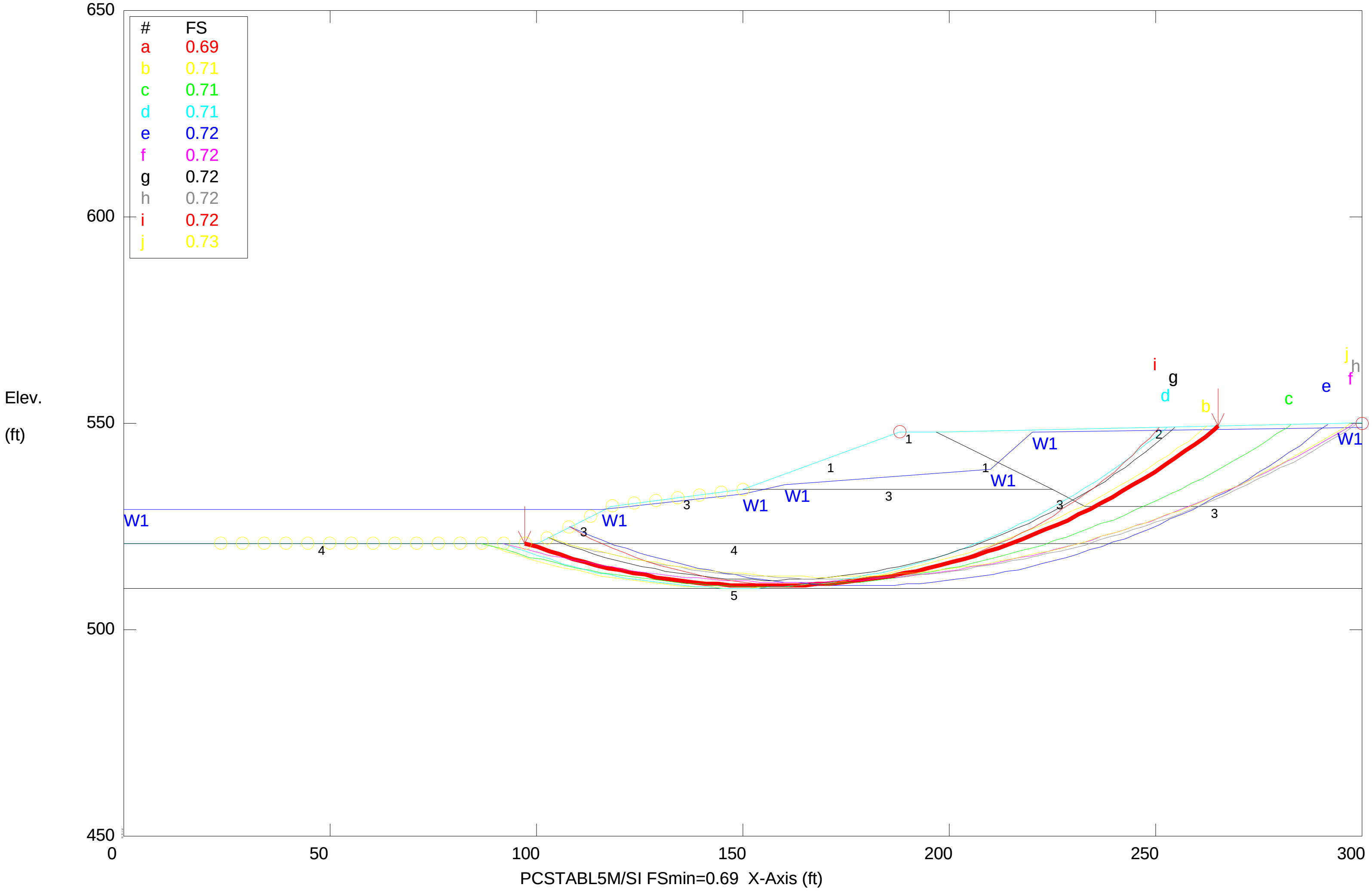


Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	125	125	1000	0	0	0	W1
2	Ash	120	120	100	0	0	0	W1
3	Natural	120	120	0	30	0	0	W1

CONFIDENTIAL BUSINESS INFORMATION

Alliant Burlington Economizer Pond North Ash Slope - Earthquake Case

Ten Most Critical. C:BURL31C4.PLT By: TCW 01-17-11 2:15pm

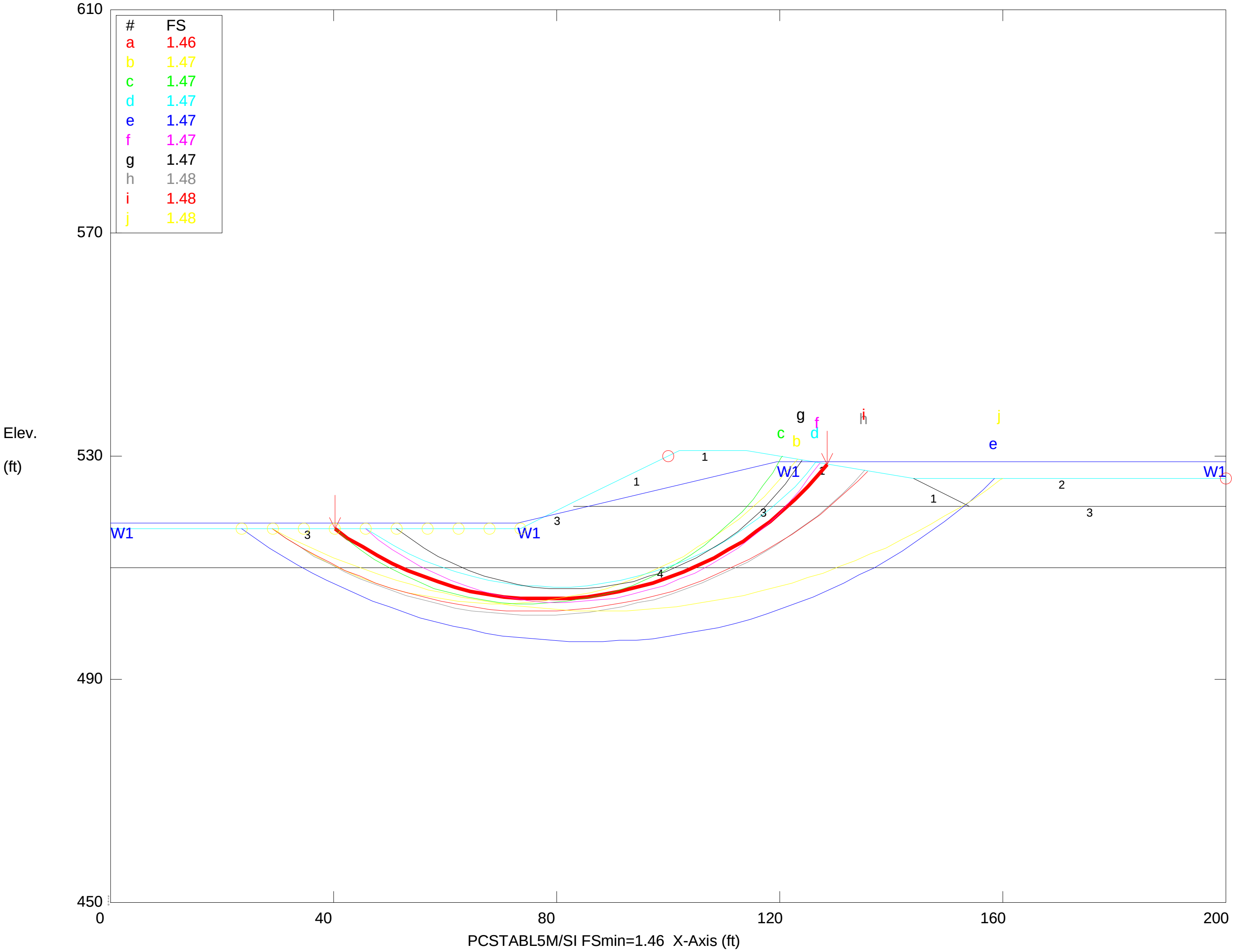


Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Dike	130	130	0	28	0	0	W1
2 Ash	120	120	100	0	0	0	W1
3 Clay	125	125	500	0	0	0	W1
4 Clay	125	125	500	0	0	0	W1
5 Sand	125	125	0	30	0	0	W1

CONFIDENTIAL BUSINESS INFORMATION

Alliant Burlington Between the Ash Ponds North Dike Slope - Earthquake Case

Ten Most Critical. E:BURL41C2.PLT By: Tom Wells 01-15-11 12:31pm

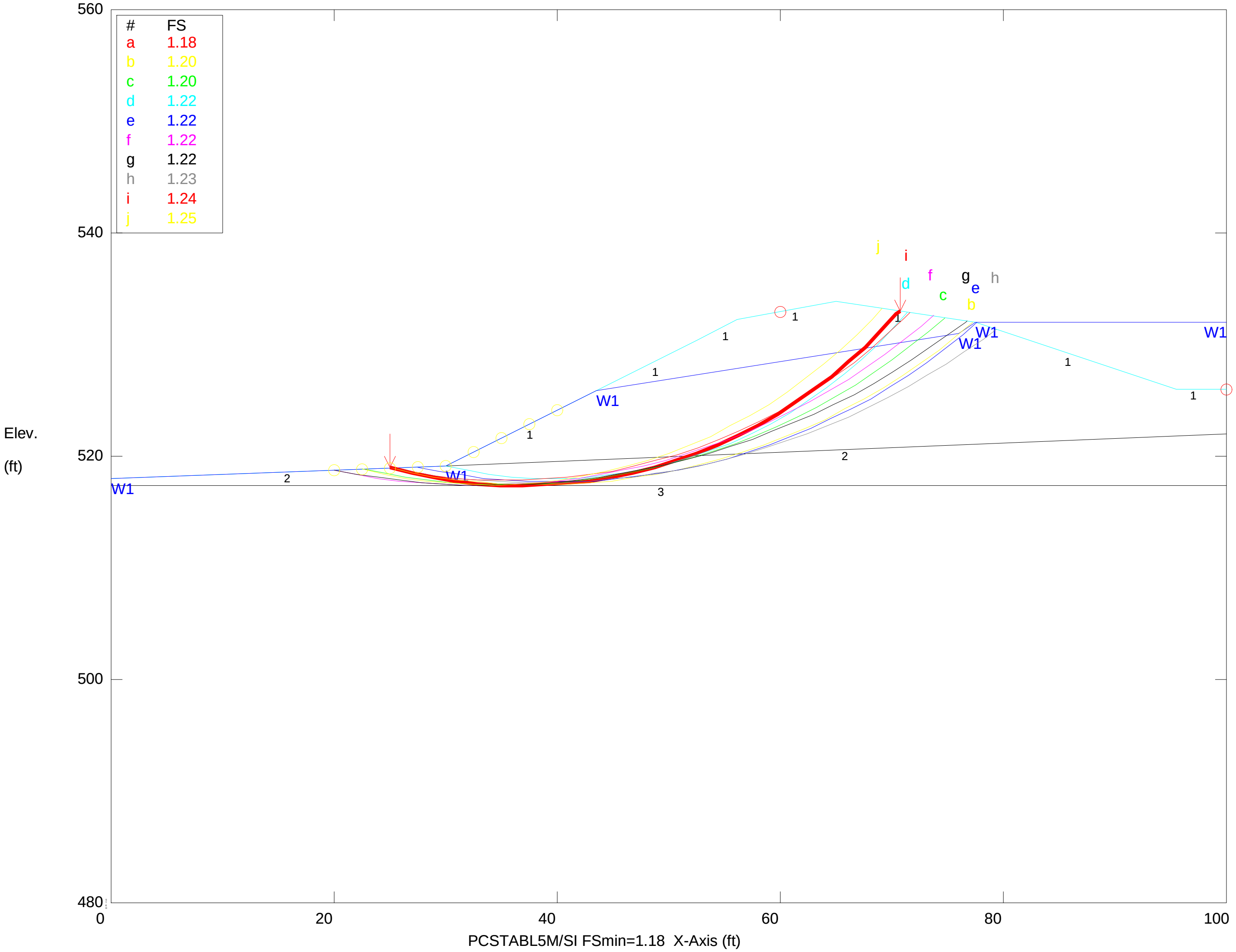


Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	130	130	1000	0	0	0	W1
2	Ash	120	120	100	0	0	0	W1
3	Clay	125	125	500	0	0	0	W1
4	Sand	125	125	0	30	0	0	W1

CONFIDENTIAL BUSINESS INFORMATION

Alliant Burlington Ash Seal Pond South Dike - Earthquake Case

Ten Most Critical. C:BURL51C.PLT By: TCW 01-18-11 11:04am



Soil Type No. Label		Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Clay	120	120	500	0	0	0	W1
2	Sand	130	130	0	30	0	0	W1
3	Clay	125	125	1250	0	0	0	W1