Report of Dam Safety Assessment of Coal Combustion Surface Impoundments
NRG Energy
Huntley Generating Station
Tonawanda, NY

AMEC Project No. 3-2106-0194

Prepared By:

AMEC Earth & Environmental, Inc.
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

Prepared For:

U.S. Environmental Protection Agency
Office of Solid Waste and Emergency Response
Office of Resource Conservation and Recovery
1200 Pennsylvania Ave., NW
MC: 5304P
Washington, DC 20460

September 2011

I certify that the management units referenced herein:

NRG Energy's Huntley Generating Station Pond 1, Pond 2, Pond 3, North Equalization Pond, South Equalization Pond and South Settling Pond were assessed on June 15, 2011. I further certify that this report was prepared under my direct personal supervision.

Signature _____

Don W. Dotson, PE, D.GE.
Senior Geotechnical Engineer

List of AMEC Participants who have participated in the assessment of the management units and in preparation of the report:

- Chris Eger
  CADD Technician
- Daniel Conn
  GIS Specialist
- Mary Sawitzki, PE
  Civil/Environmental Engineer
- James Black, PE
  Civil Engineer

TABLE OF CONTENTS

SECTION **PAGE NO.**

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION AND PROJECT DESCRIPTION

1.1 Introduction

AMEC was hired by the United States Environmental Protection Agency (EPA) via contract BPA EP09W001702, to perform assessments of selected coal combustion by-products surface impoundments. AMEC was directed by EPA, through the provided scope of work and verbal communications, to utilize the following resources and guidelines to conduct a site assessment and produce a written assessment report for the coal combustion waste facilities and impoundments.

- Coal Combustion Waste (CCW) Impoundment Inspection forms (hazard rating, found in Report Appendix A)
- Coal Combustion Dam Inspection Checklist (found in Report Appendix A)
- Impoundment Design Guidelines of the Mining Safety and Health Administration (MSHA) Coal Mine Impoundment Inspection and Plan Review Handbook (hydrologic, hydraulic, and stability conditions)
- National Dam Safety Review Board Condition Assessment Definitions (condition rating)

As part of this contract with EPA, AMEC was assigned to perform an assessment of NRG Energy's (NRG) Huntley Generating Station (Huntley), which is located in Tonawanda, New York as shown on Figure 1, the Site Location and Vicinity Map. (This figure is presented on the next page and in the figures section of this report.)

A site visit to Huntley was made by AMEC on June 15, 2011. The purpose of the visit was to perform visual observations, to inventory coal combustion waste (CCW) surface impoundments, assess the containment dikes, and to collect relevant historical impoundment documentation.

AMEC engineers, Don Dotson, PE and James Black, PE, were accompanied during the site visit by the individuals listed on Table 1.

Table 1. Site Visit Attendees

Company or Organization	Name and Title
Huntley Power, LLC	Carson Leikam, Plant Manager
Huntley Power, LLC	Joseph Pietro, Environmental Coordinator
NRG Energy, Inc.	Joseph Schwab, Regional Engineering and Construction Manager
NRG Energy, Inc.	Kevin Schroeder, Regional Environmental

NRG reported three ponds in their response letter to EPA dated May 15, 2009. During the site visit, NRG and Huntley personnel reported three additional ponds, Pond 1, Pond 2 and Pond 3, previously used to store and dewater ash. The ponds no longer receive CCW, still contain CCW and actively receive other waste streams from the plant. AMEC engineers included these ponds in the field assessment and took photographs.

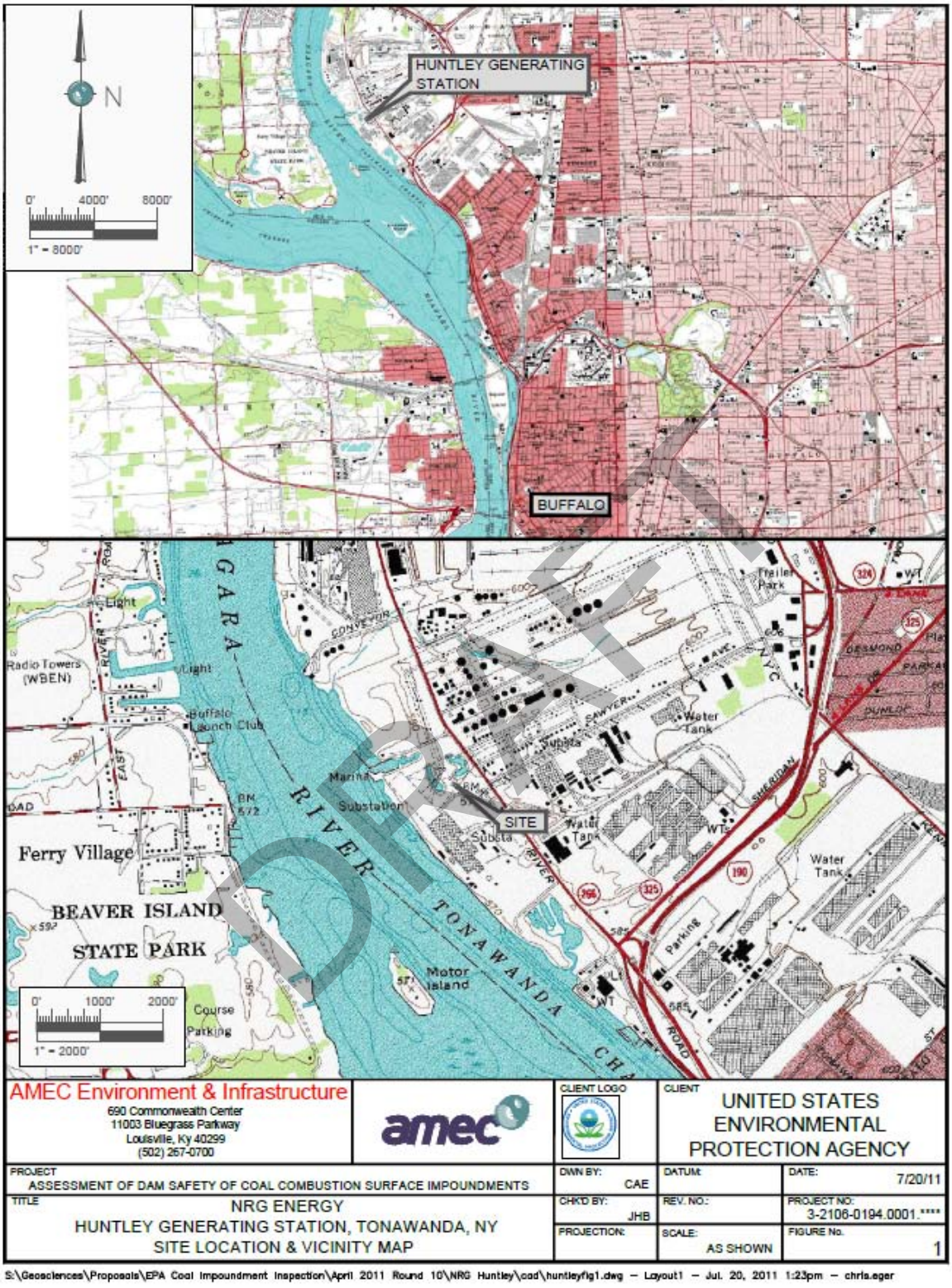


Figure 1. Site Location and Vicinity Map

1.2 Project Background

Coal fired power plants, like NRG's Huntley Generating Station; produce CCW as a result of the power production process. At Huntley, impoundments (dams) were designed and constructed to provide storage and dewatering for the CCW that is produced. CCW impoundment areas at the Huntley facility are referred to as the Pond 1, Pond 2, Pond 3, North Equalization (EQ) Pond, South Equalization Pond and South Ash Settling Pond. Plant north is designated at about 40 degrees west of true north. Unless noted otherwise, directions in this report will be referenced to plant north. Ponds 1, 2 and 3 are located to the north of the plant. The North and South EQ Ponds and the South Pond are located to the south of the plant. Ponds 1 and 2 were commissioned in 1977. The commission date for Pond 3 is unknown. The North and South EQ ponds were commissioned in 1983 and have not been expanded. The South Settling Pond commission date is unknown and the last modification to the pond was performed in 1976 when the outlet channel was relocated for the Erie County Raw Water Intake.

The National Inventory of Dams (NID), administered by the U.S. Army Corps of Engineers (USACE), provides a hazard rating for many dams within the United States. The ash settling ponds at Huntley are not included in the NID. The Huntley ash impoundments are not regulated by the New York State Department of Environmental Conservation and have no hazard potential rating by the state.

1.2.1 Coal Combustion Dam Assessment and Checklist Forms

As part of the observations and evaluations performed at Huntley, AMEC completed EPA's Coal Combustion Dam Assessment Checklists and CCW Impoundment Assessment Forms. Assessment forms for each pond are presented in Appendix A. The Impoundment Inspection Forms include a section that assigns a "Hazard Potential" that is used to indicate what would likely occur following failure of an impoundment. "Hazard Potential" choices include "Less than Low," "Low," "Significant," and "High." As defined on the Assessment Form, dams assigned a Significant Hazard Potential are those dams where "failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant Hazard Potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure". Low Hazard Potential classification definition is reserved for dams where "failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property." Less than Low Hazard Potential classification is reserved for dams where "failure or misoperation results in no probable loss of human life and no economic or environmental losses."

Based on the site visit evaluation of the impoundments, AMEC engineers assigned a "Low Hazard" potential to Pond 1 due to its relatively small size (0.58 acres), and downstream location of Pond 2 and Pond 3. Pond 2, Pond 3, North Equalization Pond, South Equalization Pond and South Settling Pond were assigned a "Significant Hazard" potential. A breach of these ponds would likely result in a release of CCW to the Niagara River causing environmental and economic losses.

1.2.2 State Issued Permits

The New York State Department of Environmental Conservation (DEC) issued a State Pollution Discharge Elimination System (SPDES) Permit to NRG. The DEC number for the facility is 9-

1464-00130/00003 and the current SPDES permit identification number is NY 000 1023. This SPDES Permit authorizes NRG to discharge decant from the ash ponds through multiple outfalls to the Niagara River. The effective date of the permit is June 1, 2003. The permit date of expiration is December 31, 2008. Modification dates are July 19, 2007. The required date to file for renewal of the permit was July 4, 2011. Documentation shows NRG filed for renewal on June 20, 2008. A letter dated June 23, 2008 from the DEC states they are reviewing the renewal and grants the current permit to remain in effect "should the departments technical review and the subsequent permit modification not be completed prior to the expiration date of the current permit." To date, the facility has not been issued a new permit.

1.3 Site Description and Location

The Huntley Generating Station is located at 3500 River Road in the city of Tonawanda, Erie County, New York. NRG provided the following description of the plant location and operations:

> NRG's Huntley Generating Station is located three miles north of Buffalo, NY on a 120-acre site on the east shore of the Niagara River. Though some of the buildings date back to 1916 when the "River Station" first began commercial service, the plant has been continuously modernized and is now comprised of two units totaling a nominal rating of 400 MW. The inactive northern section of the building, known as Huntley 2, housed four Units (Units 63-66) whose commercial operation dates from 1942 through 1954. Units 63 and 64 were retired from service on April 11, 2006 and Units 65 and 66 were retired from service on June 02, 2007. The active southern side of the building, known as Huntley 1, houses two 200 MW units, Units 67 and 68, which entered commercial service in 1957 and 1958, respectively. Huntley Station owns and maintains its own landfill within one mile of the plant for disposal of coal combustion byproducts, which have not been beneficially utilized.

Figure 3, the Critical Infrastructure Map, provides an aerial view of the region and indicates the location of the Huntley ash ponds in relation to schools, hospitals, and other critical infrastructure that is located within approximately 5 miles down gradient of the impoundments. A table that provides names and coordinate data for the infrastructure is included on the map. A Topographic Site Map is included as Figure 1. The Aerial Site Plan, shown on the next page and included in the figures section as Figure 2, provides a view of the pond areas.

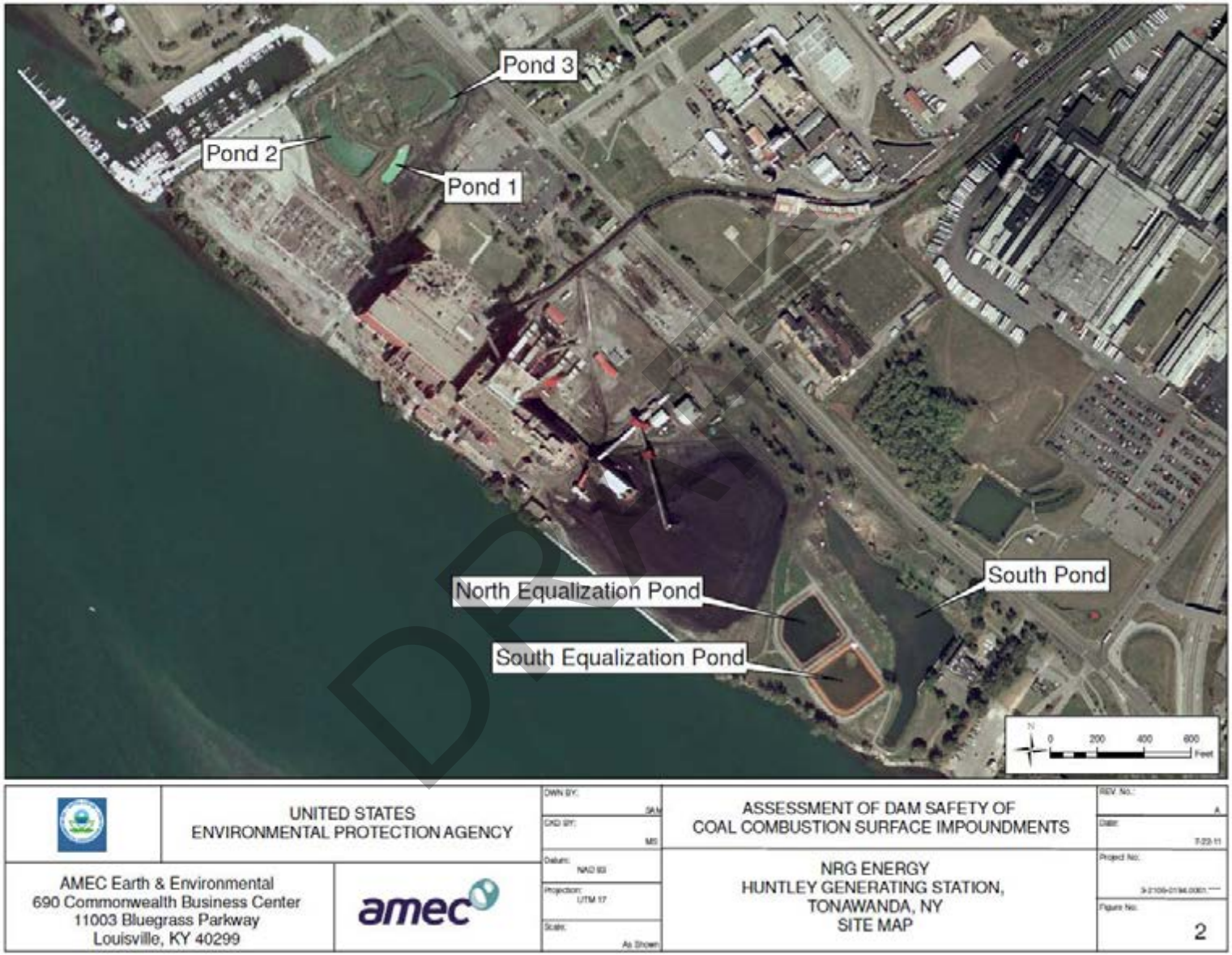


Figure 2. Site Map

1.4 Ash Ponds

A May 15, 2009 document, written by NRG Energy in response to EPA's Request for Information under Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C 9604(e), provided the following general background for the North and South EQ Ponds and the South Settling Pond:

> Both North and South Equalization Ponds temporarily contain fly ash and other materials including coal pile runoff, boiler and air preheater wash water containing coal fines and fly ash, before these materials are treated by the waste water treatment system. Washes are performed periodically and any collected coal fines and fly ash are removed from the basins and transported to the Huntley Station's off-site landfill. The South Settling Pond collects fly ash, bottom ash and boiler slag, including bottom ash and slag from the from the bottom ash and slag handling systems and minor amounts of fly ash from roadway wash down from the vicinity of the fly ash silo. Bottom ash is dredged at the inlet almost weekly, and the remaining areas of the pond are dredged periodically. Fly ash accumulates in the South Settling Pond between dredging.
>
> Based on its review of readily available records, NRG determined the North and South EQ Ponds were initially designed by Staley Consultants and constructed in 1984 under the supervision of the Construction Services Department of the previous owner, Niagara Mohawk Power Corporation (NIMO). NRG could not ascertain who supervised the construction for NIMO. The South Settling Pond Modification was designed by Malcolm Pirnie.
>
> The North and South EQ Basins and the South Settling Pond are not presently inspected or monitored by a professional engineer.

The following ash handling summary detailed below was provided by NRG personnel who are knowledgeable concerning the facility's operational processes:

> The Huntley Station's Ponds 1, 2 and 3 receive flows from drainage from the north wastewater collection system which includes sub-basement sump pumps, Huntley 2 roof and floor drains, auxiliary cooling system drains and demineralized water production wastes. Ponds 2 and 3 discharge into a ditch through SPDES Outfalls 001A and 001B, then into the Niagara River. The North and South Equalization Basins receive flows from the wastewater from the air preheater washes and coal pile runoff sump pumps. The North and South EQ basins are treated by an on-site Wastewater Treatment Facility which discharges into plants Low Level Waste Water Pit through internal SPDES Outfall 007A and ultimately to the Niagara River through the South Settling Pond and SPDES Outfall 008. The South Settling Pond receives flow from sluice waters and suspended solids from Unit 67 and Unit 68 bottom ash and economizer ash systems and discharge from the Low Level Waste Water Pit. The Low Level Pit discharge includes rain water from roadway drains, sub basement sump drains, boiler water releases, Huntley 1 roof and floor drains, auxiliary cooling systems drains and discharge from the Wastewater Treatment facility from treating the North and South EQ basin water.

NRG's May 15, 2009 response to EPA's Request for Information and other provided documentation, as well as recent communications with NRG Energy personnel, provided the following additional information that is specific to each ash pond. Current descriptive

information resulting from the site visit and photographic references are provided in Section 2 of this Assessment Report.

1.4.1 Pond 1

Pond 1 is located on the north side of the plant. Provided plans, *Modification ("MOD.") of North Slag Pond System,* for/by Niagara Mohawk Power Corporation, indicates Pond 1 was constructed in 1977. Pond 1 is relatively small in size and was formally used as an ash settling basin. Plans indicate the pond was constructed with a 6 feet wide clay liner on the south embankment (outside embankment). The pond is shown to have a 1-foot thick clay liner on the 2H:1V interior side slopes and a 2-feet thick clay liner on the bottom. The ash pond is inactive as a CCW impoundment and currently used as the initial receiving pond for flows from the north wastewater collection system. Decant from Pond 1 flows by gravity through pipes and is controlled by gates to Pond 2 or Pond 3. It is assumed the former use of the pond system for ash involved directing the flow of sluiced ash to one of the downstream ponds while the other was allowed to dewater, then after ash was removed the flow was switched to repeat the process. NRG reported the ponds no longer receive ash, but may contain residual ash from their former use. Table 2 provides a summary of surface area, height, storage capacity, and stored material volumes for this pond.

1.4.2 Pond 2

Pond 2 is located on the north side of the plant and was formerly used as an ash setting basin. Provided plans, *Modification ("MOD.") of North Slag Pond System,* for/by Niagara Mohawk Power Corporation, indicates Pond 2 was also constructed in 1977. Plans indicate the pond was constructed with a 6 feet wide clay liner on the west embankment (outside embankment). The pond is shown to have a 1-foot thick clay liner on the 2H:1V upstream slope adjacent to the common dike with Pond 1 and a concrete bottom. The downstream slopes are shown to be on 2H:1V slopes. The ash pond is inactive as a CCW impoundment and currently used as a secondary receiving pond from Pond 1 for flows from the north wastewater collection system. Decant from Pond 2 flows by gravity through a pipe controlled by a gates to a ditch on the north end of the site. The ditch flows west to discharge to the Niagara River. NRG reported the pond no longer receives ash, but may contain residual ash from their former use. Table 2 provides a summary of surface area, height, storage capacity, and stored material volumes for this pond.

1.4.3 Pond 3

Pond 3 is located on the north side of the plant. Plans showing the construction of Pond 3 were not available. A provided plan sheet for the construction of Ponds 1 and 2, *Modification ("MOD.") of North Slag Pond System, 1977*, for/by Niagara Mohawk Power Corporation, indicates Pond 3 was formally called the North Slag Pond. The drawing includes a boring within the proposed (current) Pond 2 location with results showing a top horizon of 12.5 feet of ash. This indicates the North Pond was the original ash pond for the facility and at some previous time may have extended over the entire North Pond System area. The drawing indicates a future expansion of the North Pond, but current conditions indicate the expansion has not been constructed but the pond's name was changed to Pond 3. Pond 3 is currently inactive as a CCW impoundment and is used as a secondary receiving pond from Pond 1 for flows from the north wastewater collection system. Decant from Pond 3 flows by gravity through a pipe controlled by a gates to a ditch on the north end of the site. The ditch flows west to discharge to the Niagara River. NRG reported the pond no longer receives ash, but may contain residual

ash from their former use. Table 2 provides a summary of surface area, height, storage capacity, and stored material volumes for this pond.

1.4.4 North Equalization Basin

The North Equalization Basin (North Basin) is located on the south side of the plant. Provided plans, Coal Pile Drainage Collection System and Equalization Basins, stamped by Charles Meyer with the Niagara Mohawk Power Corporation indicate the North and South Equalization basins were constructed in 1984. Sheet 4 of those plans indicate the basin and coal pile area is located within an "abandoned slag pond." The North Equalization Basin is a partially below-grade, asphalt lined basin. Discharge from the North Basin normally passes through a Wastewater Treatment System and ultimately discharges to the South Settling Pond. Discharge from the basin is controlled by a flow control structure which can direct flows between the equalization basins, to the treatment system or bypass directly to the South Settling Pond. Table 2 provides a summary of surface area, height, storage capacity, and stored material volumes for this pond.

1.4.5 South Equalization Basin

The South Equalization Basin (South Basin) is located on the south side of the plant. The basin is a partially below-grade, asphalt lined basin. Similar to the North Basin, discharge from the South Basin normally passes through a Wastewater Treatment System and ultimately discharges to the South Settling Pond. Discharge from the basin is controlled by a flow control structure which can direct flows between the two equalization basins, to the wastewater treatment system or bypass directly to the South Settling Pond. Table 2 provides a summary of surface area, height, storage capacity, and stored material volumes for this pond.

1.4.6 South Settling Pond

The South Ash Settling Pond is located at the south end of the plant facilities and to the east and south of the two equalization basins. The lower section and outlet of the South Pond previously extended to the south and then to the west to discharge to the river. Modifications occurred in 1976 due to construction of a new raw water intake for the Erie County Water Authority. The lower section was moved to the north to create an almost straight south embankment and a new outlet was installed. Prior to these improvements, the Dunlop Tire plant across River Road discharged to the South Pond. In the early 1980's, an elevated piped system was installed. The pipe is visible within the pond and extends from east to west just inside the south dike then turns southwest out of the pond to its separate outlet structure located off NRG property. The South Pond is the active primary settling pond for the plant and receives sluiced CCW and other wastestreams from the plant. Decant from the South Settling Pond is conveyed by gravity through a 92-inch by 65-inch arched CMP to the Niagara River. Table 2 provides a summary of surface area, height, storage capacity, and stored material volumes for this pond.

Table 2. Pond Size and Storage Data

Area	Surface Area (acre)	Maximum Height of Management Unit (feet)	Storage Capacity (cubic yards)	Stored Material Volume (cubic yards)
North Ponds[1] (Inactive)				
Pond 1	0.58	5	Unknown	Unknown
Pond 2	0.13	7	Unknown	Unknown

Pond 3	0.13	7	Unknown	Unknown
South Ponds[2] (Active)				
North Equalization	1.58	5[3]	10,400	None
South Equalization	1.58	3[3]	11,900	Unknown
South Ash Settling	7.3	6.75[4]	76,600	7,500[5]

[1]Data for north pond system are as reported or derived from values obtained during June 15, 2011 site visit.
[2] Data for south pond system obtained from 2009 NRG response letter to EPA RFI.
[3] Reported as berm height.
[4] Reported as submerged berm height at outfall.
[5] Based on January 7, 2009 survey.

1.5 Previously Identified Safety Issues

Discussions with plant personnel and review of provided documentation indicate that there are no current or previously identified safety issues from the previous five years at the Huntley Generating Station.

1.6 Site Geology

Based on research on the internet, bedrock underlying the Huntley Generating Station consists of dolomite and shale deposits belonging to the Salina group of the Late Silurian period. Research and Attachment A of the provided document *Appendix B - Stormwater Calculations, Analysis of Drainage Outfall No. 7*, performed by Shaw and dated October 2007 shows NRCS to designate the plant "urban soil" and does not provide any descriptions. A boring in the middle and before construction of Pond 2 on a provided plan sheet, *Modification ("MOD.") of North Slag Pond System, 1977*, for/by Niagara Mohawk Power Corporation, indicates the soil strata at that location consisted of 12.5 feet of ash underlain by 9 feet of soft mud underlain by 15 feet of fine sand and silt to the boring termination depth. Recent borings were performed in the area of the outlet at the South Pond to obtain data for a stability analysis. The results of these borings are discussed in Section 3 of this report. No other soil or bedrock data was provided.

1.7 Inventory of Provided Materials

NRG provided documents to AMEC that pertained to the design and operation of the Huntley Generating Station. These documents were used in the preparation of this report and are listed in Appendix C, Inventory of Provided Materials.

2.0 FIELD ASSESSMENT

2.1 Visual Observations

AMEC performed visual assessments of Huntley's Ash Ponds, including Pond 1, Pond 2, Pond 3, North Equalization Basin, South Equalization Basin and the South Pond on June 15, 2011. Assessment of the ash ponds was completed in general accordance with FEMA's *Federal Guidelines for Dam Safety, Hazard Potential Classification System for Dams,* April 2004. The EPA Coal Combustion Dam Assessment Checklist and Coal Combustion Waste (CCW) Impoundment Assessment Form were completed for each ash pond during the site visit and provided to EPA via email within five business days following the site visit. Appendix A contains copies of the completed checklist forms. A Photo Location Map (B-1), as well as descriptive photos, can be found in Appendix B. Additionally, some of the photos are provided in this section for easy reference. Rainfall data for the Tonawanda, New York area was collected for thirty-two days prior to the site visit. Table 3, below, summarizes the rainfall data for the days and month immediately preceding AMEC's site visit.

Table 3. Huntley Rainfall Data

Rainfall Prior to Site Visit	
Date	**Rainfall (in.)**
June 6, 2011	0.00
June 7, 2011	0.19
June 8, 2011	T
June 9, 2011	0.00
June 10, 2011	T
June 11, 2011	T
June 12, 2011	T
June 13, 2011	0.03
June 14, 2011	0.08
Total (9 days prior to visit)	0.30
June Rainfall (14 days prior to visit)	0.64
Total (32 days prior to visit)	6.80

2.2 Visual Observations - Pond 1

Pond 1 is located in the ash management area at the north end of the plant (North Ponds). The pond is situated in the southwest corner of this area. Pond 1 is bordered by a section of Pond 3 and a field to the east, Pond 2 to the north, a substation to the west and the plant grounds to the south. Pipes from the plant for wastewaters (and formerly CCW) enter Pond 1 from pipes on its southwest corner. Dense, tall grass and trees prevented a good view of the area (Photos 1-1 and 1-4). See the following photo presented as 1-1 in Appendix B.

2.2.1 Pond 1 - Embankments and Crest

This pond is incised on the south embankment and diked on the north, east and west embankments. Drawings indicate the land surface elevation on the north side of the pond and common dike with Pond 2 is 579.0 feet. The land surface elevation at the south end of the pond is 580.0 feet. The plan bottom of the pond is 566.0 feet. The lower half of the south bank and the area to the south of Pond 1 was covered with ash. (Photos 1-1 and 3-4). A predominant feature on the upper half of the south bank and all of the north, west and east dikes of the pond was dense, tall grass which hindered the visual assessment of these slopes (Photos 1-1 through 1-5).

2.2.2 Pond 1 - Outlet Control Structures

Pond 1 has outlets to Pond 2 and Pond 3. The location of the outlet pipe to Pond 3 is at the northeast corner of Pond 1 (Photos 1-2 and 1-3). The location of the outlet pipe to Pond 2 is at the northeast embankment of Pond 1 (Photo 1-5). Both outlet pipes are shown on Section 7-7 and 7A-&7A of the provided *Modification ("MOD.") of North Slag Pond System, 1977*, for/by Niagara Mohawk Power Corporation to be 43-inch by 27-inch galvanized arch pipes. The length of the outlet pipes are 70 feet to Pond 2 and 40 feet to Pond 1. Both inlet elevations are 576.1 feet with outlet elevations of 575.7 feet to Pond 3 and 575.4 feet to Pond 2.

2.3 Visual Observations -Pond 2

Pond 2 is located in the ash management area at the north end of the plant (North Ponds). The pond is situated in the northwest portion of this area. Pond 2 is bordered by Pond 3 to the east,

a ditch to the north, a substation to the west and Pond 1 to the south. An inlet pipe from Pond 1 enters Pond 2 at the southeast corner. Plans show the width of the top of the common dike of Pond 2 with Pond 1 as 20 feet. Dense, tall grass prevented a good view of the area. See the following photo presented as 2-1 in Appendix B.

2.3.1 Pond 2 - Embankments and Crest

Pond 2 is a diked structure. Drawings indicate the top of berm elevation as 579.0 feet. The plan bottom of the pond is 570.0 feet. Dense, tall grass prevented a good view of the interior and exterior slopes (Photo 2-1, 2-2, 2-5, 2-6 and 2-7). A feature at the northwest corner of the pond consists of a concrete ramp leading down into the pond (Photo 2-2).

2.3.2 Pond 2 - Outlet Control Structures

Pond 2 discharges flow by gravity through a 24-inch diameter gated culvert pipe located on the north dike (Photo 2-3). The flow discharges to a ditch that slopes from east to west along the north boundary of the property and then west to the Niagara River. “Fabriform” slope protection is present upstream and downstream in the outfall area. See the following photo of the outfall area presented as 2-4 in Appendix B. Three other 15-inch diameter gated pipes are present at the outlet and are reported to include an emergency overflow, a bottom drain and unknown drain. The inlet and outlet elevations of the 24-inch pipe are 576.3 and 569.0 feet, respectively.

2.4 Visual Observations - Pond 3

Pond 3 is located in the ash management area at the north end of the plant (North Ponds). The pond is situated in the east section of this area. Pond 3 is the original pond in this area and previously designated as the "North Slag Pond." Pond 3 is bordered by an open field and River Road to the east; a ditch to the north; an open field with towers, Pond 2 and Pond 1 to the west; and an open field and plant grounds to the south. An inlet pipe from Pond 1 enters Pond 3 at the southwest end of the pond. Plans show the width of the top of the common dike of Pond 3 with Pond 1 as 20 feet, or more. Dense, tall grass prevented a good view of the inlet area (Photo 3-1).

2.4.1 Pond 3 - Embankments and Crest

Pond 3 appears to be incised on the interior west embankment and diked on the east, north, south and inlet dikes. Drawings indicate the top of berm elevations range from about 581 to 582 feet on south side to about 576 to 579 feet on the north side. Although as-built information was not available for this pond, sections shown for future improvements (to-date not constructed) indicate a bowl-like shape with generally steeper than 2H:1V side slopes. The elevation of the berms appeared higher during the site visit, but dense, tall grass and occasional trees prevented a good view of the interior and exterior slopes (Photos 3-2 through 3-8). See the following photo presented as 3-2 in Appendix B.

2.4.2 Pond 3 - Outlet Control Structures

Pond 3 discharges flow by gravity through an 18-inch diameter gated culvert pipe located on the north dike (Photos 3-9). Skimmer booms are located upstream of the outlet pipe (Photo 3-10). The flow discharges to a ditch that slopes from east to west along the north boundary of the property and then west to the Niagara River (Photo 3-11). This ditch receives discharge from Pond 3 and Pond 2. The inlet and outlet elevations of the 18-inch pipe are 574.3 and 573.4 feet, respectively.

2.4 Visual Observations - North Equalization Basin

The North Equalization Basin, or Equalization Basin No. 1, is located in the ash management area at the south end of the plant (South Ponds). The North Basin is situated in the northwest section of this area. The basin is bordered by the coal pile area to the north, an open area and the South Pond to the east, the South Equalization basin to the south, and an open area and the Niagara River to the west. A 12-inch diameter inlet pipe from the flow control structure enters the basin at the southeast corner. Plans show the width of the top of the common dike of the North and South Equalization Basins as 12 feet (Photo NEQ-6).

2.5.1 North Equalization Basin - Embankments and Crest

The North Equalization Basin is incised on the north embankment and diked on the east, south and west. Drawings indicate the top of berm (crest) elevation is 580.3 feet. The bottom,

upstream slopes, crest and portions of the downstream slopes have an asphalt liner. The liner is shown to consist of 2-inches of binder and 2-inches of surface for a total 4-inch asphalt cover. The lined slopes and crest appeared to be in fair condition with red staining on the lower sections of the upstream slopes and areas of cracks with or without protruding vegetation in several locations (Photos NEQ-1 through NEQ-6). The downstream slopes, especially on the west dike appeared to be in poor to fair condition with more degradation of the asphalt liner as evidenced by more protruding vegetation (Photo NEQ-4 and NEQ-7). As you proceed south along the west dike, the North Basin is located approximately 185 feet to 110 feet from the edge of the bank of the Niagara River. The following photo presented as NEQ-3 in Appendix B presents a view of the crest and the upstream and downstream slopes of the basin.

2.5.2 North Equalization Basin - Outlet Control Structures

The North Equalization Basin discharges flow through a 6-inch pipe to the flow control structure. The outlet pipe is located at the bottom and in the southwest corner of the pond. The inlet and outlet pipes to the pond were under water and could not be seen during the site visit. Plant personnel dictate the location of the discharge from the basin by the flow control structure.

2.6 Visual Observations - South Equalization Basin

The South Equalization Basin, or Equalization Basin No. 2, is located adjacent and south of the North Equalization Basin in the ash management area at the south end of the plant (South Ponds). The South Basin is situated in the west-central section of this area. The basin is bordered by the north basin to the north, an open area and the South Pond to the east, an open

area and the South Pond to the south, and an open area and/or the Niagara River to the west. An 12-inch diameter inlet pipe from the flow control structure enters the basin at the northeast corner. Plans show the width of the top of the common dike of the North and South Equalization Basins as 12 feet. See the following photo presented as NEQ-6 in Appendix B.

2.6.1 South Equalization Basin - Embankments and Crest

The South Equalization Basin is a diked impoundment. Drawings indicate the top of berm elevation is 580.3 feet. The bottom, upstream slopes, crest and portions of the downstream slopes have the same type and thickness of asphalt liner as the north basin. The lined slopes and crest appeared to be in fair condition with slight red staining on the lower sections of the upstream slopes and areas of cracks with or without protruding vegetation in several locations (Photos SEQ-1 through SEQ-4). The downstream slopes, especially on the west dike appeared to be in poor to fair condition with more degradation of the asphalt liner as evidenced by more protruding vegetation (Photo SEQ-3 and SEQ-4). As you proceed south along the west dike, the South Basin is located approximately 100 feet to 35 feet from the edge of the bank of the Niagara River (Photos SEQ-3 through SEQ-5). From the southwest corner of the South Basin looking south, the outlet pipe of the South Pond can be seen (Photo SEQ-6). The following photo presented as SEQ-3 in Appendix B presents a view of the southwest corner of the basin, Niagara River in background.

2.6.2 South Equalization Basin - Outlet Control Structures

The South Equalization Basin discharges flow through a 6-inch pipe to the flow control structure. The outlet pipe is located at the bottom and in the northwest corner of the pond. The inlet and outlet pipes to the pond were under water and could not be seen during the site visit. Plant personnel dictate the location of the discharge from the basin by the flow control structure.

2.7 Visual Observations - South Ash Pond

The South Settling Pond System, also known as the South Ash Pond is located in the ash management area at the south end of the plant (South Ponds). The South Pond is situated in the east and south end of this area. The basin is bordered by the coal pile and an access road to the north, an open area and River Road to the east, the plant property boundary to the south, and bothe equalization basins and the Niagara River to the west. CCW flows directed by the flow control structure and other plant wastes enter the South Pond through multiple pipes that discharge at the north end of the pond (Photo S-1). Flow through the pond is to the south (as the pond widens) then turns to the west (as the pond narrows) to discharge to the Niagara River.

The South Pond is used to settle and remove ash on a regular basis. The north end of the pond is dredged regularly and the dewatered ash is transported to an off-site landfill. Periodically, the entire pond is dredged, with the last time occurring in 2009. No construction plans or other drawings are available for the South Pond.

2.7.1 South Ash Pond - Embankments and Crest

The South Ash Pond was reported to be a combination incised and diked impoundment. The north and west sections are incised and the west and south sections are diked. Based on a survey drawing prior to the recent dredging, the top of the banks of the South Pond generally range from about 578 feet at the north end to 574 feet at the southwest end/outlet area. The drawing indicates generally lower top of bank areas at the southeast corner and along the south bank.

At the time of the field assessment, the upstream slopes at the north end of the South Pond were steep and void of vegetation (Photo S-2 and S-8). Generally, all other upstream slopes, crests and downstream slopes were covered with high grass preventing a good view of the slopes (Photos S-2, S-3, S-5, S-9 and S-10). Steep slopes appeared to be present on the inside of the curve on the west embankment and at the southeast end of the pond (Photos S-2 and S-10). See the following photo presented as S-2 in Appendix B.

2.7.2 South Ash Pond - Outlet Control Structures

The South Pond was modified in 1984. This modification included the southwest end of the pond and the outlet structure. The South Pond discharges flow by gravity through a 92-inch by 65-inch arched CMP located on the southwest dike (Photos S-3, S-4, S-6 and S-7). Skimmer booms are located upstream of the outlet pipe and the upstream slope is armored with rip-rap

(Photo S-4 and S-7). The flow discharges to the Niagara River with grouted rip-rap slopes upstream and downstream of the outlet pipe (Photo S-6). The inlet and outlet elevations of the 92-inch by 65-inch arched CMP are 568.8 and 565.0 feet, respectively. See the following photo presented as S-4 in Appendix B showing the inlet of the outlet pipe.

See the following photo presented as S-6 in Appendix B showing the outlet pipe area to the Niagara River.

2.8 Monitoring Instrumentation

There is no geotechnical or groundwater monitoring instrumentation associated with the Impoundments located at the Huntley Power Station.

3.0 DATA EVALUATION

3.1 Design Assumptions

AMEC has reviewed provided documentation related to design assumptions regarding both hydraulic adequacy and dike stability. However, some design assumptions were not available in the documentation, and have been listed as not provided where necessary.

3.2 Hydrologic and Hydraulic Design

3.2.1 Long Term Hydrologic Design Criteria

The Mine Safety and Health Administration provides minimum hydrologic criteria relevant to CCW impoundments in Impoundment Design Guidelines of the Mining Safety and Health Administration (MSHA) Coal Mine Impoundment Inspection and Plan Review Handbook (Number PH07-01) published by the U.S. Department of Labor, Mine Safety and Health Administration, Coal Mine Safety and Health, October 2007.

When detailing impoundment design storm criteria, MSHA states that dams need "to be able to safely accommodate the inflow from a storm event that is appropriate for the size of the impoundment and the hazard potential in the event of failure of the dam." Additionally, MSHA notes that sufficient freeboard, adequate factors of safety for embankment stability, and the prevention of significant erosion to discharge facilities, are all design elements that are required for dam structures under their review. Additional impoundment and design storm criteria are as shown in Table 4, MSHA Minimum Long Term Hydrologic Design Criteria.

Table 4. MSHA* Minimum Long Term Hydrologic Design Criteria

Hazard Potential	Impoundment Size	
	< 1000 acre-feet < 40 feet deep	**≥ 1000 acre-feet ≥ 40 feet deep**
Low - Impoundments located where failure of the dam would result in no probable loss of human life and low economic and/or environmental losses.	100 - year rainfall**	½ PMF
Significant/Moderate - Impoundments located where failure of the dam would result in no probably loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities.	½ PMF	PMF
High - Facilities located where failure of the dam will probably cause loss of human life.	PMF	PMF

*Mining Safety and Health Administration (MSHA) Coal Mine Impoundment Inspection and Plan Review Handbook (Number PH07-01) published by the U.S. Department of Labor, Mine Safety and Health Administration, Coal Mine Safety and Health, October 2007

**Per MSHA, the 24-hour duration shall be used with the 100-year frequency rainfall.

Probable maximum flood (PMF) is, per MSHA, "the maximum runoff condition resulting from the most severe combination of hydrologic and meteorological conditions that are considered reasonably possible for the drainage area." Additionally, MSHA notes the designer should consider several components of the PMF that are site specific. These components are said to

include: “antecedent storm; principal storm; subsequent storm; time and spatial distribution of the rainfall and snowmelt; and runoff conditions.” Basic agreement, it was noted, exists between dam safety authorities regarding “combinations of conditions and events that comprise the PMF;” however, there are “differences in the individual components that are used.” MSHA provided the following as a “reasonable set of conditions for the PMF:

- Antecedent Storm: 100-year frequency, 24 hour duration, with antecedent moisture condition II (AMC II), occurring 5 days prior to the principal storm.

- Principal Storm: Probable maximum precipitation (PMP), with AMC III. The principal storm rainfall must be distributed spatially and temporally to produce the most sever conditions with respect to impoundment freeboard and spillway discharge.

- Subsequent Storm: A subsequent storm is considered to be handled by meeting the “storm inflow drawdown criteria,” as described subsequently in the document.

With regard to storm influent drawdown criteria, MSHA Impoundment Design Guidelines noted that:

> *Impoundments must be capable of handling the design storms that occur in close succession. To accomplish this, the discharge facilities must be able to discharge, within 10 days, at least 90 percent of the volume of water stored during the design storm above the allowable normal operating water level. The 10-day drawdown criterion begins at the time the water surface reaches the maximum elevation attainable for the design storm. Alternatively, plans can provide for sufficient reservoir capacity to store the runoff from two design storms, while specifying means to evacuate the storage from both storms in a reasonable period of time - generally taken to be at a discharge rate that removes at least 90% of the second storm inflow volume within 30 days……When storms are stored, the potential for an elevated saturation level to affect the stability of the embankment needs to be taken into account.*

In, Mineral Resources, Department of Labor, Mine Safety and Health Administration, Title *30 CFR § 77.216-2 Water, sediment, or slurry impoundments and impounding structures; minimum plan requirements; changes or modifications, certification*, information relevant to the duration of the probable maximum precipitation is given. Sub-section *(10)* of *77.216-2* states that a “statement of the runoff attributable to the probable maximum precipitation of 6-hour duration and the calculations used in determining such runoff” shall be provided at minimum in submitted plans for water, sediment or slurry impoundments and impounding structures.

The definition of design freeboard, according to the MSHA Guidelines, is “the vertical distance between the lowest point on the crest of the embankment and the maximum water surface elevation resulting from the design storm.” Additionally, the Handbook states that “Sufficient documentation should be provided in impoundment plans to verify the adequacy of the freeboard.” Recommended items to consider when determining freeboard include “potential wave run-up on the upstream slope, ability of the embankment to resist erosion, and potential for embankment foundation settlement.” Lastly, the Handbook states, “Without documentation, and absent unusual conditions, a minimum freeboard of 3 feet is generally accepted for impoundments with a fetch of less than 1 mile.”

The CCW impoundments at the Huntley Power Station fall within the middle storm event designation category on Table 4. Using MSHA long term hydrologic criteria, design for the ½ PMF rainfall event would be recommended.

3.2.2 Hydrologic Design Criteria

AMEC was provided the following documents with hydraulic calculations:

Analysis of Drainage Outfall No. 7 Calculations dated October, 2007 by Shaw, Stone and Webster, Inc. (Huntley Stormwater Calcs, Part 1).

Analysis of Drainage at Filter Building calculations dated October, 2008 by Shaw, Stone and Webster, Inc. (Huntley Stormwater Calcs, Part 2).

These two documents represent stormwater calculations for only a portion of the site in the filter building area. No hydrologic and hydraulic study specifically for the North Ponds - Pond 1, Pond 2 and Pond 3 and the South Ponds - North Equalization Basin, South Equalization Basin, and South Ash Settling Basin were provided.

3.3 Structural Adequacy & Stability

EPA policy for conventional minimum recommended factors of safety for different loading conditions is shown in Table 6 below.

Table 6. Minimum Stability Factors of Safety

Loading Condition	Minimum Factor of Safety
Rapid Drawdown	1.3
Long-Term Steady Seepage	1.5
Seismic Loading	1.0

To consider the structural adequacy and stability of the ash ponds at the Huntley Generating Station, AMEC reviewed stability analysis material provided by NRG with respect to the load cases shown in Table 6. Factors of safety documented in the provided material were compared with those factors outlined in the table to help determine whether the impoundments meet the requirements for acceptable stability.

AMEC reviewed the July 1, 2009 report entitled *Settling Pond Outlet Embankment Evaluation* prepared by GZA for the Huntley Generating Station prepared for NRG Energy. This report is presented in Appendix D. The completed stability analyses are summarized in Section 3.3.1. The GZA analysis included a study of one cross-section at the southwest dike (outlet area) of the South Settling Pond, as shown on Figure 4. The report presented a summary of the data that was reviewed including a geotechnical exploration that included three borings performed in the study area by Earth Dimensions, Inc. and laboratory test results by GZA as well as the reasoning, methods employed and results of the structural stability analyses performed for one cross-section. The procedures used and factors of safety documented in the provided material were compared with those factors outlined in Table 6 to help determine whether the impoundments meet the requirements for acceptable stability.

GZA evaluated the overall stability of the South Pond by reviewing the cross-section and drilling data for their study, as shown on Figure 5. The report summarizes the soils conditions encountered in the borings as follows:

> *• Overburden Fill: The fill thickness varied between test borings including 12.0 feet at B-I, 14 feet at B-2, and 10 feet at B-3. The soils sampled were visually described as varying between gravel and slag in the upper portions of the fill soil to a silt and fine sand soil in the lower portions. Smaller amounts of brick, concrete and wood fragments were observed throughout the fill material. The fill soil samples were predominantly course grained and non-plastic.*
>
> *• Silt and Fine Sand: The depth of the silt and fine sand soil encountered varied from about 12 to 14 feet bgs in B-1 and B-2 respectively and is about 8 feet thick. The recovered samples were visually described as generally a dark gray to gray silt and fine sand soil (ML). The silt content of the soil samples tested for grain size ranged from about 53% (B-1) to 55% (B-2) and the clay content ranged from 7% to 9%, respectively, indicating the soil is predominately fine-grained and silt-sized. Atterberg limits were not tested on these soils as they were observed in the field as non plastic.*
>
> *• Sand - A well graded sand layer including very fine sand to coarse sand was observed at depths ranging from about 20 to 22 feet bgs and its presence continued to the end of each boring (26 feel bgs).*

The report describes the "Existing Embankment Conditions" as:

> *The soils encountered in B-1 and B-2 generally consists of a fine to coarse grained fill material over a silt and fine sand layer over a well graded sandy soil. At the boring locations, the composition of the fill material was variable with a greater amount of coarse soil (sand, gravel and slag and lesser amounts of concrete, brick and wood debris) noted closer to the ground surface. Finer grained, sandy silt soils were observed in the lower portions of the fill layer. The soil encountered below the fill and below the water line was predominately a loose silt and fine sand soil (about 6 to 7 feet thick) over a well graded sandy soil.*
>
> *SPT "N" values from the silt and fine sand layer underlying the fill soils (about 12 to 14 feet bgs) were measured with values ranging from about 2 to 7 indicating a loose relative density.*
>
> *The "N" values of 2 to 7 measured and recorded for the silt and fine sand soils sampled below the water table may not be representative of in-situ conditions. More representative "N" values may be higher. During soil sampling and SPT work, a hydrostatic in-balance was present due to a higher assumed groundwater elevation outside the HSAs, compared to inside the HSAs. This hydrostatic in-balance may result in a disturbance at the bottom of the HSAs in the zone where split-spoon sampling and SPT work occurred. Earth Dimensions attempted to maintain a water column inside the hollow stem augers during sampling through the saturated soil layer that balanced the outer water pressure.*
>
> *SPT "N" values from the fill soils located above the silt and fine sand and the well graded sandy soils below were generally observed to be higher.*

Groundwater elevations obtained immediately after drilling ranged from 563.1 feet to 565.8 feet. The groundwater elevation in B-2 after the water was allowed to stabilize

overnight was 565.6 feet. Other elevations used or considered include the water elevation of the Niagara River at approximately 566 feet and the water elevation in the South Pond at 570.0 feet.

The cross-section analyzed at the southwest end of the South Pond corresponds to the outlet embankment. The report describes the section as:

> *This embankment was generally observed to have an asphalt pavement access road over its top portion. Rip rap armor was observed on the side slopes between the asphalt and the shorelines on both sides of the embankment. The rip rap located on the settlement pond side has a grassy vegetation cover and the rip rap on the Niagara River side is interlocked with a cement grout, a limited amount of vegetation is present.*

The report notes the side slopes are generally observed to be 3H:1V. Measurements on the submitted stability analyses plots indicate a top width of about 20 feet with 8 to 10-feet wide slightly sloping shoulders and side slopes of 3.5H:1V on the downstream slope and 3H:1V on the upstream slope. Sheet 3 of the design drawings for the "Intake Modification" shows the section for the South Pond outlet, but the design slopes are not clearly labeled/represented.

Laboratory work included limited tests to determine classification and consistency, such as measurement of natural water content and sieve analyses. Soil strength of cohesive material was determined using one consolidated undrained triaxial compression test. The triaxial test results for the sandy silt provided two strength parameter scenarios (noted as 1 and 2 in Table 7). It appears that cohesionless shear strengths were correlated to blow counts. Table 7 provides a summary of the soil properties utilized in GZA's report.

Table 7. Soil Properties for Stability Analysis

Material	Unit Weight γ (lb/ft^3) Dry/Wet	Friction Angle, σ' (Degrees)	Cohesion, c' (lb/ft^2)
Rip-Rap Cover	140/140	40	0
Fill	128/130	30	0
Sandy Silt (1)	120.5/124.5	19	560
Sandy Silt (2)	120.5/124.5	25	0
Sand	130/132	32	0

3.3.1 South Ash Pond - Structural Adequacy & Stability

Static Analysis - South Ash Pond

The South Ash Pond was analyzed for static long term conditions utilizing soil strengths described above. The slope stability analyses were performed using the computer program PCSTABL (version 6). GZA provided, as Attachment 3 of their report, plots from the program showing the cross-section which outlines their estimated soil profiles along with their corresponding soil parameters and stability analyses results. The cross-section utilized for the South Ash Pond includes a top width of about 20 feet with 8 to 10-feet wide slightly sloping shoulders and side slopes of 3.5H:1V on the downstream slope and 3H:1V on the upstream slope. The section has a top of dike elevation of about 575 feet, a downstream toe elevation of 566 feet at the Niagara River shoreline and an upstream toe elevation of 570 feet at the pond

shoreline. The analysis included the phreatic surface through the embankment from the normal pond elevation to the normal river elevation.

The results of GZA's stability analyses indicated minimum factors of safety of 1.79 and 1.78 for circular failure surfaces and minimum factors of safety of 3.53 and 2.20 for block failure surfaces on the exterior face of the outlet dike. The two sets of factors of safety for each case are based on the sandy silt (1) and sandy silt (2) parameters, respectively (as discussed above and shown in Table 7).

In their evaluation of the results, GZA states: "*Slopes with factors of safety greater than 1.5 are generally considered in a stable condition."* GZA also provides an infinite slope analysis using a friction angle of 30 degrees and a slope angle of about 18.4 degrees (corresponding to a 3H:1V slope) and a resultant factor of safety of 1.7. GZA states because the factor of safety is greater than 1.5, a shallow slope failure is not expected to occur. They also note additional slope stability is provided by the rip-rap which was not utilized in the infinite slope analysis.

In the considerations and recommendations section of the report GZA notes the section as measured and evaluated indicates the embankment is stable. They note surficial erosion on the downstream slope due to the Niagara River did not appear to be an issue. GZA recommended periodic inspection and maintenance of the grouted rip rap and clay pipe drains on the downstream slope and the outlet pipe from the basin.

Seismic Analysis - South Ash Pond

A seismic analysis was not performed for the outlet cross-section of the South Ash Pond, but is addressed in the *Considerations and Recommendations* section of the report:

> *Although it is our opinion that the embankment is stable in its current condition, there is the possibility that the silt and fine sand soils located below the fill material may be susceptible to liquefaction resulting from seismic activity. Liquefaction of the soil may cause it to "flow" (i.e, become liquid) and be displaced by the overlying embankment fill. Based on our observations and evaluation of the settling pond embankment, it is our opinion that the embankment would have a hazard rating classification of low to remote.*
>
> *This soil, a loose lacustrine deposited soil, is located beneath the groundwater table and appears to be of relatively uniform size (tine sand and silts with low SPT "N" values recorded from the test borings). Based on these observations and a limited literature review pertaining to liquefaction potential[1,] this soil unit may have characteristics that make it prone to "possible" or "probable" liquefaction.*
>
> *We note that the impact of liquefaction experienced by a soil material is a function of the intensity of seismic activity and other site specific factors. It is our opinion that if the silt and fine sand soil were to experience liquefaction, it is unlikely that the embankment would experience catastrophic failure (i.e., entire embankment sliding into the river allowing uncontrolled now from the settlement basin). Rather, the embankment may undergo settlement from the displacement of the silt and fine sand layer beneath the embankment requiring repair and maintenance.*

[1]Simplified Procedure for Evaluating Soil Liquefaction Potential, Seed, H.B; Idriss, I.M.; Journal of the Soil Mechanics and Foundation Division, ASCE; Sept 1971.

3.3.2 Additional Stability Analyses

Stability analyses were not presented for Pond 1, Pond 2, Pond 3, and the North and South Equalization Basins. Pond 1 is approximately half the size of the larger Pond 2 and Pond 3. Pond 1 has common dikes with these ponds and would most likely fail into Pond 2 or Pond 3 with relatively insignificant hydrologic and structural impact if such a failure should occur. Based on configuration alone, Pond 2 would have a more critical cross-section than Pond 3. However, embankment and foundation conditions would need to be studied to confirm the critical section(s). Likewise, the South Equalization Basin appears to have a more critical section than the adjacent North Equalization Basin, but conditions would need to be studied to confirm.

3.4 Foundation Conditions

Foundation conditions for the South Pond were provided in the July 2009 Settling Pond Outlet Embankment evaluation presented in Section 3.3.

The provided *Modification ("MOD.") of North Slag Pond System, 1977*, for/by Niagara Mohawk Power Corporation with plans, sections and details shows a boring in the area of the present Pond 2. The boring indicates a soil profile from the surface as 12.5 feet of ash underlain by 3 feet of soft mud underlain by 13 feet of fine sand and silt. Based on the limited provided information for the foundation soils, there is no evidence the exterior embankments of Ponds 1, 2 and 3 and the South Ash Pond are built over wet ash, slag or other unsuitable materials.

One of the provided plans for the construction of the North and South Equalization Basins, Sheet C-34738, indicate an unknown area of the coal pile and basin(s) are located within an "Abandoned Slag Pond" (shown in lower right of drawing). This drawing is presented in Appendix E. No other information on this former slag pond was provided. Based on the limited provided information, there is inconclusive evidence the North and South Equalization Ponds are built over wet ash, slag or other unsuitable materials.

3.5 Operations and Maintenance

3.5.1 Safety Assessments

NRG reported weekly inspections of the North Ponds (Ponds 1, 2 and 3) and daily inspections of the South Ponds (North and South Equalization Basins and the South Ash Settling Pond) by plant personnel. The inspections are not documented. No other plant or consultant inspection documentation addressing the stability of the impoundments was provided.

3.5.2 Instrumentation

Based on the provided documents, groundwater monitoring wells are present on the plant property. There is no geotechnical or groundwater monitoring instrumentation for the embankments of the ponds at the Huntley Power Station.

3.5.3 State or Federal Inspections

No State or Federal inspections regarding the condition of the ponds have taken place at the Huntley Power Station.

4.0 COMMENTS AND RECOMMENDATIONS

Condition assessment definitions, as accepted by the National Dam Safety Review Board, are as follows:

SATISFACTORY

No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.

FAIR

No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.

POOR

A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. POOR may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.

UNSATISFACTORY

A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

NOT RATED

The dam has not been inspected, is not under state jurisdiction, or has been inspected but, for whatever reason, has not been rated.

4.1 Acknowledgement of Management Unit Conditions

I certify that the management units referenced hereinafter were personally assessed by me and was found to be in the following condition:

NORTH PONDS

Pond 1: Poor

Pond 2: Poor

Pond 3: Poor

SOUTH PONDS

North Equalization Basin: Poor

South Equalization Basin: **Poor**

South Ash Settling Pond: **Poor**

4.2 Recommendations

In the assessing engineers opinion Pond 1 is rated in Poor condition due to lack of hydrologic and static and seismic stability analysis documentation. Pond 1 is relatively small in size and would most likely fail into Pond 2 or Pond 3 with relatively insignificant hydrologic and structural impact if such a failure should occur. The condition of Pond 1 is relatively sound and not requiring immediate attention.

Pond 2, Pond 3, North Equalization Basin and South Equalization Basin were rated Poor due to lack of documentation; specifically,

1) Hydrologic and hydraulic study for the ponds, and
2) Stability analysis for the ponds.

The Poor rating for these ponds reflect the fact that, uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary. In addition, vegetation on the embankments of the North Ponds (Ponds 1, 2 and 3) and on/below the west embankments of the North and South Equalization Basins was too high to inspect the embankments closely.

The South Ash Settling Pond was rated Poor due to lack of documentation; specifically,

1) Hydrologic and hydraulic study for the pond, and
2) More complete stability analysis for the ponds.

The Poor rating for the South Ash Settling Pond reflects the fact that, uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary. In addition, vegetation on the embankments of the South Pond was generally too high to inspect the embankments closely.

The EPA is currently working to complete final rules for the CCW assessment program. Additionally, condition ratings noted in this *Report of Dam Safety Assessment of Coal Combustion Surface Impoundments* represent a snapshot in time. If the following recommendations are implemented and acceptable levels of protection are shown, it may be possible to improve the condition ratings.

4.2.1 Hydrologic and Hydraulic Recommendations

All North and South Ponds

AMEC recommends that an appropriate design storm rainfall and freeboard depth in accordance with MSHA guidelines be applied to each impoundment‘s watershed to assess whether the dam and decant system can safely store, control, and discharge the design flow. MSHA suggests a minimum freeboard of 3 feet as described in Section 3.2.1 of this Assessment Report. However, in AMEC’s opinion, a freeboard increase to at least 18 inches above the design storm water surface elevation, would merit improved condition ratings to the level of Fair for this analysis. Based on the size and rating for Pond 2, Pond 3, North

Equalization Basin, South Equalization Basin and South Ash Pond, the MSHA recommended design storm would be the ½ PMF event. Since Pond 1 discharges to Ponds 2 and 3, it should be included in the study for the North Ponds with the same design storm. Hydraulic calculations should also be completed to determine the rate at which the discharge system could pass the design storm, if necessary, or draw down elevated water surfaces following such an event. The analysis should consider all critical stages over the life of the pond including full pond conditions and flood stage of the Niagara River.

4.2.2 Geotechnical and Stability Recommendations

Conventional minimum factor of safety criteria are 1.3 for rapid drawdown, 1.5 for static long-term stability and 1.0 for earthquake stability (by pseudo-static method). Likewise, if the dam does not meet the seismic factor of safety, then the stability of the embankment should be analyzed and the amount of embankment deformation or settlement that may occur should be evaluated to assure that sufficient section of the crest will remain intact to prevent a release from the impoundment.

North Ponds (Ponds 1, 2 and 3), North and South Equalization Basins

Stability analysis was not presented for these ponds. AMEC recommends a study of the embankment stability for these ponds be performed by a professional engineer.

Vegetation on the embankment slopes of the North Ponds and below the west embankment of both basins was too tall to inspect the embankments closely. No visible signs of major slope failures were observed. AMEC recommends NRG periodically mow the impoundment areas to allow inspection of the embankments and detection of any problems.

Drawing C-34738 shows an "Abandoned Slag Pond" in the area of the North and South Equalization Basins (and coal pile). No other information on this former slag pond was provided. The removal or presence of this material should be confirmed with documentation or exploration. If present, the extent and effects of the slag material on the stability of the embankments should be analyzed.

South Ash Settling Pond

A July 2009 report by GZA, titled *Settling Pond Outlet Embankment Evaluation,* for the Huntley Generating Station presents stability analyses for the South Ash Pond. One cross section was analyzed for static long term conditions. The location of the cross section was selected to represent the most critical area on the southwest or outlet embankment.

From the results of a triaxial test for the silt and fine sand layer, GZA presents two effective strength scenarios. AMEC agrees with the strength parameter of 0 psf for cohesion and 25 degrees for the internal friction angle (a 560 psf cohesion value is questionable for a non-plastic silt and sand). Based on this parameter and applicable analysis, the report provides a minimum factor of safety of 1.78 on a circular failure surface for the stability of the embankment. On review of the other soil strength parameters provided in the report, the friction angle used for the fill (30 degrees) may be high due to the presence of soft zones and debris noted in the boring. Using the Infinite Slope Analysis as presented in the report for a 3H:1V slope, a friction angle of 26 degrees corresponds to a factor of safety of 1.46, neglecting the additional slope stability provided by the surface rip-rap. Based on the Infinite Slope Analysis, it appears that the calculated factor of safety of the outlet embankment of the South Pond approximately meets the minimum required factor of safety from Table 6 .

Although the provided report comments on liquefaction due to seismic activity, a seismic stability analysis is not presented. AMEC recommends that the analysis be revised to include a seismic analysis. The analysis should be reviewed after completion of the recommended hydraulic study to evaluate elevated phreatic conditions and the need for a rapid drawdown analysis based on flood and receding waters of the Niagara River.

Vegetation on the embankment slopes of the South Ash Pond was too tall to inspect the embankments closely. Although step interior slopes were observed, no visible signs of major slope failures affecting the overall stability of the embankments were observed. AMEC recommends NRG periodically mow the area to allow inspection of the embankments and detection of any problems.

4.2.3 Inspection Recommendations

Inspection procedures at the Huntley Generating Station include weekly (North Ponds) and daily (South Ponds), undocumented inspection of the grounds by plant personnel.

AMEC recommends NRG perform periodic documented inspections of the impoundments, preferably bi-annual inspections with one performed by a Professional Engineer, either by a consultant or by internal, off-site personnel. Maps and/or photos, preferably both, can maintain a visual record of the location of problems and can be used to develop work orders. Inspection reports should be maintained by the facility. Additionally, routine inspections (daily or weekly) performed by facility O&M personnel could be supported by an inspection checklist to serve as documentation of the inspection. A record of work items can also be used to document work performed and work needed to be done.

Vegetation on the impoundments should be aggressively managed. We further recommend that vegetation be managed based on guidance in (a) Corps of Engineers EM 1110-2-301, *Guidelines for Landscape Planting and Vegetation Management at Floodwalls, Levees, and Embankment Dams* and (b) FEMA 534, *Technical Manual for Dam Owners: Impacts of Plants on Earthen Dams*. Additionally, animal impact can be mitigated based on guidance in FEMA 473, *Technical Manual for Dam Owners: Impacts of Animals on Earthen Dams*.

5.0 CLOSING

This report is prepared for the exclusive use of the Environmental Protection Agency for the site and criteria stipulated herein. This report does not address regulatory issues associated with storm water runoff, the identification and modification of regulated wetlands, or ground water recharge areas. Further, this report does not include review or analysis of environmental or regional geo-hydrologic aspects of the site, except as noted herein. Questions or interpretation regarding any portion of the report should be addressed directly by the geotechnical engineer.

Any use, reliance on, or decisions to be made based on this report by a third party are the responsibility of such third parties. AMEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The conclusions and recommendations given in this report are based on visual observations, our partial knowledge of the history of Huntley's impoundments, and information provided to us by others. This report has been prepared in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

APPENDIX A

EPA COAL COMBUSTION DAM INSPECTION CHECKLISTS AND COAL COMBUSTION WASTE IMPOUNDMENT INSPECTION FORMS DATA - OCTOBER 2010

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Huntley Generating Station	Date: June 15, 2011
Unit Name: Pond 1	Operator's Name: NRG Energy Inc.
Unit I.D.:	Hazard Potential Classification: **High** **Significant** **Low** (Low circled)
Inspector's Name: Don Dotson/AMEC and James Black/AMEC	

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

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Weekly		18. Sloughing or bulging on slopes?	See Comment	
2. Pool elevation (operator records)?	576.3+/-		19. Major erosion or slope deterioration?	See Comment	
3. Decant inlet elevation (operator records)?	See Comment		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	579.0 ft		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below): See Note		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)	X		At isolated points on embankment slopes?	See Comment	
10. Cracks or scarps on crest?	See Comment		At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?	See Comment		Over widespread areas?		X
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?	X	
17. Cracks or scarps on slopes?	See Comment		24. Were Photos taken during the dam inspection?	X	

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

Inspection Issue # Comments

1. By plant personnel, not documented.

3. Invert Elevation 576.1 feet to Pond 2 and Pond 3, regulated by gates.

9. Tree diameter estimated at 4-inches.

10, 11, 17, 18, 19 and 21 Couldn't see due to high vegetation.

23. Common outlet dikes with Pond 2 and Pond 3.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # NY0001023 INSPECTOR Dotson/Black

Date June 15, 2011

Impoundment Name Huntley Pond 1
Impoundment Company NRG Energy
EPA Region 2
State Agency (Field Office) Address

Name of Impoundment Huntley Pond 1
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update

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

IMPOUNDMENT FUNCTION: Inactive CCW impoundment, currently receives other wastewater from plant.

Nearest Downstream Town : Name Tonawanda, NY
Distance from the impoundment approx. 3 miles
Impoundment
Location: Longitude -78 Degrees 55 Minutes 55.34 Seconds
Latitude 42 Degrees 58 Minutes 22.5 Seconds
State NY County Erie

Does a state agency regulate this impoundment? YES NO X

If So Which State Agency?

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

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

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

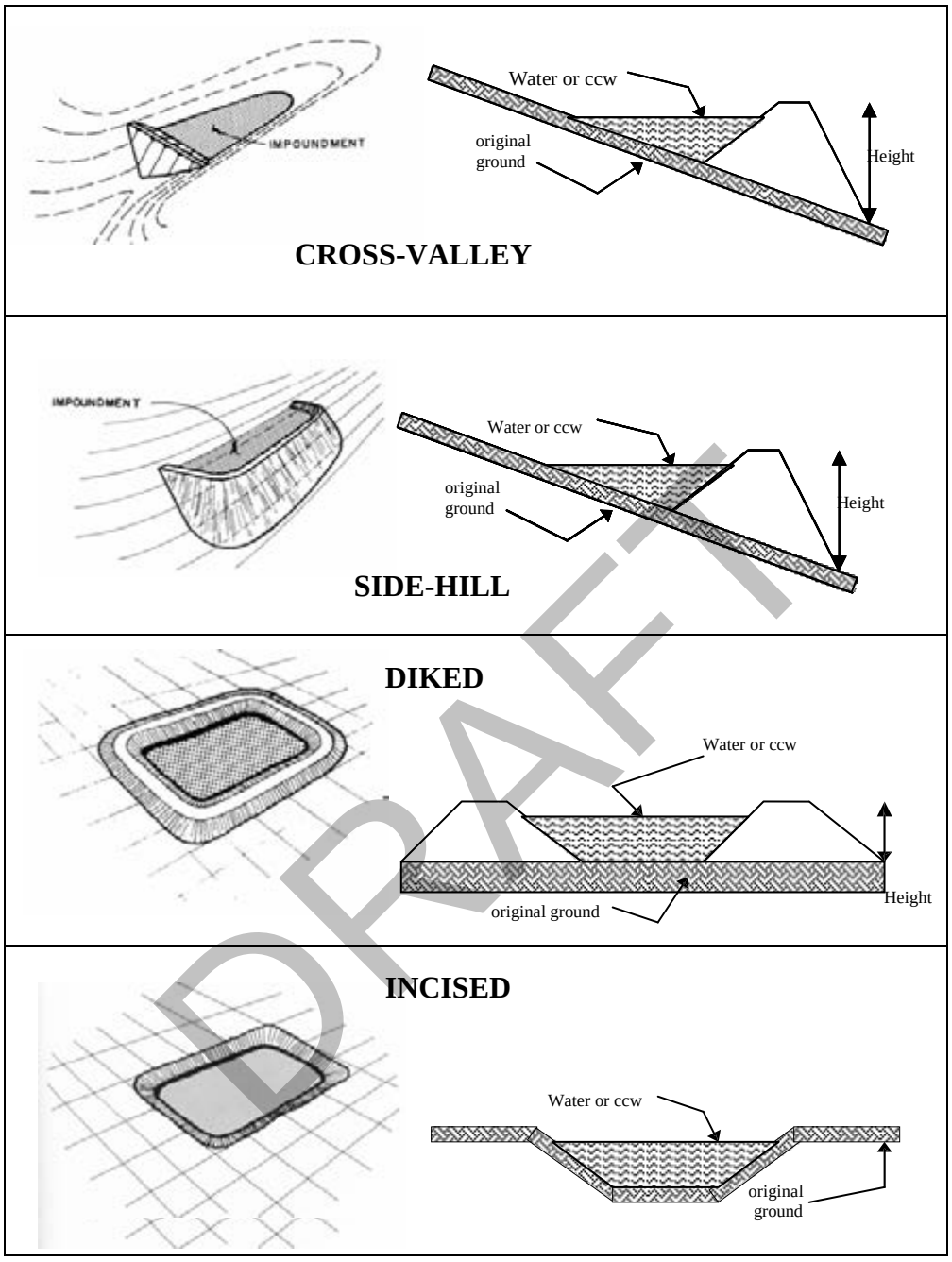
_____**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

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

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Small pond discharging to Pond 2 and Pond 3. Unlikely failure would be to one of these ponds with little impact.

CONFIGURATION:



_____Cross-Valley
_____Side-Hill
_____Diked
_____Incised (form completion optional)
__X__Combination Incised/Diked

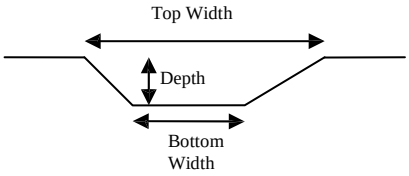
Embankment Height __0-5_____feet Embankment Material Unknown
Pool Area ___0.58_____ acres Liner _No_____
Current Freeboard __2.7_____ feet Liner Permeability _N/A_____

TYPE OF OUTLET (Mark all that apply)

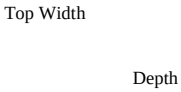
_____Open Channel Spillway
_____Trapezoidal
_____Triangular
_____Rectangular
_____Irregular

_____depth
_____bottom (or average) width
_____top width

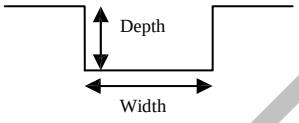
TRAPEZOIDAL



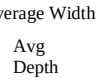
TRIANGULAR



RECTANGULAR

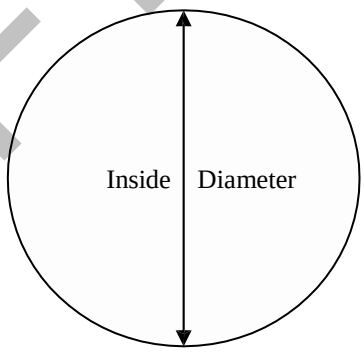


IRREGULAR



__X__Outlet

(2) 43”x27” inside diameter
Discharge pipes to Pond 2 and Pond 3



Material
__X__corrugated metal
_____welded steel
_____concrete
_____plastic (hdpe, pvc, etc.)
_____other (specify) _____

Is water flowing through the outlet? YES __X__ NO _____

_____No Outlet

_____Other Type of Outlet (specify) _____

The Impoundment was Designed By Niagara Mohawk Power Corporation

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

If So When? _____

If So Please Describe : _____

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

If So When? _____

IF So Please Describe: _____

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

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

If so Please Describe : _____

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Huntley Generating Station	Date: June 15, 2011
Unit Name: Pond 2	Operator's Name: NRG Energy Inc.
Unit I.D.:	Hazard Potential Classification: High (Significant) Low
Inspector's Name: Don Dotson/AMEC and James Black/AMEC	

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

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Weekly		18. Sloughing or bulging on slopes?	See Comment	
2. Pool elevation (operator records)?	576.3		19. Major erosion or slope deterioration?	See Comment	
3. Decant inlet elevation (operator records)?	575.3		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	579.0		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?	See Comment	
10. Cracks or scarps on crest?	See Comment		At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?	See Comment		Over widespread areas?		X
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes?	See Comment		24. Were Photos taken during the dam inspection?	X	

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

Inspection Issue # Comments

1. By plant personnel, not documented.

10, 11, 17, 18, 19 and 21. Couldn't see due to high vegetation.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # NY0001023 INSPECTOR Dotson/Black

Date June 15, 2011

Impoundment Name Huntley Pond 2
Impoundment Company NRG Energy
EPA Region 2
State Agency (Field Office) Address

Name of Impoundment Huntley Pond 2
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update

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

IMPOUNDMENT FUNCTION: Inactive CCW impoundment, currently receives flow from Pond 1.

Nearest Downstream Town : Name Tonawanda, NY
Distance from the impoundment approx. 3 miles
Impoundment
Location: Longitude -78 Degrees 55 Minutes 58.41 Seconds
Latitude 42 Degrees 58 Minutes 23.93 Seconds
State NY County Erie

Does a state agency regulate this impoundment? YES NO X

If So Which State Agency?

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

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

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

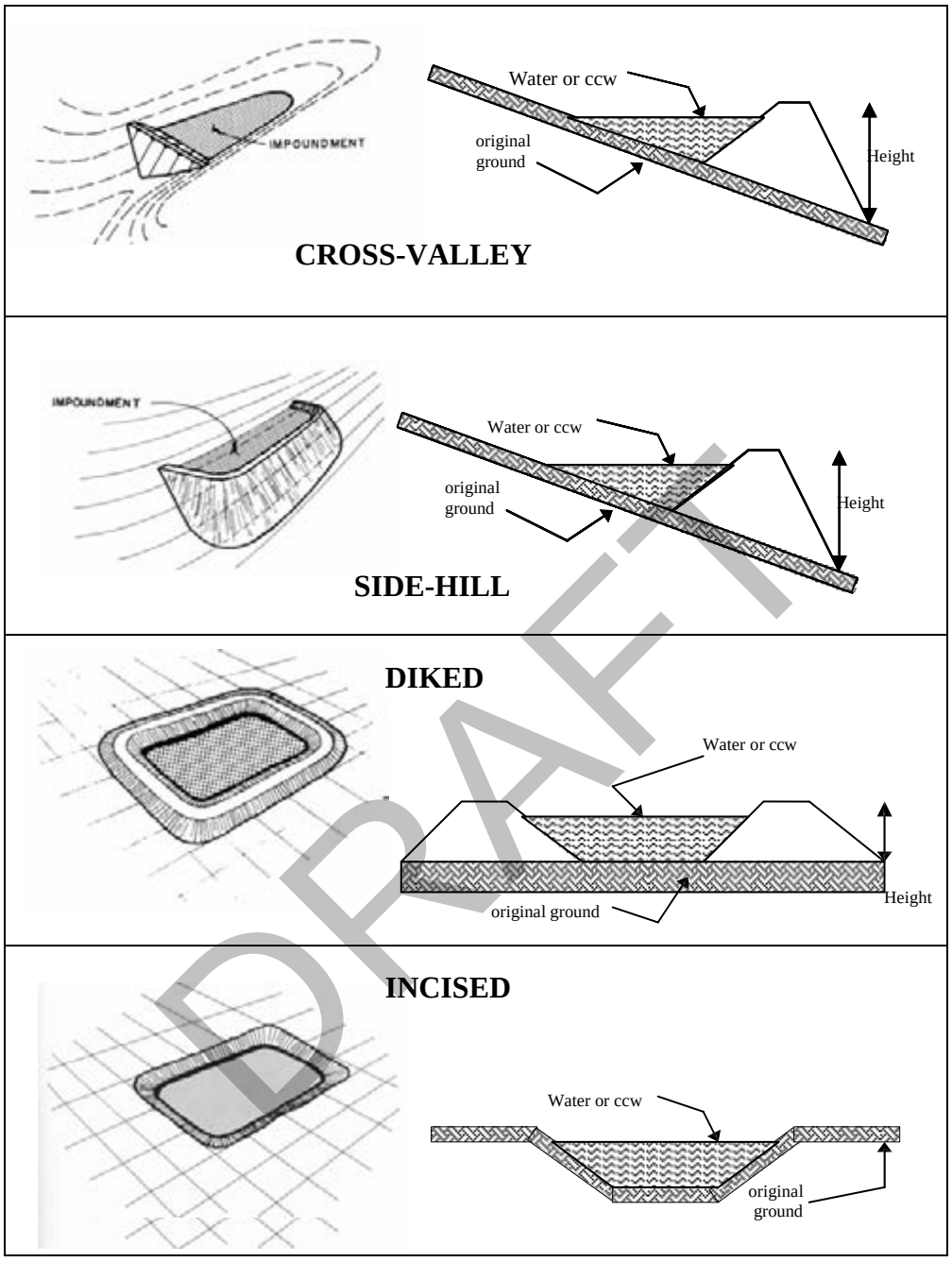
__X__**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

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

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Release from Pond 2 outlets to ditch discharging to Niagara River. Failure would cause economic and/or environmental damage.

CONFIGURATION:



_____Cross-Valley
_____Side-Hill
__X__Diked
_____Incised (form completion optional)
_____Combination Incised/Diked

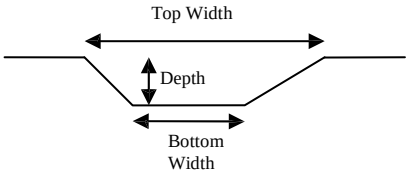
Embankment Height 10 feet Embankment Material Unknown
Pool Area 1.03 acres Liner No
Current Freeboard 2.7 feet Liner Permeability N/A

TYPE OF OUTLET (Mark all that apply)

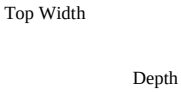
_____Open Channel Spillway
_____Trapezoidal
_____Triangular
_____Rectangular
_____Irregular

_____depth
_____bottom (or average) width
_____top width

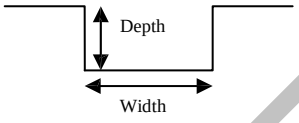
TRAPEZOIDAL



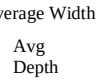
TRIANGULAR



RECTANGULAR

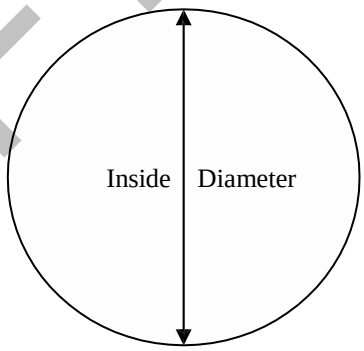


IRREGULAR



__X__Outlet

24” inside diameter
Normally used decant pipe, others present.



Material
__X__corrugated metal
_____welded steel
_____concrete
_____plastic (hdpe, pvc, etc.)
_____other (specify) _____

Is water flowing through the outlet? YES __X__ NO _____

_____No Outlet

_____Other Type of Outlet (specify) _____

The Impoundment was Designed By Niagara Mohawk Power Corporation

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

If So When? _____

If So Please Describe : _____

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

If So When? _____

IF So Please Describe: _____

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

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

If so Please Describe : _____

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Huntley Generating Station	Date: June 15, 2011
Unit Name: Pond 3	Operator's Name: NRG Energy Inc.
Unit I.D.:	Hazard Potential Classification: High (Significant) Low
Inspector's Name: Don Dotson/AMEC and James Black/AMEC	

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

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Weekly		18. Sloughing or bulging on slopes?	See Comment	
2. Pool elevation (operator records)?	574.9+/-		19. Major erosion or slope deterioration?	See Comment	
3. Decant inlet elevation (operator records)?	574.35		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	578.0		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)	X		At isolated points on embankment slopes?	See Comment	
10. Cracks or scarps on crest?	See Comment		At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?	See Comment		Over widespread areas?		X
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes?	See Comment		24. Were Photos taken during the dam inspection?	X	

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

Inspection Issue #	Comments
1.	By plant personnel, not documented.
9.	Tree diameter estimated at 4-inches.
10, 11, 17, 18, 19 and 21.	Couldn't see due to high vegetation.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # NY0001023 INSPECTOR Dotson/Black

Date June 15, 2011

Impoundment Name Huntley Pond 3
Impoundment Company NRG Energy
EPA Region 2
State Agency (Field Office) Address

Name of Impoundment Huntley Pond 3
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update

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

IMPOUNDMENT FUNCTION: Inactive CCW impoundment, currently receives flow from Pond 1.

Nearest Downstream Town : Name Tonawanda, NY
Distance from the impoundment approx. 3 miles
Impoundment
Location: Longitude -78 Degrees 55 Minutes 52.30 Seconds
Latitude 42 Degrees 58 Minutes 26.01 Seconds
State NY County Erie

Does a state agency regulate this impoundment? YES NO X

If So Which State Agency?

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

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

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

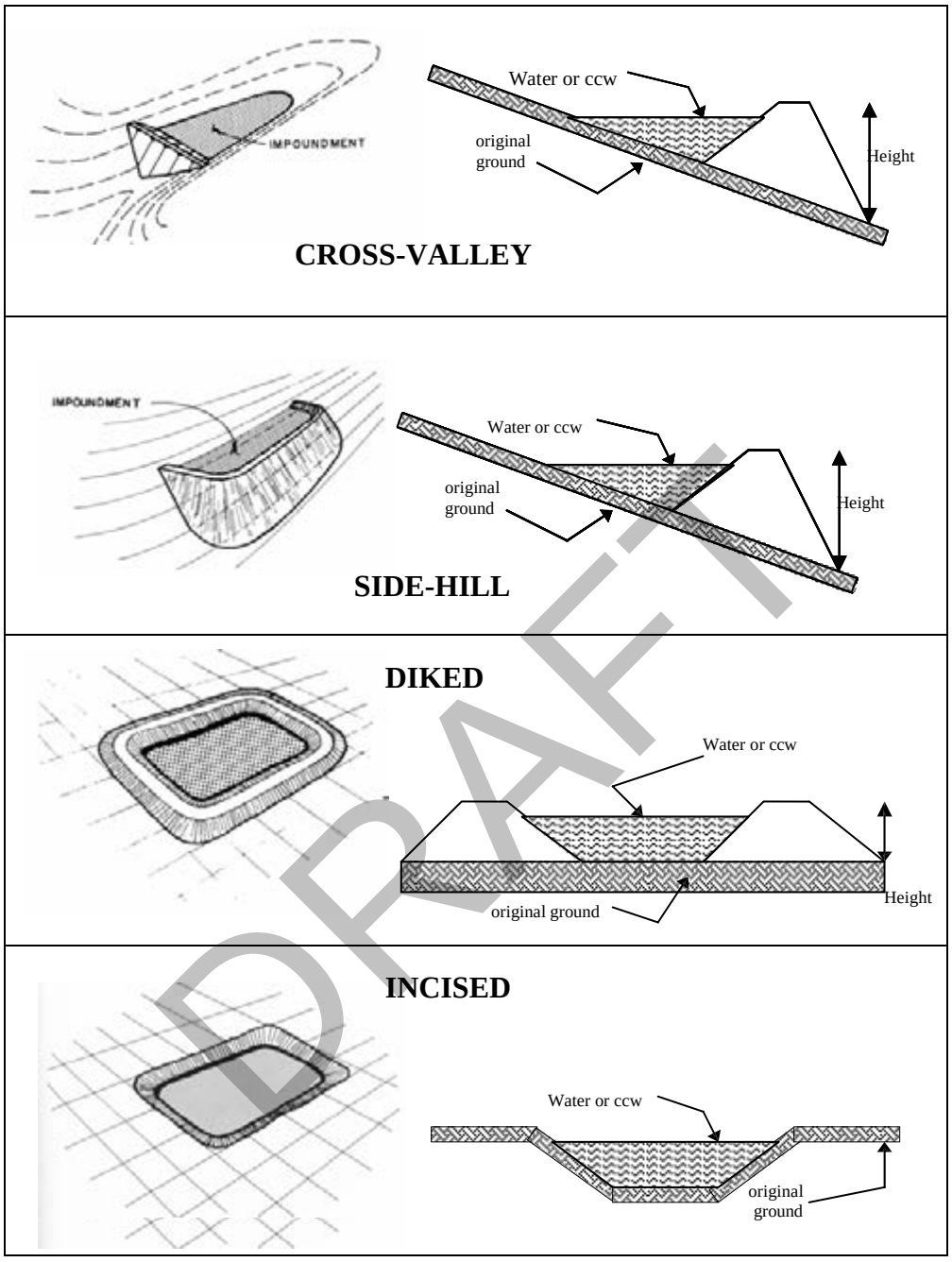
__X__**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

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

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Release from Pond 3 outlets to ditch discharging to Niagara River. Failure would cause economic and/or environmental damage.

CONFIGURATION:



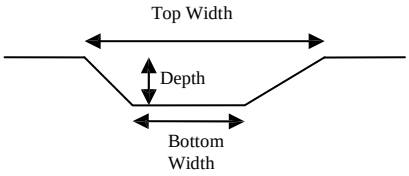
_____Cross-Valley
_____Side-Hill
_____Diked
_____Incised (form completion optional)
__X__Combination Incised/Diked

Embankment Height __+/- 9_____feet Embankment Material Unknown
Pool Area ___1.15_____ acres Liner _No_____
Current Freeboard __3.1_____ feet Liner Permeability _N/A_____

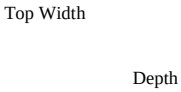
TYPE OF OUTLET (Mark all that apply)

_____Open Channel Spillway
_____Trapezoidal
_____Triangular
_____Rectangular
_____Irregular

TRAPEZOIDAL

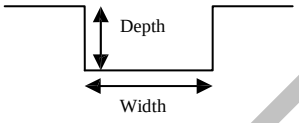


TRIANGULAR

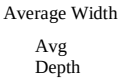


_____depth
_____bottom (or average) width
_____top width

RECTANGULAR

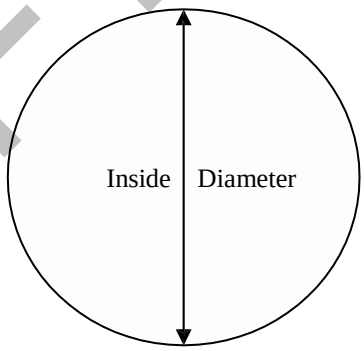


IRREGULAR



__X__Outlet

18” inside diameter



Material
__X__corrugated metal
_____welded steel
_____concrete
_____plastic (hdpe, pvc, etc.)
_____other (specify) _____

Is water flowing through the outlet? YES __X__ NO _____

_____No Outlet

_____Other Type of Outlet (specify) _____

The Impoundment was Designed By Unknown

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

If So When? _____

If So Please Describe : _____

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

If So When? _____

IF So Please Describe: _____

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

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

If so Please Describe : _____

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Huntley Generating Station	Date: June 15, 2011
Unit Name: North Equalization Basin	Operator's Name: NRG Energy Inc.
Unit I.D.:	Hazard Potential Classification: High (Significant) Low
Inspector's Name: Don Dotson/AMEC and James Black/AMEC	

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

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Daily		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	See Comment		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	571.8		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	580.0		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?	See Comment	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?	See Comment		23. Water against downstream toe?		X
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

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

Inspection Issue # Comments

1. By plant personnel, not documented.
2. Pool elevation regulated through Flow Control Structure by plant personnel.

16 and 20. Decant pipes submerged on bottom of pond, regulated as above.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # NY0001023 INSPECTOR Dotson/Black

Date June 15, 2011

Impoundment Name Huntley North Equalization Basin
Impoundment Company NRG Energy
EPA Region 2
State Agency (Field Office) Address

Name of Impoundment Huntley North Equalization Basin
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update

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

IMPOUNDMENT FUNCTION: Settling basin, low amounts of CCW, can decant to South Eq. Basin or South Pond.

Nearest Downstream Town : Name Tonawanda, NY
Distance from the impoundment approx. 3 miles
Impoundment
Location: Longitude -78 Degrees 55 Minutes 36.63 Seconds
Latitude 42 Degrees 58 Minutes 00.77 Seconds
State NY County Erie

Does a state agency regulate this impoundment? YES NO X

If So Which State Agency?

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

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

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

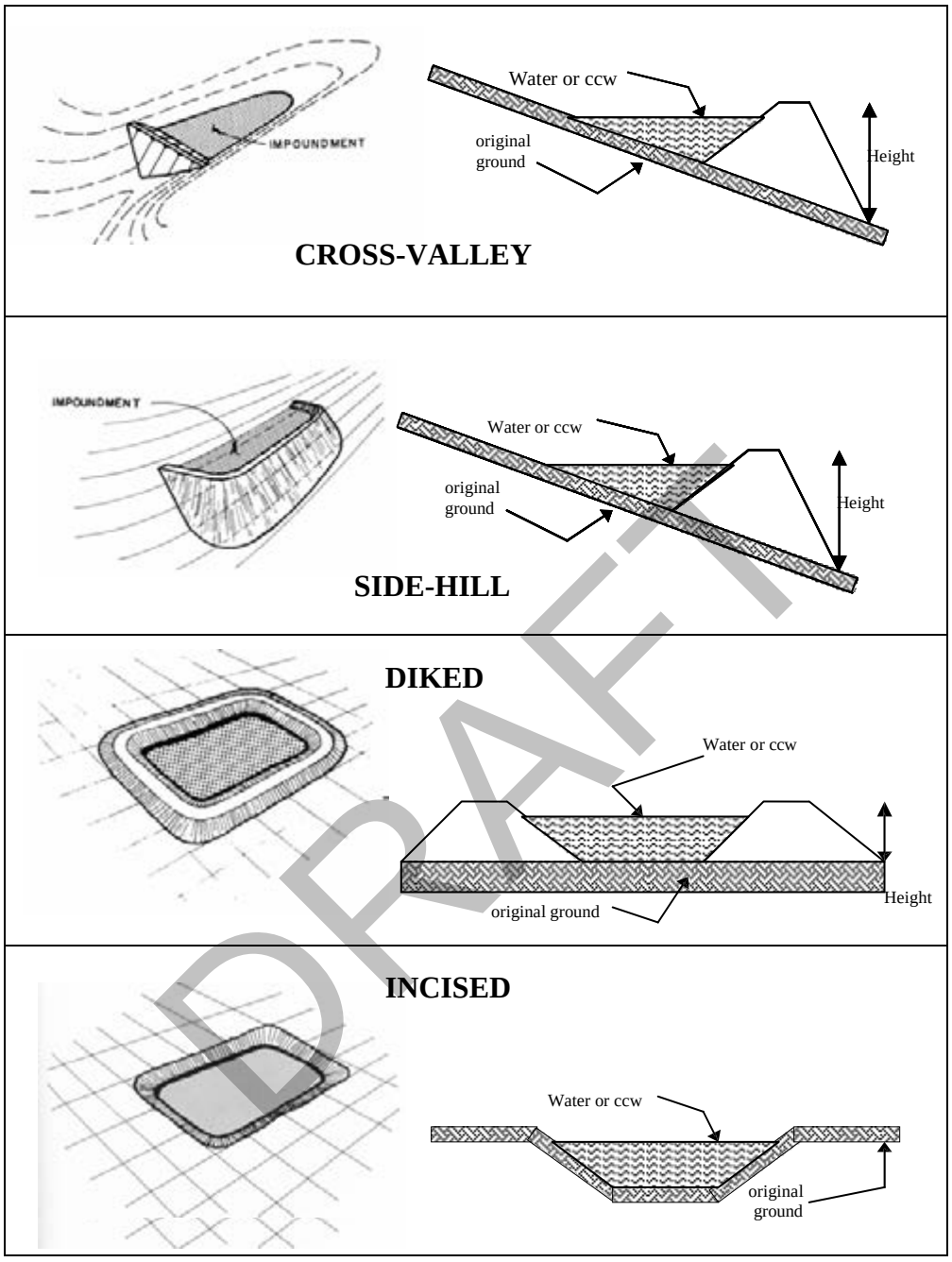
__X__**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

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

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Release from basin would discharge to Niagara River causing economic and/or environmental damage.

CONFIGURATION:



_____Cross-Valley
_____Side-Hill
_____Diked
_____Incised (form completion optional)
__X__Combination Incised/Diked

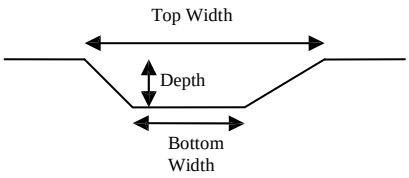
Embankment Height __3_____ feet Embankment Material Clay
Pool Area __1.576_____ acres Liner _Asphalt (Interior and Exterior)___
Current Freeboard __5_____ feet Liner Permeability _Unknown_____

TYPE OF OUTLET (Mark all that apply)

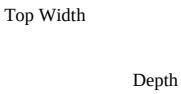
_____Open Channel Spillway
_____Trapezoidal
_____Triangular
_____Rectangular
_____Irregular

_____depth
_____bottom (or average) width
_____top width

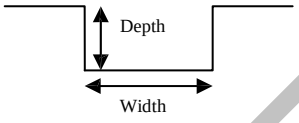
TRAPEZOIDAL



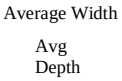
TRIANGULAR



RECTANGULAR

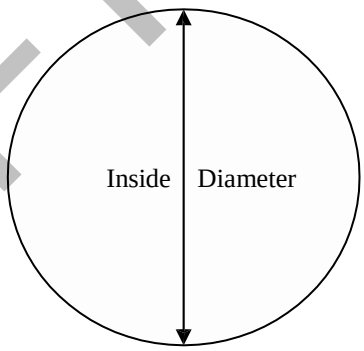


IRREGULAR



__X__ Outlet

__6”__ inside diameter



Material
_____corrugated metal
_____welded steel
_____concrete
_____plastic (hdpe, pvc, etc.)
__X__other (specify) Unknown, probably HDPE

Is water flowing through the outlet? YES __*__ NO _____
*** Outlet Submerged**

_____No Outlet

_____Other Type of Outlet (specify) _____

The Impoundment was Designed By Stanley Consultants

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

If So When? _____

If So Please Describe : _____

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

If So When? _____

IF So Please Describe: _____

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

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

If so Please Describe : _____

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Huntley Generating Station	Date: June 15, 2011
Unit Name: South Equalization Basin	Operator's Name: NRG Energy Inc.
Unit I.D.:	Hazard Potential Classification: High (Significant) Low
Inspector's Name: Don Dotson/AMEC and James Black/AMEC	

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

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Daily		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	See Comment		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	572.3		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	580.0		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?	See Comment	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	See Comment		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe?	See Comment	
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?	See Comment		23. Water against downstream toe?	X	
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

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

Inspection Issue # Comments

1. By plant personnel, not documented.
2. Pool elevation regulated through Flow Control Structure by plant personnel.

12, 16 20 and 21. Decant pipes submerged on bottom of pond, regulated as above.

23. Downstream slope at southwest corner daylights to bench above and adjacent to Niagara River. Crest to river approximately 50 feet at southwest corner.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # NY0001023 INSPECTOR Dotson/Black

Date June 15, 2011

Impoundment Name Huntley South Equalization Basin
Impoundment Company NRG Energy
EPA Region 2
State Agency (Field Office) Address

Name of Impoundment Huntley South Equalization Basin
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update

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

IMPOUNDMENT FUNCTION: Settling basin, low amounts of CCW, can decant to North Eq. Basin or South Pond.

Nearest Downstream Town : Name Tonawanda, NY
Distance from the impoundment approx. 3 miles
Impoundment
Location: Longitude -78 Degrees 55 Minutes 35.08 Seconds
Latitude 42 Degrees 57 Minutes 58.45 Seconds
State NY County Erie

Does a state agency regulate this impoundment? YES NO X

If So Which State Agency?

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

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

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

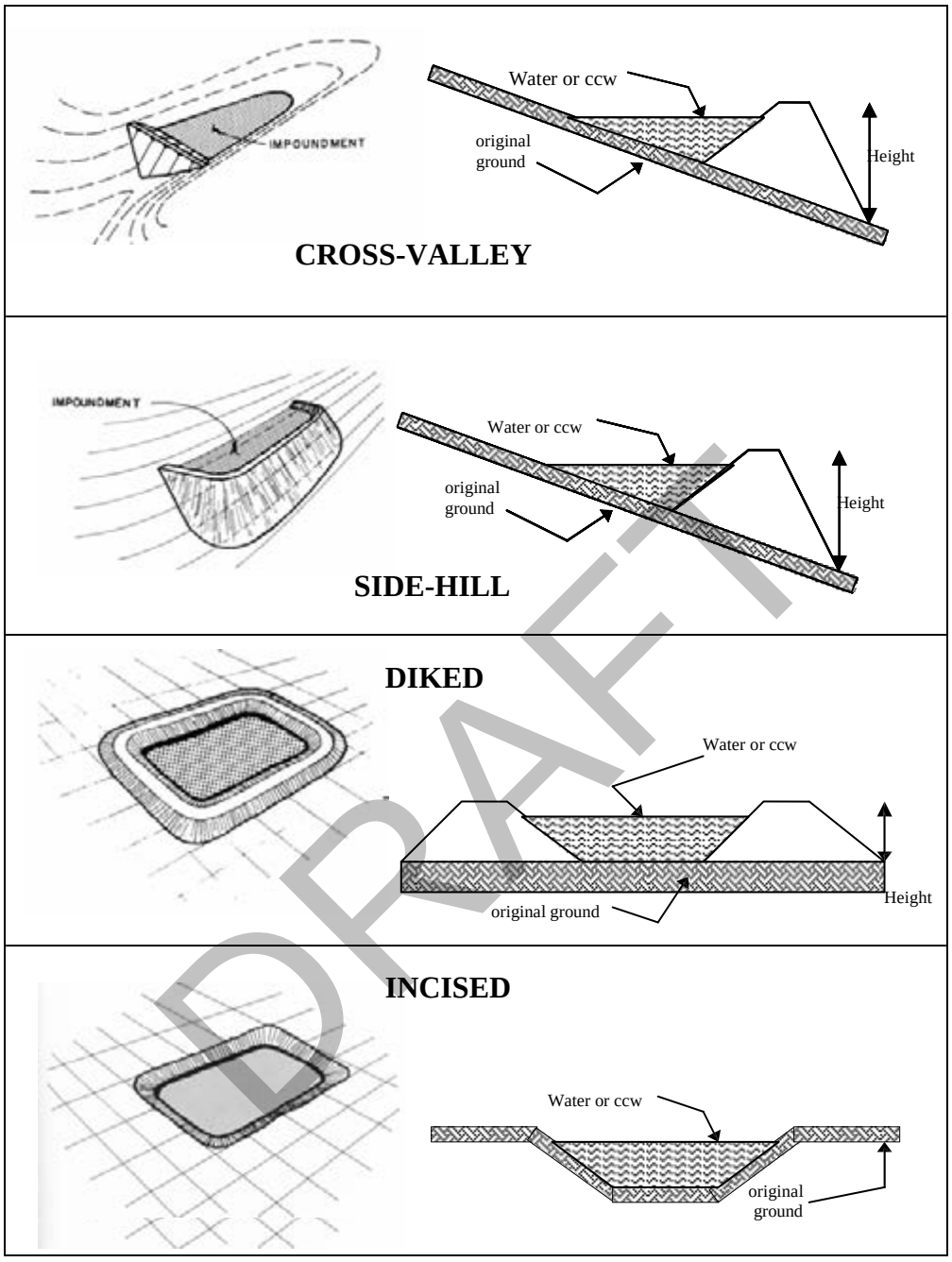
__X__**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

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

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Release from basin would discharge to Niagara River causing economic and/or environmental damage.

CONFIGURATION:



_____Cross-Valley
_____Side-Hill
_____Diked
_____Incised (form completion optional)
__X__Combination Incised/Diked

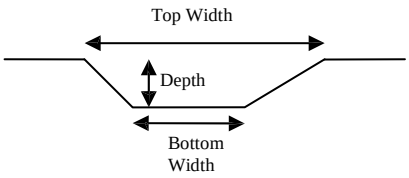
Embankment Height __5__ feet Embankment Material Clay
Pool Area __1.576__ acres Liner Asphalt (Interior and Exterior)
Current Freeboard __5__ feet Liner Permeability Unknown

TYPE OF OUTLET (Mark all that apply)

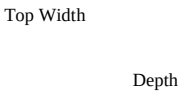
_____Open Channel Spillway
_____Trapezoidal
_____Triangular
_____Rectangular
_____Irregular

_____depth
_____bottom (or average) width
_____top width

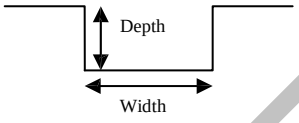
TRAPEZOIDAL



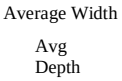
TRIANGULAR



RECTANGULAR

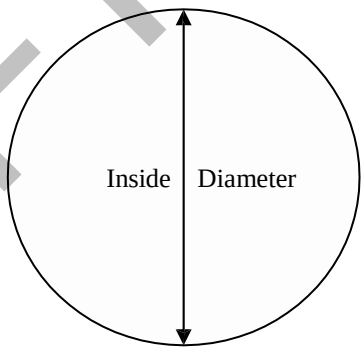


IRREGULAR



__X__ Outlet

__6”__ inside diameter



Material
_____corrugated metal
_____welded steel
_____concrete
_____plastic (hdpe, pvc, etc.)
__X__other (specify) Unknown, probably HDPE

Is water flowing through the outlet? YES __*__ NO _____
*** Outlet Submerged**

_____No Outlet

_____Other Type of Outlet (specify) _____

The Impoundment was Designed By Stanley Consultants

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

If So When? _____

If So Please Describe : _____

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

If So When? _____

IF So Please Describe: _____

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

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

If so Please Describe : _____

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Huntley Generating Station	Date: June 15, 2011
Unit Name: South Ash Settling Pond	Operator's Name: NRG Energy Inc.
Unit I.D.:	Hazard Potential Classification: High (Significant) Low
Inspector's Name: Don Dotson/AMEC and James Black/AMEC	

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

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Daily		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	569.3		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	569.0		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	575 +/-		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?	See Comment		23. Water against downstream toe?	X	
17. Cracks or scarps on slopes?	See Comment		24. Were Photos taken during the dam inspection?	X	

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

Inspection Issue # Comments

1. By plant personnel, not documented.

16. Skimmer booms in front of outlet.

17, 18, 19 and 21. High vegetation prevented good assessment of dikes, some steep interior slopes.

23. Southwest/Outlet dike discharges to Niagara River.

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # NY0001023 INSPECTOR Dotson/Black

Date June 15, 2011

Impoundment Name Huntley South Ash Settling Pond
Impoundment Company NRG Energy
EPA Region 2
State Agency (Field Office) Address

Name of Impoundment Huntley South Ash Settling Pond
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update

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

IMPOUNDMENT FUNCTION: Active CCW impoundment.

Nearest Downstream Town : Name Tonawanda, NY
Distance from the impoundment approx. 3 miles
Impoundment
Location: Longitude -78 Degrees 55 Minutes 31.42 Seconds
Latitude 42 Degrees 58 Minutes 01.04 Seconds
State NY County Erie

Does a state agency regulate this impoundment? YES NO X

If So Which State Agency?

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

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

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

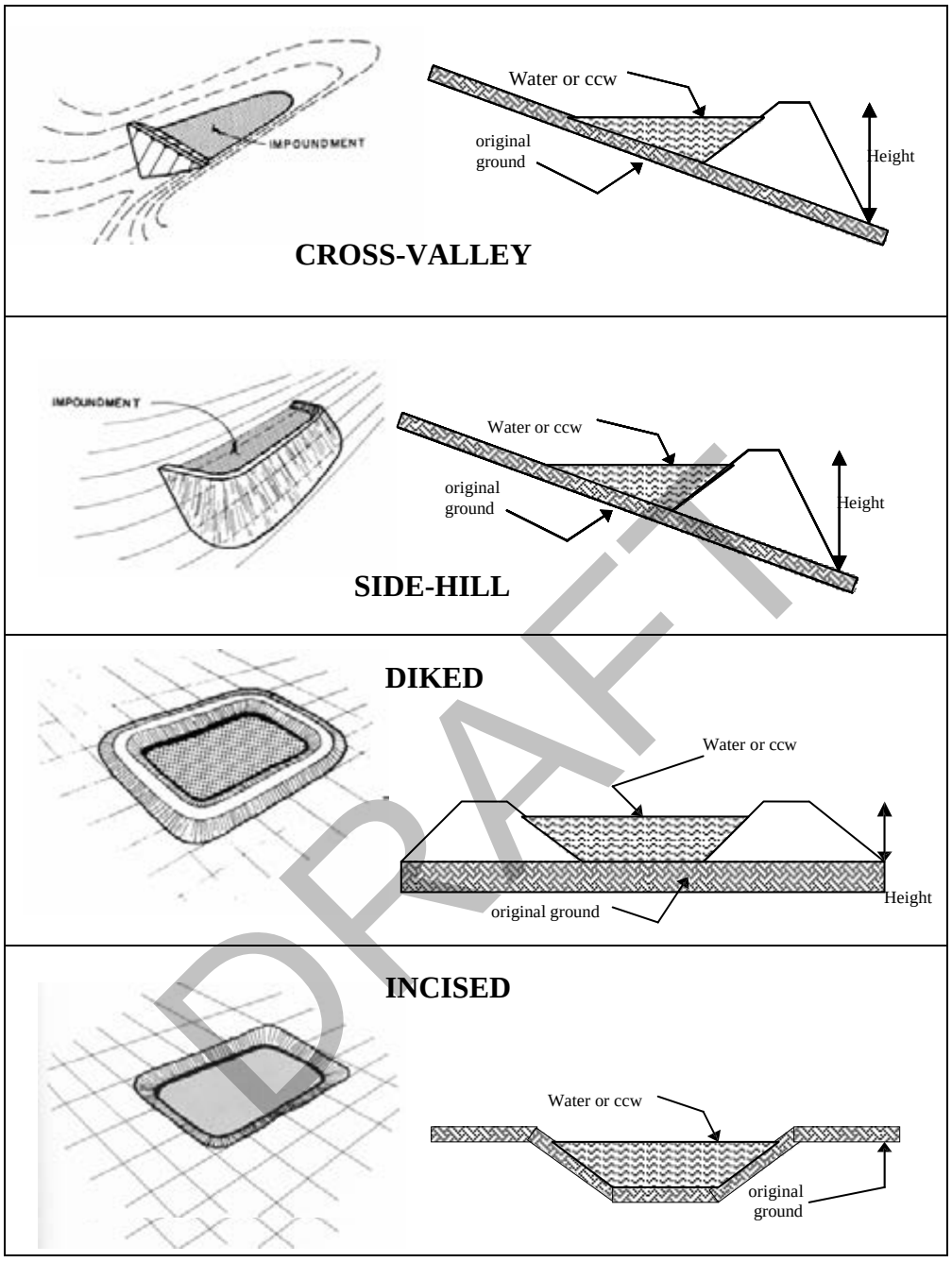
__X__**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

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

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Release from basin would discharge directly to Niagara River causing economic and/or environmental damage.

CONFIGURATION:



_____Cross-Valley
_____Side-Hill
_____Diked
_____Incised (form completion optional)
__X__Combination Incised/Diked

Embankment Height __10*_____ feet Embankment Material Unknown
Pool Area ___7.3_____ acres Liner _No_____
Current Freeboard __4.2_____ feet Liner Permeability _N/A_____

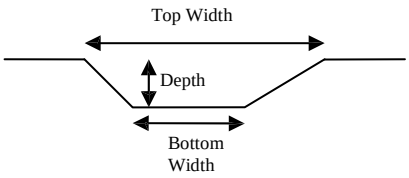
* Based on 2009 Stability Analysis

TYPE OF OUTLET (Mark all that apply)

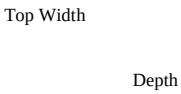
_____Open Channel Spillway
_____Trapezoidal
_____Triangular
_____Rectangular
_____Irregular

_____depth
_____bottom (or average) width
_____top width

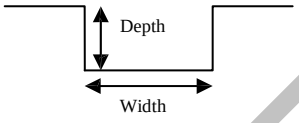
TRAPEZOIDAL



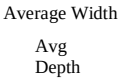
TRIANGULAR



RECTANGULAR

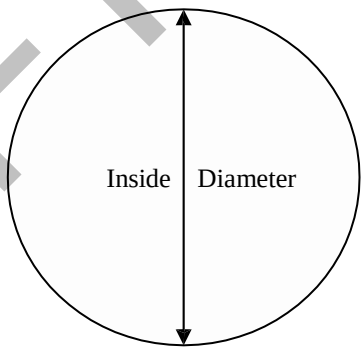


IRREGULAR



__X__ Outlet

_____inside diameter



Material
_____corrugated metal
_____welded steel
_____concrete
_____plastic (hdpe, pvc, etc.)
__X__ other (specify) **92" x 65" Arched CMP**

Is water flowing through the outlet? YES __X__ NO _____

_____No Outlet

_____Other Type of Outlet (specify) _____

The Impoundment was Designed By: **Unknown (Niagara Mohawk Power Corporation?), Malcolm Pirnie designed latest improvement to move outlet structure.**

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

If So When? _____

If So Please Describe : _____

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

If So When? _____

IF So Please Describe: _____

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

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

If so Please Describe : _____

APPENDIX B

SITE PHOTO LOG MAP AND SITE PHOTOS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY	DWN BY: SAM	ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	REV. No.: A	
	CKD BY: MS		Date: 7-22-11	
AMEC Earth & Environmental 690 Commonwealth Business Center 11003 Bluegrass Parkway Louisville, KY 40299	Datum: NAD 83	NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY PHOTO LOCATION MAP	Project No: 3-2106-0194.0001.****	
	Projection: UTM 17		Figure No: B-1	
	Scale: As Shown			

1-1

LOOKING NORTHWEST AT POND 1, HIGH VEGETATION

1-2

LOOKING NORTHEAST AT POND 1 AND OUTLET PIPE TO POND 3, HIGH VEGETATION

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE: NRG ENERGY
HUNTLEY GENERATING STATION, TONAWANDA, NY
POND 1 SITE PHOTOS

DWN BY:	DATUM:	DATE:
CAE		7/21/11
CHK'D BY:	REV. NO.:	PROJECT NO:
JHB		3-2106-0194.0001.****
PROJECTION:	SCALE:	FIGURE No.
	AS SHOWN	B-2

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond1sitephotos.dwg – B–2 – Jul. 22, 2011 8:22am – chris.eger

1-3

LOOKING NORTHEAST AT POND 1, CLOSEUP OF OUTLET TO POND 3, HIGH VEGETATION

1-4

LOOKING WEST AT INLET PIPE FROM PLANT TO POND 1, HIGH VEGETATION

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE: NRG ENERGY
HUNTLEY GENERATING STATION, TONAWANDA, NY
POND 1 SITE PHOTOS

DWN BY:	DATUM:	DATE:
CAE		7/21/11
CHK'D BY:	REV. NO.:	PROJECT NO:
JHB		3-2106-0194.0001.****
PROJECTION:	SCALE:	FIGURE No.
	AS SHOWN	B-3

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond1sitephotos.dwg – B–3 – Jul. 22, 2011 8:22am – chris.eger

1-5

LOOKING WEST POND 1 AND OUTLET PIPE TO POND 2, HIGH VEGETATION

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE: NRG ENERGY
HUNTLEY GENERATING STATION, TONAWANDA, NY
POND 1 SITE PHOTOS

DWN BY:	DATUM:	DATE:
CAE		7/21/11
CHK'D BY:	REV. NO.:	PROJECT NO:
JHB		3-2106-0194.0001.****
PROJECTION:	SCALE:	FIGURE No.
	AS SHOWN	B-4

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond1sitephotos.dwg – B-4 – Jul. 22, 2011 8:23am – chris.eger

2-1

LOOKING SOUTH AT INTERIOR OF
POND 2, HIGH VEGETATION

2-2

LOOKING SOUTHEAST AT INTERIOR OF POND 2,
HIGH VEGETATION, RAMP INTO POND

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY POND 2 SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-5

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond2sitephotos.dwg – B–5 – Jul. 22, 2011 8:27am – chris.eger

2-3

NORMAL GATED OUTLET PIPE FROM POND 2

2-4

LOOKING NORTH AT OUTFALL TO DITCH FROM POND 2

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY POND 2 SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-6

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond2sitephotos.dwg – B-6 – Jul. 22, 2011 8:27am – chris.eger

2-5

LOOKING SOUTHWEST AT NORTHWEST DOWNSTREAM EMBANKMENT OF POND 2, HIGH VEGETATION

2-6

LOOKING SOUTH AT SOUTHWEST DOWNSTREAM EMBANKMENT OF POND 2, HIGH VEGETATION

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY POND 2 SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-7

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond2sitephotos.dwg – B-7 – Jul. 22, 2011 8:27am – chris.eger

2-7

LOOKING NORTH AT NORTHWEST DOWNSTREAM EMBANKMENT OF POND 2

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE: NRG ENERGY
HUNTLEY GENERATING STATION, TONAWANDA, NY
POND 2 SITE PHOTOS

DWN BY:	DATUM:	DATE:
CAE		7/21/11
CHK'D BY:	REV. NO.:	PROJECT NO:
JHB		3-2106-0194.0001.****
PROJECTION:	SCALE:	FIGURE No.
	AS SHOWN	B-8

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond2sitephotos.dwg – B-8 – Jul. 22, 2011 8:27am – chris.eger

3-1

LOOKING NORTH AT INLET TO POND 3 FROM POND 1, HIGH VEGETATION

L

3-2

LOOKING WEST AT SOUTH END OF POND 3, HIGH VEGETATION

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY POND 3 SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-9

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond3sitephotos.dwg – B-9 – Jul. 22, 2011 8:32am – chris.eger

3-3

LOOKING WEST AT NORTH END OF POND 3, HIGH VEGETATION

3-4

LOOKING WEST AT SOUTH SIDE OF POND 3 (FOREGROUND)
AND POND 1 (BACKGRROUND), HIGH VEGETATION

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY POND 3 SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-10

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond3sitephotos.dwg – B–10 – Jul. 22, 2011 8:32am – chris.eger

3-5

LOOKING NORTHEAST AT EAST SIDE
OF POND 3, HIGH VEGETATION

N

3-6

LOOKING SOUTH AT EAST SIDE
OF POND 3, HIGH VEGETATION

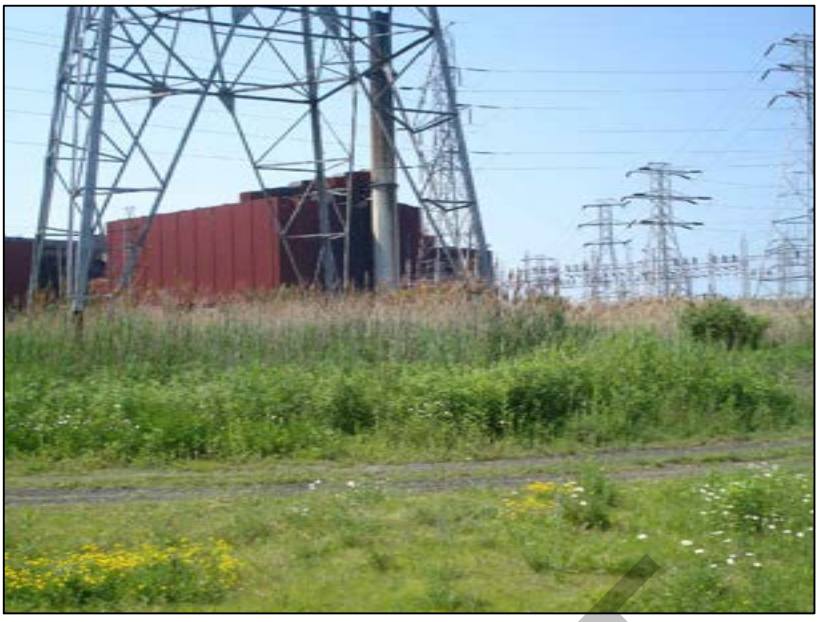
AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY POND 3 SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-11

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond3sitephotos.dwg – B–11 – Jul. 22, 2011 8:32am – chris.eger



3-7

LOOKING SOUTHWEST AT POND 3, HIGH VEGETATION

3-8

LOOKING WEST AT NORTH END OF POND 3 (FOREGROUND)
AND POND 2 (MOUND IN BACKGROUND)

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE: NRG ENERGY
HUNTLEY GENERATING STATION, TONAWANDA, NY
POND 3 SITE PHOTOS

DWN BY:	DATUM:	DATE:
CAE		7/21/11
CHK'D BY:	REV. NO.:	PROJECT NO:
JHB		3-2106-0194.0001.****
PROJECTION:	SCALE:	FIGURE No.
	AS SHOWN	B-12

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond3sitephotos.dwg – B-12 – Jul. 22, 2011 8:33am – chris.eger

3-9

INLET OF OUTLET PIPE FROM POND 3

3-10

LOOKING SOUTH AT SKIMMER
ABOVE OUTLET PIPE FROM POND 3

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY POND 3 SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-13

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond3sitephotos.dwg – B–13 – Jul. 22, 2011 8:33am – chris.eger

3-11

LOOKING NORTH AT OUTLET TO
DITCH FROM POND 3

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY POND 3 SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No. B-14

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\pond3sitephotos.dwg – B-14 – Jul. 22, 2011 8:33am – chris.eger

NEQ-1

LOOKING SOUTHEAST AT EAST CREST AND INTERIOR SLOPES OF NORTH AND SOUTH EQUALIZATION BASINS

NEQ-2

LOOKING SOUTHWEST ACROSS NORTH EQUALIZATION BASIN, NIAGARA RIVER IN BACKGROUND

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY NORTH EQUALIZATION BASIN SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-15

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\NEQsitephotos.dwg – B–15 – Jul. 22, 2011 8:38am – chris.eger

NEQ-3

LOOKING WEST AT NORTHWEST
CORNER OF NORTH EQUALIZATION BASIN

NEQ-4

BETWEEN EQ PONDS LOOKING NORTH AT
WEST END OF NORTH EQUALIZATION BASIN

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY NORTH EQUALIZATION BASIN PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-16

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\NEQsitephotos.dwg – B–16 – Jul. 22, 2011 11:59am – chris.eger

NEQ-5

BETWEEN EQ PONDS LOOKING NORTHEAST AT
INTERIOR OF NORTH EQUALIZATION BASIN

NEQ-6

BETWEEN EQ PONDS LOOKING EAST AT CREST
BETWEEN NORTH AND SOUTH EQUALIZATION BASIN

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY NORTH EQUALIZATION BASIN SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No. B-17

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\NEQsitephotos.dwg – B-17 – Jul. 22, 2011 8:43am – chris.eger

NEQ-7

SOUTHWEST CORNER OF SOUTH EQUALIZATION BASIN LOOKING NORTH AT WEST DIKE OF SOUTH EQULIZATION BASIN (FOREGROUND) AND NORTH EQUALIZATION BASIN (BACKGROUND)

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY NORTH EQUALIZATION BASIN SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-18

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\NEQsitephotos.dwg – B–18 – Jul. 22, 2011 8:42am – chris.eger

SEQ-1

BETWEEN EQUALIZATION BASINS LOOKING EAST AT COMMON DIKE

SEQ-2

NORTHWEST CORNER OF SOUTH EQUALIZATION BASIN LOOKING SOUTHEAST ACROSS BASIN.

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY SOUTH EQUALIZATION BASIN SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-19

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\SEQsitephotos.dwg – B-19 – Jul. 22, 2011 8:45am – chris.eger

SEQ-3

SOUTH EQUALIZATION BASIN - LOOKING SOUTHWEST AT CREST AND DOWNSTREAM SLOPE OF WEST EMBANKMENT, HIGH VEGETATION

SEQ-4

SOUTHWEST CORNER OF SOUTH EQUALIZATION BASIN LOOKING NORTH

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY SOUTH EQUALIZATION BASIN SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-20

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\SEQsitephotos.dwg – B–20 – Jul. 22, 2011 8:47am – chris.eger

SEQ-5

SOUTHWEST CORNER OF SOUTH EQUALIZATION BASIN LOOKING WEST AT TOE OF DOWNSTREAM SLOPE/BANK OF NIAGARA RIVER

SEQ-6

SOUTHWEST CORNER OF SOUTH EQUALIZATION BASIN LOOKING SOUTH AT DOWNSTREAM SLOPE, SOUTH POND OUTLET IN BACKGROUND.

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY SOUTH EQUALIZATION BASIN SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No. B-21

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\SEQsitephotos.dwg – B–21 – Jul. 22, 2011 8:48am – chris.eger

S-1

LOOKING NORTHWEST AT SLUICE PIPES
INLETS AT NORTH END OF SOUTH POND

S-2

LOOKING SOUTH/SOUTHWEST INTO INTERIOR OF NORTH END
OF SOUTH POND, SLOPES WITH STEEP ASH AND HIGH VEGETATION

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY SOUTH POND SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No. B-22

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\southpondsitephotos.dwg – B–22 – Jul. 22, 2011 8:55am – chris.eger

S-3

LOOKING SOUTH TOWARD AREA AT SOUTHWEST END OF SOUTH POND AND OUTLET, SOUTH POND OUTLET PIPE EXPOSED IN BACKGROUND

S-4

INLET OF OUTLET PIPE AT SOUTH POND, SKIMMER BOOMS UPSTREAM FROM OUTLET.

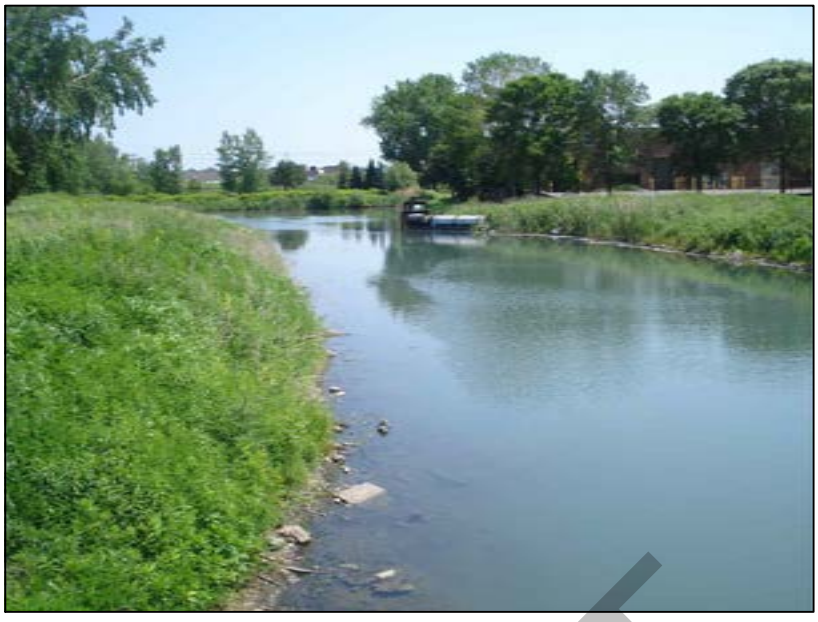
AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY SOUTH POND SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No.: B-23

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\southpondsitephotos.dwg – B–23 – Jul. 22, 2011 8:55am – chris.eger



S-5

NEAR SOUTH POND OUTLET LOOKING EAST
AT INTERIOR OF POND, HIGH VEGETATION

S-6

OUTLET OF SOUTH POND TO NIAGARA RIVER

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY SOUTH POND SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No. B-24

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\southpondsitephotos.dwg – B–24 – Jul. 22, 2011 8:55am – chris.eger

S-7

AT SOUTH POND OUTLET LOOKING EAST AT
INTERIOR OF SOUTH END OF POND, HIGH VEGETATION

S-8

FROM SOUTH DIKE LOOKING NORTH AT POND INTERIOR
AND SLURRY INLET PIPES, NOTE ADJACENT BARE AREAS

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY SOUTH POND SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No. B-25

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\southpondsitephotos.dwg – B–25 – Jul. 22, 2011 8:55am – chris.eger

S-9

FROM SOUTH DIKE LOOKING WEST AT POND
INTERIOR AND OUTLET TO NIAGARA RIVER, HIGH VEGETATION

S-10

FROM SOUTH DIKE LOOKING EAST AT SOUTHEAST CORNER OF POND,
SOUTH US SLOPES AND CREST, HIGH VEGETATION

AMEC Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, Ky 40299
(502) 267-0700

CLIENT LOGO

CLIENT: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 7/21/11
TITLE: NRG ENERGY HUNTLEY GENERATING STATION, TONAWANDA, NY SOUTH POND SITE PHOTOS	CHK'D BY: JHB	REV. NO.:	PROJECT NO: 3-2106-0194.0001.****
	PROJECTION:	SCALE: AS SHOWN	FIGURE No. B-26

S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\April 2011 Round 10\NRG Huntley\cad\southpondsitephotos.dwg – B–26 – Jul. 22, 2011 8:56am – chris.eger

APPENDIX C

INVENTORY OF PROVIDED MATERIALS

- 59759 South Pond Prior to Dredging 06-2011.pdf
- A Brief Flow Description of the NRG Huntley Impoundments.doc
- APP_18A_Aug-17-09 Wastewater Diagram.pdf
- Brief description of the NRG Huntley Station.doc
- C-34734-W Equalization Basins.pdf
- C-34738-W Equalization Basins.pdf
- C-34739-W Equalization Basins.pdf
- C-34744-W Equalization Basins.pdf
- C-34745-W Equalization Basins.pdf
- Completed Diagram WB-1 2010.pdf
- DEC Correspondence - Stormwater from Baghouse to Outfall 008.pdf
- EPA Surface Inpoundment Response 05-2009.pdf
- Final_Embankment_Evaluation_Report_7-1-09.pdf
- Huntley SPDES Permit Extension 2008.pdf
- North Slag Ponds C-32223-W SH 1.pdf
- North Slag Ponds C-32223-W SH 2.pdf
- North Slag Ponds C-32223-W SH 3.pdf
- NRG After Dredging - South Pond final survey data 11x17.pdf
- NRG Huntley Doc FEE Report Email June 13.htm
- NRG Huntley Doc_WW Management Plan Email June 13.htm
- NRG Huntley Docs via Email June 13.htm
- NRG Huntley Site Drawing Fabric Filter Stormwater.pdf
- NRG Huntley Stormwater Calcs, Part 1.pdf
- NRG Huntley Stormwater Calcs, Part 2.pdf
- Requested Information.htm
- South Ash Pond 3 of 9 March 1976.pdf
- South Ash Pond 7 of 9 March 1976.pdf
- South Ash Pond 9 of 9 March 1976.pdf
- SPDES Permit - Station.pdf
- Wastewater Management Plan Report.pdf

APPENDIX D

SLOPE STABILITY ANALYSIS

GZA
GeoEnvironmental
of New York

*Engineers and
Scientists*

July 1, 2009
File No. 21.0056497.00

Mr. Joe Schwab
Joseph.Schwab@nrgenergy.com
Huntley Power LLC
3500 River Road
Tonawanda, New York 14150

Re: Settling Pond Outlet Embankment Evaluation
Huntley Generation Plant
Tonawanda, New York

535 Washington Street
11th Floor
Buffalo, New York
14203
716-685-2300
Fax: 716-685-3629
www.gza.com

Dear Mr. Schwab:

GZA GeoEnvironmental of New York (GZA) is pleased to submit this Settling Pond Embankment Evaluation Report to NRG / Huntley Power LLC (NRG) for the south settling pond located in the southern portion of the Huntley Generation Plant at 3500 River Road in Tonawanda, New York (Site). The settling pond embankment is located between the south settling pond to the east and the Niagara River to the west (see Figure 1). This report summarizes:

- The subsurface conditions encountered at the site based on the recently completed test boring program; and
- Our embankment evaluation findings and recommendations.

INTRODUCTION

GZA was engaged by NRG to drill three (3) test borings to observe subsurface conditions and provide a geotechnical and stability assessment of the above referenced embankment. An existing discharge pipe is present within this embankment that allows surface water to drain from the settling pond to the Niagara River in the southern portion of the NRG Huntley Power Plant. GZA completed the following scope of services.

- Retained the services of Earth Dimensions Inc. (Earth Dimensions) of Elma, New York to complete three test borings at the Site (see Figure 1). Two borings were done in the embankment area on each side of the existing discharge pipe and one test boring was done in an area of presumed undisturbed soils located south of the settlement pond and discharge pipe. Overburden soil samples were collected and logged by Earth Dimensions. Ground water measurements were made from within the drilling augers at the completion of the borings.
- Selected overburden soil samples were tested by GZA's geotechnical laboratory for grain size analysis (i.e., sieve and hydrometer tests). Additionally, one Shelby tube sample was collected from a layer of fine grained soils and was submitted to our soils laboratory for consolidated undrained triaxial testing and unit weight determination.

- Ground surface elevations in the area of the embankment area were measured by GZAs subcontractor, Clear Creek Land Surveying, LLC (Clear Creek) of Springville, New York. The ground surface elevation and location of the three test borings were recorded, as well as, existing embankment features including rip-rap location, the shoreline of the Niagara River the settlement pond water level, and discharge pipe inverts, among others. These locations were tied into an existing Site benchmark that was provided by NRG for our use.
- Evaluated the stability of the embankment via the slope stability analysis program PCSTABL, Version 6 to provide an assessment of existing conditions at the Site.
- Prepared this evaluation report that summarizes the findings of the subsurface explorations, laboratory testing program, and embankment evaluation. This report also presents our recommendations of whether or not a more detailed slope stability analysis of the embankment is required.

SITE CONDITIONS

The settlement pond currently is designed to receive stormwater runoff and process water associated with NRG's bottom ash removal system. This ash is pumped to the settling pond, where the larger solids (e.g., bottom ash) being discharged settle out closer to the pipe discharge into the pond and the smaller particles (e.g., fly ash) settle out at distances further from the discharge pipes. Although the discharge volume into the settlement pond reportedly varies from time to time, the surface elevation of the water within the pond typically remains consistent at an approximate elevation (el.) 570, which is slightly above the invert of the discharge pipe inlet that drains to the Niagara River. The settlement pond is reportedly about 6 feet deep and is periodically (about once every five years) dredged to remove accumulated sediments (e.g., ash). The pond was reportedly last dredged in December of 2008.

The study area consists of the embankment located between the south end of the settling pond and the Niagara River. This embankment was generally observed to have an asphalt pavement access road over its top portion. Rip rap armor was observed on the side slopes between the asphalt and the shorelines on both sides of the embankment. The rip rap located on the settlement pond side has a grassy vegetation cover and the rip rap on the Niagara River side is interlocked with a cement grout, a limited amount of vegetation is present.

Additional observations were made on the Niagara River side where an approximate 12-inch thick layer of crushed stone underlain by a woven geotextile separation fabric was noted below the rip rap. Several 4-inch diameter clay weep pipes were also observed on the Niagara River side of the embankment. These weep pipes were observed to be spaced about every 5-feet and at the same approximate elevations. It is assumed that these weep pipes function to drain the accumulated water beneath the grouted rip rap. At the time of our observations, a trickle of water flow was observed draining from some of the clay pipes. Other pipes were observed clogged with debris washed up from the river (e.g., wood and plastic material).

A corrugated metal discharge pipe (CMP) is present through the embankment that allows drainage from the settlement pond to the Niagara River. This CMP is oval shaped, with approximate dimensions of 65-inches tall by 95 inches wide. At the time of our visit, water was flowing through the pipe at an approximate depth of about 2 to 3 inches. Some sandbags and other small debris were observed inside the pipe.

As shown on the attached Figure 2, the ground surface elevations of the existing embankment range from elevation (el.) 566 at the Niagara River shoreline (outside toe-of-slope) to el. 575.4 across the paved access road on top of the embankment to el. 569.9 at the pond shoreline (inside toe-of-slope).

SUBSURFACE EXPLORATIONS

The subsurface exploration program consisted of three test borings, designated B-1 to B-3, drilled on Monday April 27 and Tuesday April 28, 2009. The test boring locations are shown on Figure 1 and Figure 2. General test boring procedures include the following.

- Overburden drilling was done using 3-1/4 inch inside diameter hollow stem augers (HSA).
- Standard Penetration Tests (SPT) were completed in each boring in general accordance with ASTM D1586. SPT "N" values were determined by driving a 2-inch diameter split spoon sampler with a 140-pound automated hammer falling 30-inches. Soils were sampled over a 24-inch interval. The number of blows required to drive the split spoon sampler each 6-inch interval was recorded. The "N" value is the number of blows required to drive the sampler between the 6-inch to 18-inch interval.
- Split-spoon samples were recovered continuously to the bottom of each boring, at a depth of about 26 feet.
- One Shelby tube sample was collected from test boring B-1. The soil sample was collected at an approximate depth of about 14 to 16 feet bgs in a silt and fine sand soil.
- Water level measurements were made inside the HSAs at completion of the borings. Additionally, the HSAs at the B-2 location were left in place overnight and the water level inside the augers was measured the next morning.

Earth Dimensions prepared test boring logs based on visual observations of the recovered soil samples, using apparent grain size distribution and plasticity. Characteristics such as relative density and consistency (based on the SPT), color, grain size, moisture, etc. were recorded on the boring logs. Test boring logs are included as Attachment 1.

The test boring locations were marked in the field by the GZA representative during our April 22, 2009 Site visit. Clear Creek measured the ground surface elevations at each boring location referencing a Site benchmark provided by NRG.

LABORATORY TESTING

After review of the boring logs, and soil samples and in consultation with NRG, GZA selected representative soil samples for laboratory testing to confirm field descriptions and to assist in estimating engineering properties of the silt and fine sand layer encountered within and beneath the embankment. The laboratory testing program consisted of:

- Two (2) soil samples for grain size analyses including hydrometer testing (ASTM D422);
- One (1) Shelby tube soil sample for consolidated undrained triaxial compression test (ASTM D4767) and three (3) grain size (sieve analysis) analyses (ASTM D422).

The laboratory soil test results are included as Attachment 2.

SUBSURFACE CONDITIONS

The soil stratigraphy conditions observed are described in this section. A generalized profile between the test borings is depicted on Figure 3. The general thickness and elevations of the various soil layers encountered at the boring locations are summarized below.

Test boring B-1 was located proximate to the northern side of the discharge pipe closer to the settlement pond. Test boring B-2 was located along the southern side of the discharge pipe closer to the Niagara River (along the eastern side of the chain link fence) approximately 21 feet south of B-1. The ground surface elevation at B-1 is approximately 575.3 feet above sea level (MSL), B-2 is approximately 575.1 feet MSL and B-3 is approximately 574.4 ft MSL. In general, the overburden conditions encountered at the three (3) locations explored are summarized in the following paragraphs.

- Overburden Fill: The fill thickness varied between test borings including 12.0 feet at B-1, 14 feet at B-2, and 10 feet at B-3. The soils sampled were visually described as varying between gravel and slag in the upper portions of the fill soil to a silt and fine sand soil in the lower portions. Smaller amounts of brick, concrete and wood fragments were observed throughout the fill material. The fill soil samples were predominantly course grained and non-plastic.

- Silt and Fine Sand: The depth of the silt and fine sand soil encountered varied from about 12 to 14 feet bgs in B-1 and B-2 respectively and is about 8 feet thick. The recovered samples were visually described as generally a dark gray to gray silt and fine sand soil (ML). The silt content of the soil samples tested for grain size ranged from about 53% (B-1) to 55% (B-2) and the clay content ranged from 7% to 9%, respectively, indicating the soil is predominately fine-grained and silt-sized. Atterberg limits were not tested on these soils as they were observed in the field as non plastic.

- Sand – A well graded sand layer including very fine sand to coarse sand was observed at depths ranging from about 20 to 22 feet bgs and its presence continued to the end of each boring (26 feet bgs).

GROUNDWATER CONDITIONS

Groundwater was measured inside the HSAs at the completion of each test boring. Water was measured in the three test borings and the observed measurements are presented below.

Test Boring	Date of Measurement	Water measurement (bgs)	Groundwater Elevation (ft above MSL)
B-1	4-28-09	10.8	564.5
B-2*	4-28-09	9.5	565.6
B-2	4-28-09	12.0	563.1
B-3	4-27-09	8.6	565.8

*Measurement made after the water was allowed to equilibrate overnight within the HSAs and prior to completion/removal.

These measurements may not be reflective of the actual groundwater elevation due to the assumed low permeability silt soils and the fact that sufficient time may not have elapsed for the water level to fully stabilize.

Additionally, water was observed seeping from several of the 4-inch diameter clay tile weeps located on the Niagara River side of the embankment. The elevations of the weeps were measured at approximately 567± feet, about one foot above the Niagara River (approximate elevation of 566 feet). These weeps are assumed to function as drains for the stone layer underlying the grouted rip-rap layer.

SLOPE STABILITY ANALYSIS

EXISTING EMBANKMENT CONDITIONS

The soils encountered in B-1 and B-2 generally consists of a fine to coarse grained fill material over a silt and fine sand layer over a well graded sandy soil. At the boring locations, the composition of the fill material was variable with a greater amount of coarse soil (sand, gravel and slag and lesser amounts of concrete, brick and wood debris) noted closer to the ground surface. Finer grained, sandy silt soils were observed in the lower portions of the fill layer. The soil encountered below the fill and below the water line was predominately a loose silt and fine sand soil (about 6 to 7 feet thick) over a well graded sandy soil.

SPT "N" values from the silt and fine sand layer underlying the fill soils (about 12 to 14 feet bgs) were measured with values ranging from about 2 to 7 indicating a loose relative density.

The "N" values of 2 to 7 measured and recorded for the silt and fine sand soils sampled below the water table may not be representative of in-situ conditions. More representative "N" values may be higher. During soil sampling and SPT work, a hydrostatic in-balance was present due to a higher assumed groundwater elevation outside the HSAs, compared to inside the HSAs. This hydrostatic in-balance may result in a disturbance at the bottom of the HSAs in the zone where split-spoon sampling and SPT work occurred. Earth Dimensions attempted to maintain a water column inside the hollow stem augers during sampling through the saturated soil layer that balanced the outer water pressure.

SPT "N" values from the fill soils located above the silt and fine sand and the well graded sandy soils below were generally observed to be higher.

The rip rap side slopes extending upward from the edge of the river and pond to the top of the embankment are generally observed to be sloped at 3-feet horizontal (H) to 1-foot vertical (V).

GZA EVALUATION OF TRIAXIAL COMPRESSION TEST RESULTS

GZA estimated an internal friction angle (ϕ) of the silt and fine sand layer based on the one tri-axial compression test done. Our interpretation of the test indicates the following.

- Plot 1: A stress path aligned tangential to the stress circles plotted for failure at low minor principal inter-granular stress (σ_3) and high σ_3 produces a ϕ angle of 19 degrees with a shear strength intercept (cohesion (c)) of 560 psf.

- Plot 2: A stress path beginning at the plot origin (shear strength = 0 psf) and extending tangentially to the stress circle for failure at high σ_3 produces a ϕ angle of 25 degrees.

GZA analyzed the embankment's stability considering these 2 friction angle/cohesion results. Plot 1 and Plot 2 are included in Attachment 2 – Laboratory Test Results.

SLOPE STABILITY EVALUATION

Using the computer program PCSTABL (version 6) to analyze the stability of the slope embankment at the study area and our assumed soil index parameters (which are based on soil test results, published values for similar soils and based on our experience with similar soils) presented in the table below provides an analysis that indicates that the embankment slope is stable. Our analysis is further discussed below.

SOIL PARAMETERS USED FOR PCSTABL INPUT

Soil Type	Wet Unit Weight (pcf)	Model 1		Model 2	
		Friction Angle	Cohesion (psf)	Friction Angle	Cohesion (psf)
Fill Material (SM, SW, ML, GL)	130	30	0	30	0
Silt and Fine Sand Soil (ML)	120.5	19	560	25	0
Sand (SW)	132	32	0	32	0

Note: Model 1 and Model 2 represents values used to generate Plots 1 and 2, respectively, as shown in Attachment 3.

A piezometric (water) level was assumed to range in elevation from about 566 (river elevation) to 569 (pond elevation) feet. Our stability analyses considered circle, sliding block failure and infinite slope considerations. The following factors of safety were calculated for static conditions. Copies of the different run models are included in Attachment 3.

Circle and Sliding Block Failures: We evaluated circle and sliding block failures by directing a limited number of failure surfaces through the silt and fine sand layer having the lower shear strength value. The stability analysis for the circular surface and the sliding block failure estimated factors of safety ranging from about 1.8 to greater than 3. Slopes with factors of safety greater than 1.5 are generally considered in a stable condition.

Infinite Slope Analysis:

This analysis evaluates the thin soil layer or laminate stability along the slope. The factor of safety is computed using the following equation.

$$F.S. = \tan\phi/\tan\beta$$

Where:

ϕ = soils internal friction angle and β = slope angle

Using the friction angle for the fill material, immediately underlying the rip-rap layer, of 30 degrees and the embankment slope angle of about 18.4 degrees (3H:1V) gives a factor of safety of 1.7. Because the factor of safety is greater then 1.5, a shallow slope failure is not expected to occur. Additional slope stability is provided by the confining surficial rip-rap that was not utilized for this analysis.

CONSIDERATIONS AND RECOMMENDATIONS

The current slope and subsurface conditions measured and evaluated for the existing embankment indicates that the embankment is stable. Surficial erosion, due to the potential undercutting of the slope by the Niagara River, did not appear to be an issue based on our field observations. The rip rap present on the Niagara River side of the embankment is interlocked with concrete grout and appears to be suitably drained via the 4-inch diameter clay weep pipes.

GZA recommends that periodic inspection and maintenance of the grouted rip rap and clay pipe drains be made at least semi-annually or when allowable. Areas of damaged grout between the rip rap should be filled and the clay pipes should periodically be cleared of accumulated river debris. Additionally, the existing corrugated metal drainage pipe located between the settling pond and the Niagara River should periodically be inspected and maintained free of accumulating debris to allow for proper pond drainage.

Although it is our opinion that the embankment is stable in its current condition, there is the possibility that the silt and fine sand soils located below the fill material may be susceptible to liquefaction resulting from seismic activity. Liquefaction of the soil may cause it to "flow" (i.e. become liquid) and be displaced by the overlying embankment fill. Based on our observations and evaluation of the settling pond embankment, it is our opinion that the embankment would have a hazard rating classification of low to remote.

This soil, a loose lacustrine deposited soil, is located beneath the groundwater table and appears to be of relatively uniform size (fine sand and silts with low SPT "N" values recorded from the test borings). Based on these observations and a limited literature review pertaining to liquefaction potential[1], this soil unit may have characteristics that make it prone to "possible" or "probable" liquefaction.

We note that the impact of liquefaction experienced by a soil material is a function of the intensity of seismic activity and other site specific factors. It is our opinion that if the silt and fine sand soil were to experience liquefaction, it is unlikely that the embankment would experience catastrophic failure (i.e., entire embankment sliding into the river allowing uncontrolled flow from the settlement basin). Rather, the embankment may undergo settlement from the displacement of the silt and fine sand layer beneath the embankment requiring repair and maintenance.

[1] Simplified Procedure for Evaluating Soil Liquefaction Potential, Seed, H.B; Idriss, I.M.; Journal of the Soil Mechanics and Foundation Division, ASCE; Sept 1971.

We appreciate the opportunity to have completed this work for NRG / Huntley Power LLC, We will contact you in a few days to discuss this report and address any questions or comments you may have.

Sincerely,

GZA GEOENVIRONMENTAL OF NEW YORK

Daniel Troy, P.E.
Project Manager

Ernest Hanna, P.E.
Consultant Reviewer

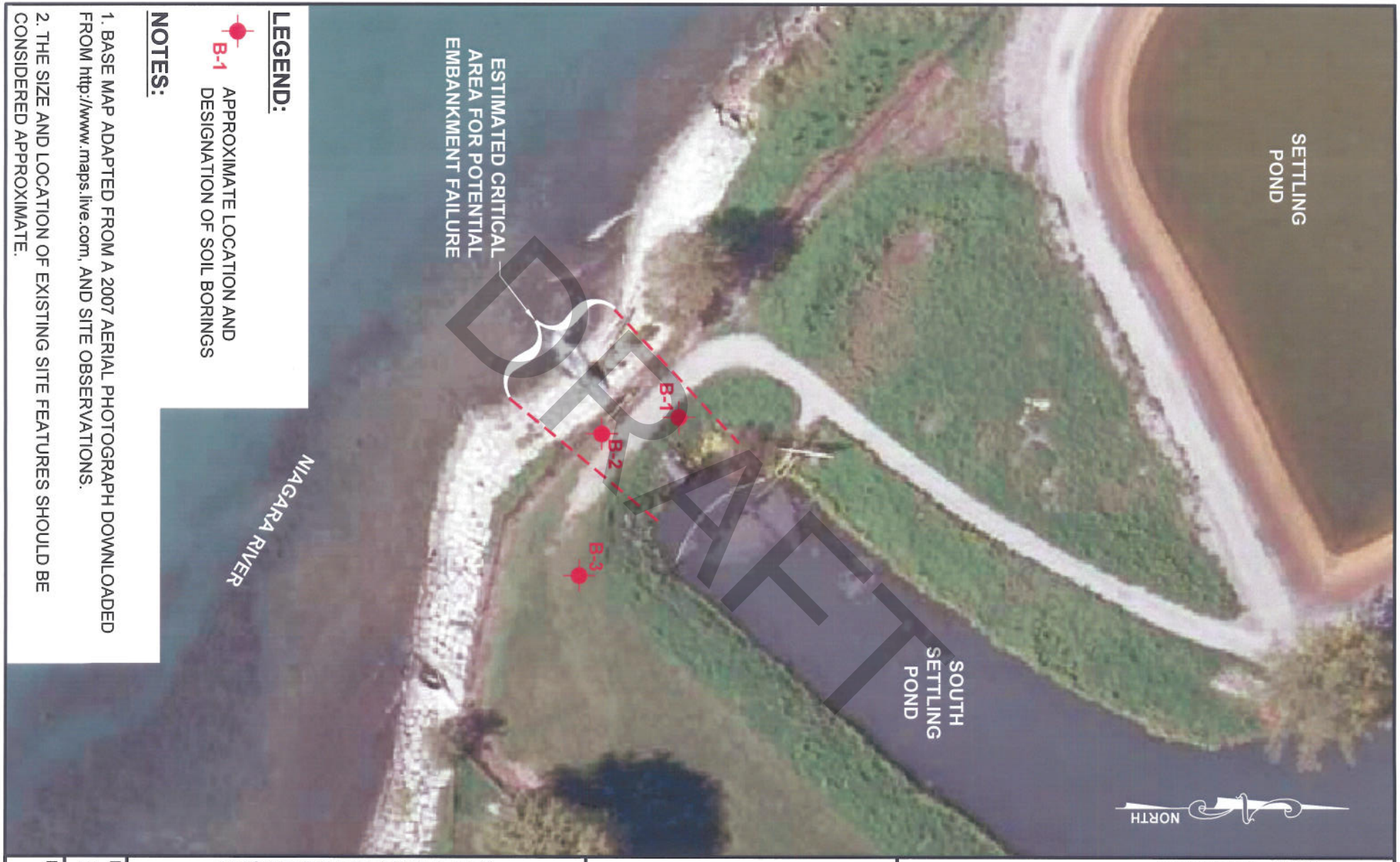
Bart Klettke, P.E.
Associate Principal

STATE OF NEW YORK
DANIEL JOHN TROY
No. 81139
LICENSED PROFESSIONAL ENGINEER

Attachments: Figures 1 through 3
Attachment 1 – Subsurface Boring Logs
Attachment 2 – Laboratory Test Results
Attachment 3- Slope Stability Model Analysis

FIGURES

 GZA-T:\PROJECTS\56400s\56497 NRG Huntley Embankment Evaluation\Site Plan.dwg [Figure 1] May 20, 2009 - 2:51pm michael.kress



LEGEND:

B-1 APPROXIMATE LOCATION AND DESIGNATION OF SOIL BORINGS

NOTES:

1. BASE MAP ADAPTED FROM A 2007 AERIAL PHOTOGRAPH DOWNLOADED FROM http://www.maps.live.com, AND SITE OBSERVATIONS.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

NRG HUNTLEY POWER, LLC

HUNTLEY GENERATION PLANT

3500 RIVER ROAD
TONAWANDA, NEW YORK

SUBSURFACE INVESTIGATION AND ENGINEERING EVALUATION

SITE PLAN

APPROXIMATE SCALE IN FEET

0 25 50 100

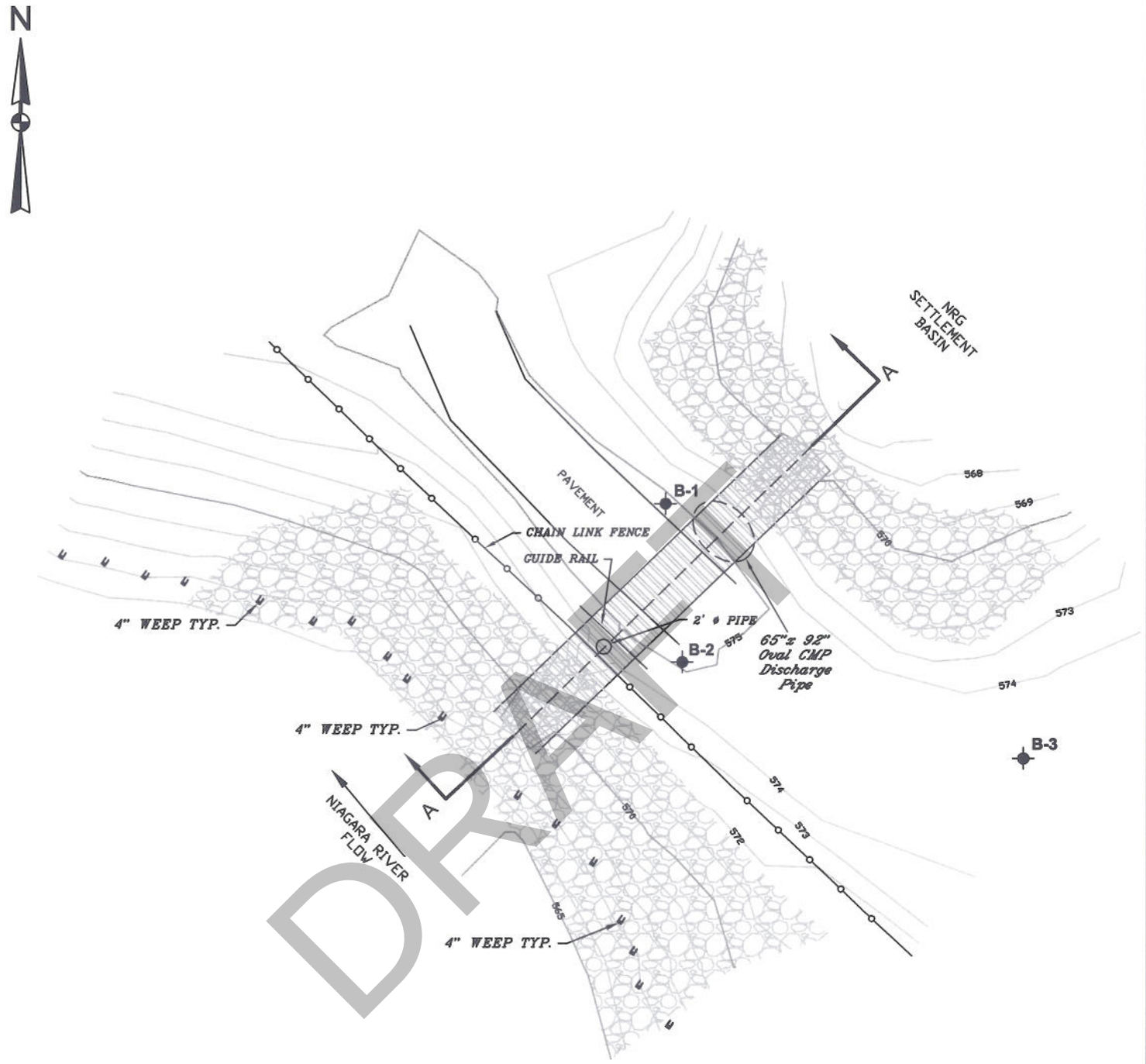
DRAWN BY: **MDK**

DATE: **MAY 2009**

PROJECT No. **21.0056497.00**

FIGURE No. **1**

GZA GeoEnvironmental of New York



NOTES:

1. BASE TOPOGRAPHY MAP PROVIDED BY CLEAR CREEK LAND SURVEYING, LLC, MAY 2009.

0 10 20 40
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

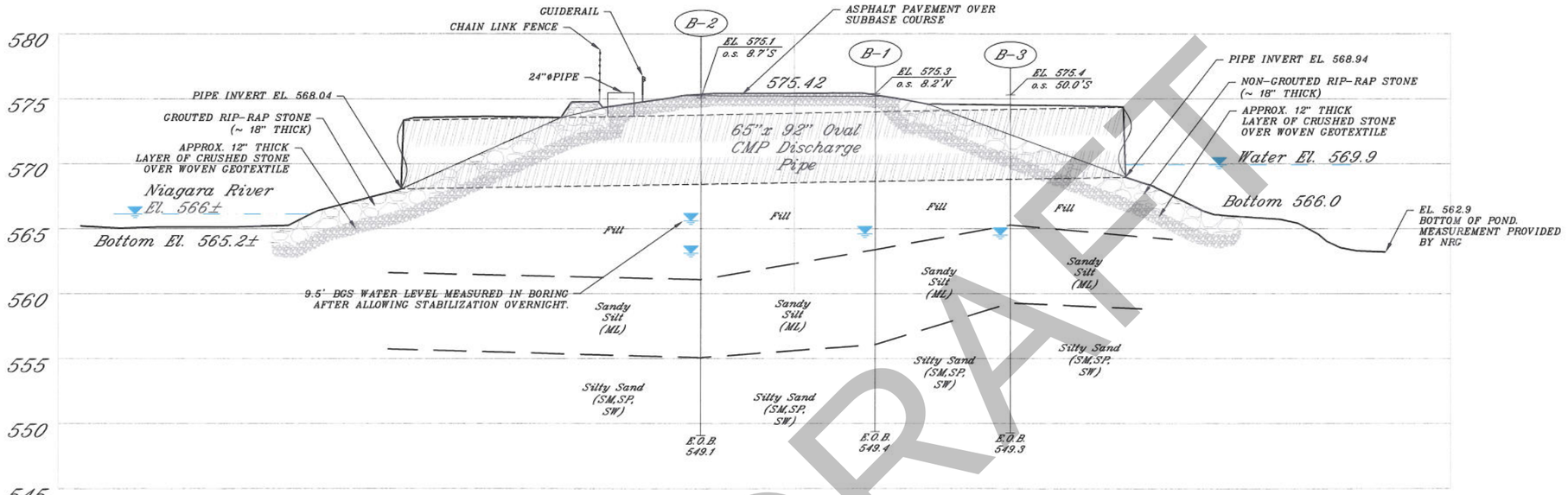
PREPARED BY:
GZA GeoEnvironmental of N.Y.
Engineers and Scientists
535 WASHINGTON STREET 11th FLOOR
BUFFALO, NEW YORK 14203
(716) 685-2300

HUNTLEY GENERATION PLANT
SUBSURFACE INVESTIGATION AND ENGINEERING EVALUATION

PREPARED FOR:
NRG HUNTLEY POWER, LLC
3500 RIVER ROAD
TONAWANDA, NEW YORK

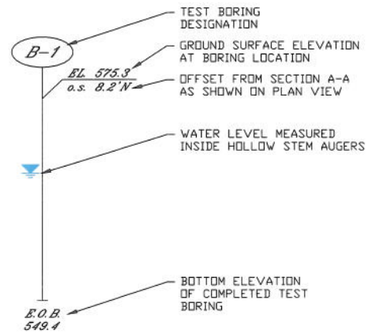
FIGURE
2

PROJ MGR:	DJT	REVIEWED BY:	ERH	CHECKED BY:	BAK	DATE	PROJECT NO.	REVISION NO.
DESIGNED BY:	DJT	DRAWN BY:	MDK	SCALE:	1" = 20'	MAY 2009	21.0056497.00	



Cross Section A–A
through Access Road

LEGEND:



NOTES:

1. BASE TOPOGRAPHY MAP AND ELEVATIONS SHOWN PROVIDED BY CLEAR CREEK LAND SURVEYING, LLC, UNLESS OTHERWISE SPECIFIED.

2. WATER LEVEL MEASUREMENTS MADE INSIDE AUGERS AT BORING COMPLETION.

3. SEE BORING LOGS FOR ADDITIONAL SUBSURFACE SOIL DESCRIPTIONS.

0 10
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

HUNTLEY GENERATION PLANT
SUBSURFACE INVESTIGATION AND
ENGINEERING EVALUATION

PREPARED FOR:
NRG HUNTLEY POWER, LLC
3500 RIVER ROAD
TONAWANDA, NEW YORK

PREPARED BY:
GZA GeoEnvironmental of N.Y.
Engineers and Scientists
535 WASHINGTON STREET 11th FLOOR
BUFFALO, NEW YORK 14203
(716) 685-2300

PROJ MGR: DJT	REVIEWED BY: ERH	CHECKED BY: BAK	FIGURE 3
DESIGNED BY: DJT	DRAWN BY: MDK	SCALE: 1" = 10'	
DATE: MAY 2009	PROJECT NO. 21.0056497.00	REVISION NO.	

ATTACHMENT 1

SUBSURFACE SOIL BORINGS

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

12D09 HOLE NO. Bore Hole 1-09 SURF. ELEVATION _

PROJECT NRG Huntley Plant - 3500 River Road LOCATION _

Town of Tonawanda, Erie Co., NY

CLIENT GZA GeoEnvironmental of New York DATE STARTED 04/28/09 COMPLETED 04/28/09

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION
	1	3						
	20		6			37		Extremely moist dark brown (SANDY-SILT) topsoil fill with 5 to 10% gravel, little sand and organic matter, very loose, massive soil structure, (ML).
				31				
					17			
	2	15						0.3
	18		19			44		Gravel, slag and concrete debris.
				25				
					15			
	3	6						
5	2		1			2		grades downward to 6.0
				1				
					3			
	4	4						Wet grayish black gravelly (SILTY-SAND) fill with 20 to 40% gravel and slag, mostly very fine to fine size sand, little silt, compact becoming very loose and loose below 8.0 feet, massive soil structure, (SM).
	24		8			18		
				10				
					9			
	5	3						
	1		1/12			<1		
					1			
10	6	13						
	12		3			5		
				2				
					1			grades downward to 12.0
	7	3						
	24		3			7		Wet dark gray (SANDY-SILT) with little mostly very fine to fine size sand, loose, massive soil structure with occasional fine size sand lens <0.05 feet in thickness, (ML).
				4				
					5			
	ST	#1						
15								
								grades downward to 16.0
	8	1						
	20		1			3		Wet dark gray (SANDY-SILT) with little mostly very fine to fine size sand, very loose and loose, weakly thinly bedded with occasional fine size sand lens <0.05 feet in thickness, (ML).
				2				
					3			
	9	1						
	24		1			5		19.3
				4				
20					5			See next sheet.

WATER TABLE AND REMARKS

Advanced 3 1/4 inch hollow stem auger casing while continuously split spoon sampling to 26.0 feet. Bore hole tremmie grouted to surface at completion.

Sample #3: Two attempts were made, both with poor recovery.

Sample #5: Poor recovery, low end value indicates potentially very loose material.

Sample #6: Visual evidence and odor of petroleum contamination.

Samples 7 & 8: slight petroleum odor.

ST#1: Shelby tube sample #1 taken between 14.0 to 16.0 foot depth. Recovery 24"/24".

Water level at 10.8 feet below ground surface at completion.

Coarse silty topsoil fill with little sand and organic matter, trace gravel to 0.3 feet over gravel, slag and concrete debris to 6.0 feet over sandy soil fill with some gravel and slag, little silt to 12.0 feet over coarse silty slack water sediment with little sand to 19.3 feet over water sorted and deposited sand with some gravel, little silt to 20.0 feet over water sorted and deposited sand with some gravel, trace silt to 24.0 feet over water sorted and deposited sand with some gravel to end of boring.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Steven J. Currie, Soil Scientist, (mw)

EARTH DIMENSIONS, INC.
Soil and Hydrogeologic Investigations • Wetland Delineations
1091 Jamison Road • Elma, NY 14059
(716) 655-1717 • FAX (716) 655-2915

12D09 HOLE NO. Bore Hole 1-09 SURF. ELEVATION —

PROJECT NRG Huntley Plant - 3500 River Road LOCATION —
Town of Tonawanda, Erie Co., NY

CLIENT GZA GeoEnvironmental of New York DATE STARTED 04/28/09 COMPLETED 04/28/09

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	10	3						Wet dark gray gravelly (SILTY-SAND) with 20 to 40% mostly subrounded gravel, mostly very fine to fine size sand, little silt, loose, stratified, (SM).	
	24		3			9			
				6					
					5				
	11	4							
	18		7						
				13		20			
					15				
	12	4							
25	16		4						
				4		8			
					6				
								grades downward to 20.0	
								Wet dark gray gravelly (SAND) with 20 to 40% mostly subrounded gravel, very fine to very coarse size sand, trace silt, loose becoming compact, loose when disturbed below 22.0 feet, stratified, (SW).	
								grades downward to 24.0	
								Wet gray gravelly (SAND) with 20 to 40% mostly subrounded gravel, very fine to very coarse size sand, loose, stratified, (SW).	
								26.0	
								Boring completed at 26.0 feet.	
30									
35									
40									

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30" PER BLOW

LOGGED BY Steven J. Currie, Soil Scientist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

12D09 HOLE NO. Bore Hole 2-09 SURF. ELEVATION _

PROJECT NRG Huntley Plant - 3500 River Road LOCATION _

Town of Tonawanda, Erie Co., NY

CLIENT GZA GeoEnvironmental of New York DATE STARTED 04/27/09 COMPLETED 04/28/09

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	5						Extremely moist dark brown (SANDY-SILT) topsoil fill with 5 to 10% gravel, little sand and organic matter, compact, massive soil structure, (ML).	Coarse silty topsoil fill with little sand and organic matter, trace gravel to 0.3 feet over cobble fill to 2.0 feet over coarse silt and gravel fill with little sand, occasional brick fragments to 4.0 feet over coarse silty soil fill with sand, trace slag to 6.0 feet over coarse silty soil fill with little sand, trace woody debris and glass fragments, occasional concrete debris to 8.4 feet over coarse silty soil fill with little to some sand, trace slag, occasional concrete debris to 10.0 feet over sandy soil fill with some gravel, little silt, trace slag, occasional concrete debris to 12.0 feet over woody debris to 14.0 feet over coarse silty slack water sediment with little to some sand to 20.0 feet over water sorted and deposited sand with trace gravel, occasional woody debris to 22.0 feet over water sorted and deposited sand with some gravel to end of boring.
	20		12			29			
				17					
					23				
	2	11						0.3	
	24		19			33		Cobble fill.	
				14				2.0	
					11				
	3	6							
5	24		4			10		Moist gray very gravelly (SANDY-SILT) fill with 40 to 60% gravel, little sand, occasional brick fragments, dense, massive soil structure, (ML), (GM).	
				6				clear transition to 4.0	
					7				
	4	3							
	24		1			9		Moist dark blackish gray (SANDY-SILT) fill with little mostly very fine to fine size sand, trace slag, loose, massive soil structure, (ML).	
				8				clear transition to 6.0	
					17				
	5	11							
	18		13			27		Wet dark blackish gray (SANDY-SILT) with little mostly very fine to fine size sand, trace woody debris and glass fragments, occasional concrete debris, loose, massive soil structure, (ML).	
				14				clear transition to 8.4	
10					12				
	6	8							
	18		7			23			
				16					
					8				
	7	1							
	4		1			4		Wet grayish black (SANDY-SILT) fill with little to some mostly very fine to fine size sand, trace slag, occasional concrete debris, compact, massive soil structure, (ML).	
				3				grades downward to 10.0	
					5				
	8	1							
15	22		1			2		Wet grayish black gravelly (SILTY-SAND) fill with 20 to 40% gravel, mostly very fine to fine size sand, little silt, trace slag, occasional woody debris, compact, massive soil structure, (SM).	
				1					
					3				
	9	1							
	24		2			3			
				1					
					3				
	10	2/12						12.0	
	24					<3		Woody debris.	
				2				grades downward to 14.0	
20					5			See next sheet.	

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Steven J. Currie, Soil Scientist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations
1091 Jamison Road • Elma, NY 14059
(716) 655-1717 • FAX (716) 655-2915

12D09 HOLE NO. Bore Hole 2-09 SURF. ELEVATION —

PROJECT NRG Huntley Plant - 3500 River Road LOCATION —
Town of Tonawanda, Erie Co., NY

CLIENT GZA GeoEnvironmental of New York DATE STARTED 04/27/09 COMPLETED 04/28/09

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	11	4							
	18		3			9		Wet gray (SANDY-SILT) with little to some mostly very fine to fine size sand, very loose, weakly thinly bedded to massive soil structure, (ML).	
				6				clear transition to 20.0	
					7				
	12	1							
	18		5			17		Wet gray (SAND) with 5 to 10% gravel, mostly very fine to fine size sand, occasional woody debris, loose, stratified, (SP).	
				12				grades downward to 22.0	
					13				
	13	5							
25	18		9			19		Wet gray gravelly (SAND) with 20 to 40% subrounded gravel, very fine to very coarse size sand, compact, loose when disturbed, stratified, (SW).	
				10				26.0	
					8			Boring completed at 26.0 feet.	
30									
35									
40									

N=NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30" PER BLOW

LOGGED BY Steven J. Currie, Soil Scientist, (mw)

SHEET 2 OF 2

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

12D09 HOLE NO. Bore Hole 3-09 SURF. ELEVATION _

PROJECT NRG Huntley Plant - 3500 River Road LOCATION _

Town of Tonawanda, Erie Co., NY

CLIENT GZA GeoEnvironmental of New York DATE STARTED 04/27/09 COMPLETED 04/27/09

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	4							
	24		4			16		Extremely moist dark brown (SANDY-SILT) topsoil fill with little sand and organic matter, loose, massive soil structure, (ML).	Advanced 3 1/4 inch hollow stem auger casing while continuously split spoon sampling to 26.0 feet. Bore hole tremmie grouted to surface at completion.
				12				0.4	
					52				
	2	29							
	24		23			42		Extremely moist brown and dark brown mix (SANDY-SILT) fill with 5 to 10% gravel, occasional cobble, little sand, trace brick fragments and slag, compact, massive soil structure, (ML).	
				19					
					19				
	3	12							
5	5		8			11			
				3				2.0	
					17				
	4	4						Moist black (SANDY-SILT) fill with 5 to 10% gravel, occasional cobble, little to some very fine to very coarse size sand, trace slag, dense, loose when disturbed, massive soil structure, (ML).	
	8		3			5			
				2					
					2				
	5	3							
	12		6			15			▼ Water level at 8.6 feet below ground surface at completion.
				9					
					7				
10								Slag and woody debris.	
								grades downward to 6.0	
	6	12							
	18		5			9		Extremely moist grayish black gravelly (SANDY-SILT) fill with 20 to 40% gravel, little sand, loose, massive soil structure, (ML).	Coarse silty topsoil fill with little sand and organic matter to 0.4 feet over coarse silty soil fill with little sand, trace gravel, brick fragments and slag, occasional cobble to 2.0 feet over coarse silty soil fill with little to some sand, trace gravel and slag, occasional cobble to 4.0 feet over slag and woody debris to 6.0 feet over coarse silty soil fill with some gravel, little sand to 8.0 feet over sandy soil fill with occasional concrete and woody debris to 10.0 feet over coarse silty slack water sediment with little sand to 16.0 feet over water sorted and deposited sand with little to some silt to 18.0 feet over water sorted and
				4					
					6				
	7	1						grades downward to 8.0	
	20		2			3			
				1				Wet grayish black (SAND) fill with very fine to very coarse size sand, occasional concrete and woody debris, compact, loose when disturbed, massive soil structure, (SW).	
					3				
	8	1							
15	22		2			3			
				1				grades downward to 10.0	
					2				
	9	2						Wet gray (SANDY-SILT) with little mostly very fine to fine size sand, loose becoming very loose below 12.0 feet, massive soil structure, (ML).	
	20		2			4			
				2					
					3				
	10	2							
	20		1			3			
				2					
20					7			See next sheet.	Continued next sheet.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Steven J. Currie, Soil Scientist, (mw)

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • FAX (716) 655-2915

12D09 HOLE NO. Bore Hole 3-09 SURF. ELEVATION _

PROJECT NRG Huntley Plant - 3500 River Road LOCATION _

Town of Tonawanda, Erie Co., NY

CLIENT GZA GeoEnvironmental of New York DATE STARTED 04/27/09 COMPLETED 04/27/09

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	11	4						Wet gray (SILTY-SAND) with mostly very fine to fine size sand, little to some silt, very loose, weakly thinly bedded, (SM).	deposited sand with trace silt and woody debris to 20.0 feet over water sorted and deposited sand with some gravel to 24.0 feet over water sorted and deposited sand and gravel to end of boring.
	18		11			17			
				6					
					10				
	12	8						grades downward to 18.0	
	18		4			7		Wet gray (SAND), mostly very fine to fine size, trace silt and woody debris, very loose, stratified, (SP).	
				3					
					3			clear transition to 20.0	
	13	3							
25	10		3			5		Wet gray gravelly (SAND) with 20 to 40% subrounded gravel, very fine to very coarse size sand, compact, loose when disturbed, stratified, (SW).	
				2					
					3			grades downward to 22.0	
								Wet gray gravelly (SAND) with 20 to 40% subrounded gravel, very fine to very coarse size sand, loose, stratified, (SW).	
								grades downward to 24.0	
30								Wet gray very gravelly (SAND) with 40 to 60% subrounded gravel, very fine to very coarse size sand, loose, stratified, (SW), (GW).	
								26.0	
35								Boring completed at 26.0 feet.	
40									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Steven J. Currie, Soil Scientist, (mw)

ATTACHMENT 2

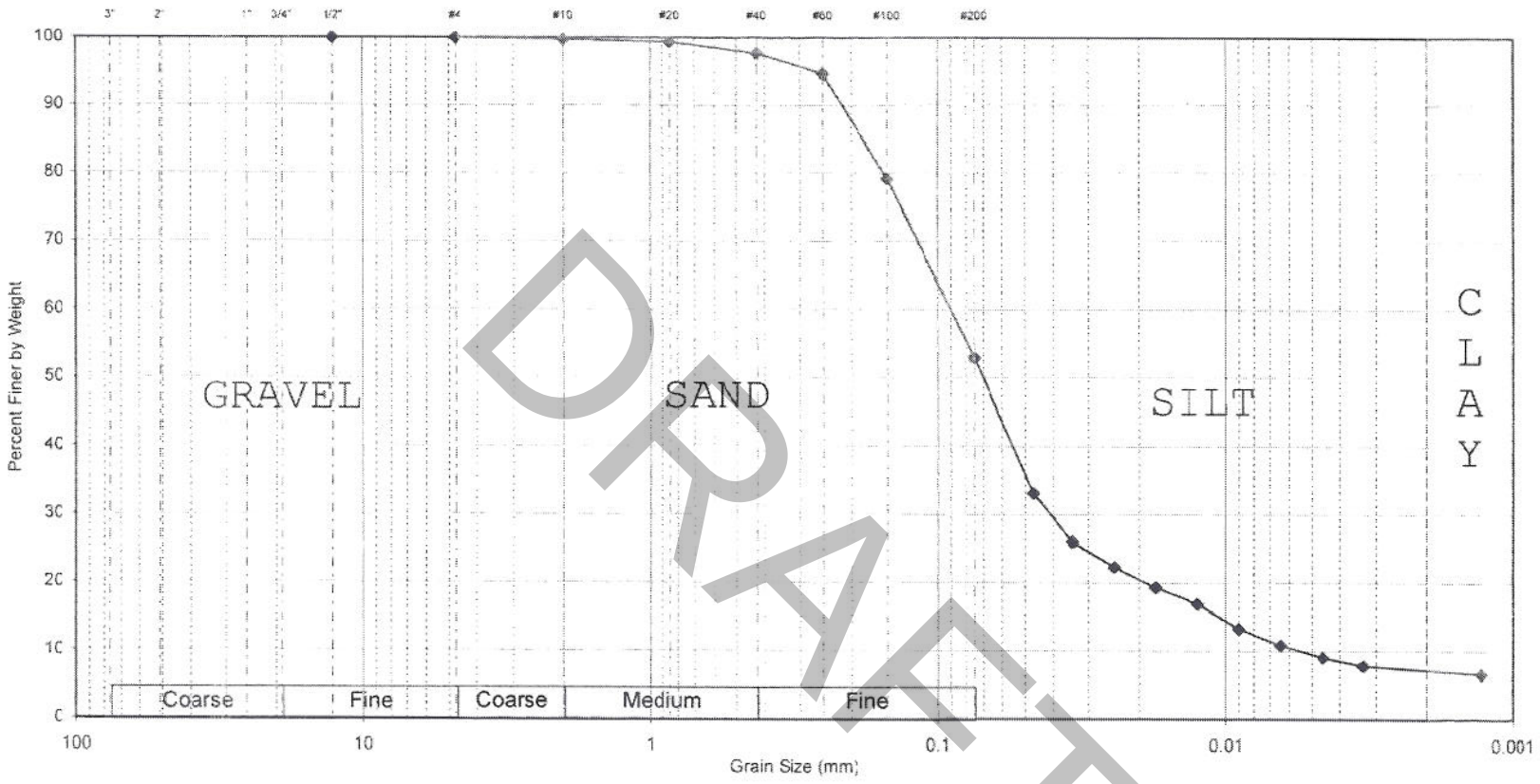
LABORATORY TEST RESULTS

LABORATORY TESTING DATA SHEET

Project Name: NRG Huntley Embankment Evaluation
Project No.: 21.0056497.00
Project Engineer: D. Troy
Project Location: Tonawanda, NY
Assigned By: B. Klettke
Date: 5/20/2009
Reviewed By: [signature]
Date Reviewed: 5/20/09

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests: Water Content %	LL %	PL %	Sieve -200 %	Hyd -2μ %	ORG %	G_s	Dry unit wt. pcf	Density: γ_d MAX (pcf) / W_{opt} (%)	Permeability cm/sec	Strength Tests: Torvane or Type Test	$\bar{\sigma}_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	Consol. $\frac{C_c}{1+e_0}$	Laboratory Log and Soil Description
B-1	S-9	12-14	1				53	7												Brown SILT and fine SAND
B-1	ST-1	14-16	2	Average Total Unit Weight (14.0-16.0') = 120.5 pcf																
		14.3		32.6										Tv= 0.22 tsf						From 14.0 to 14.8': Gray-brown SILT and fine SAND (homogenous)
		14.3-14.8		30.6			57				90.5			CIU	1010	σ_1/σ_3 Max	2243	4.2		
		14.8		31.1										Tv= 0.23 tsf						From 14.8 to 15.3': alternating layers of: SILT and SAND
		14.8-15.3		29.4			39				93.0			CIU	2000	σ_1/σ_3 Max	3357	5.6		Silt layers are 1" thick
		15.3		29.9										Tv= 0.22 tsf						Sand layers are ½" thick
		15.4-15.8		30.0			44				91.4			CIU	4000	σ_1/σ_3 Max	4643	15.6		From 15.3 to 16.0': Gray-brown fine SAND and SILT with 1/16" to 1/8" Silt layers
B-2	S-9	16-18	3				55	9												Brown SILT and fine SAND

U.S. STANDARD SIEVE AND HYDROMETER

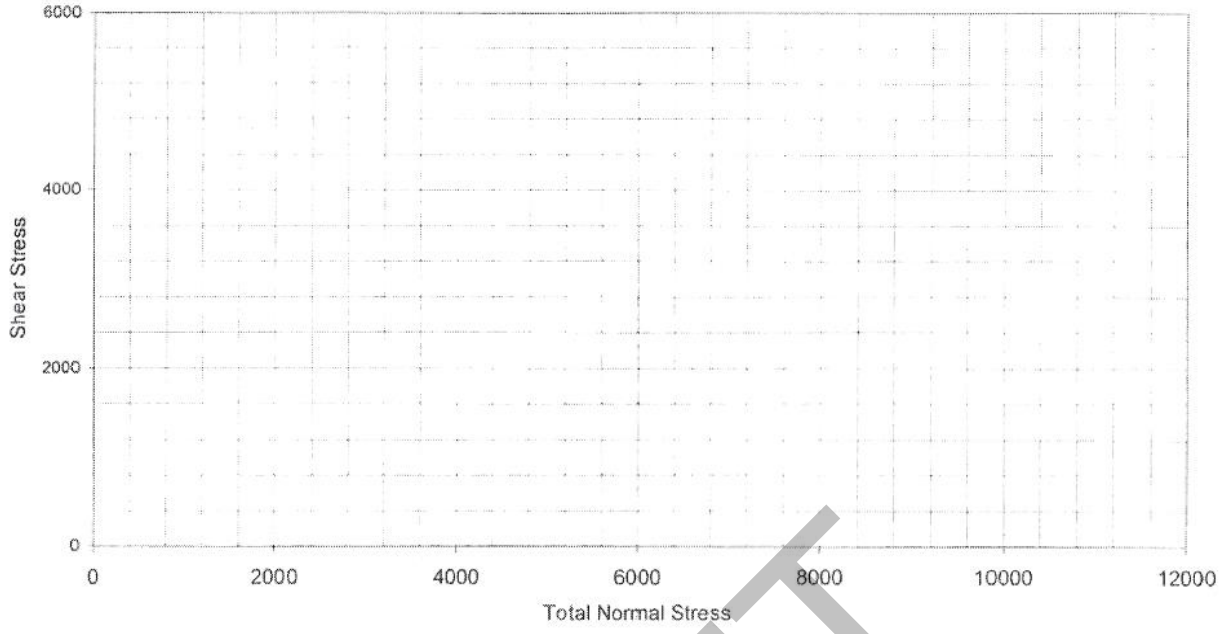


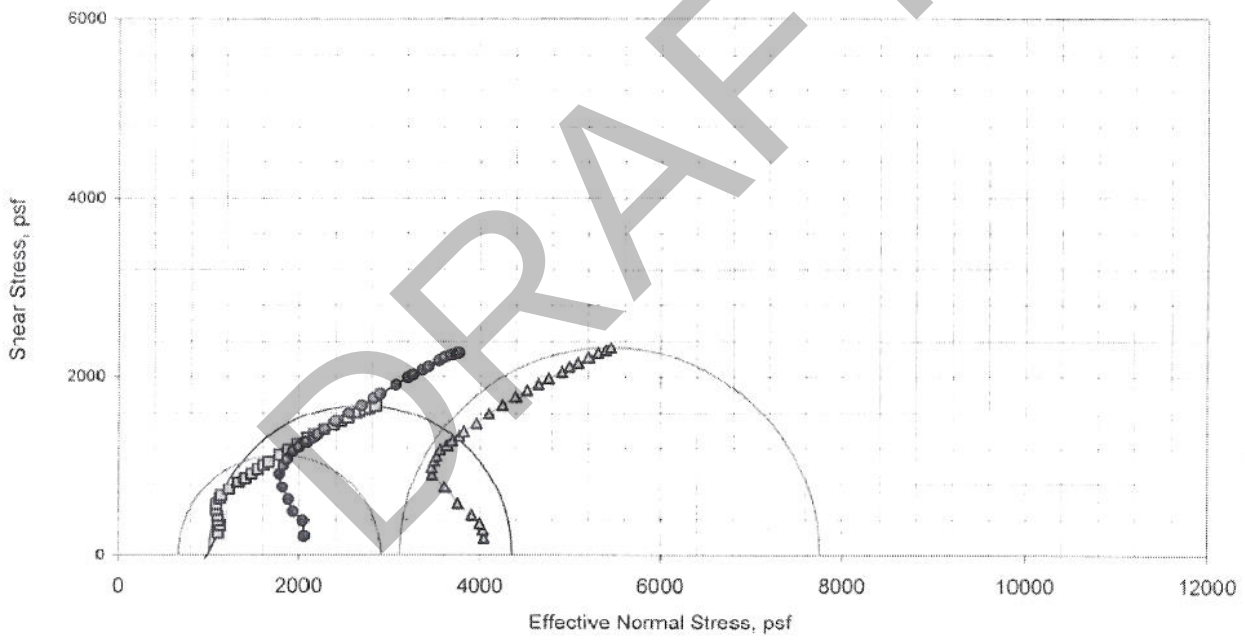
Gravel	Sand	Fines
0.0%	47.0%	53.0%

Lab #	Exploration	Sample	Depth (ft)	Description	WC	LL	PL	PI
1	B-1	S-9	12-14'	Brown SILT and fine SAND				

NRG Huntley Embankment Evaluation
Tonawanda, NY
GZA File # 21.0056497.00

Tested by: PEC Date: 5/8/09
Reviewed by: MBP Date: 5/14/09





SOIL DESCRIPTION	Brown SILT and fine SAND				
LIQUID LIMIT:	NT	PLASTIC LIMIT:	NT	SPECIFIC GRAVITY:	NT

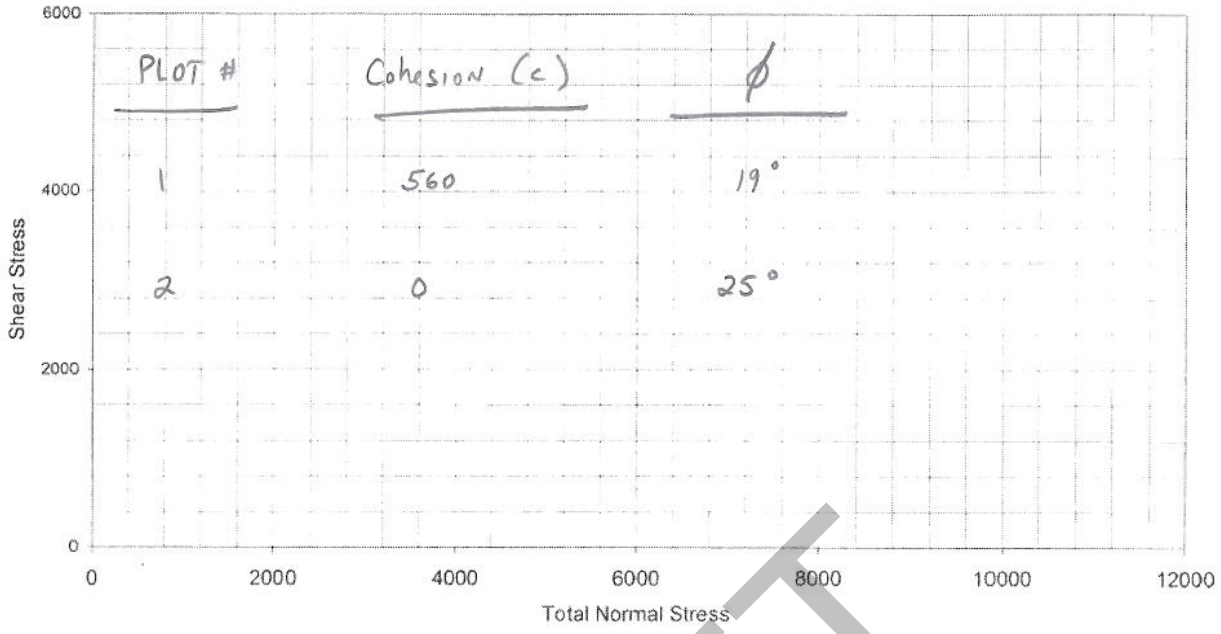
FAILURE CRITERIA: σ_1/σ_3 MAX

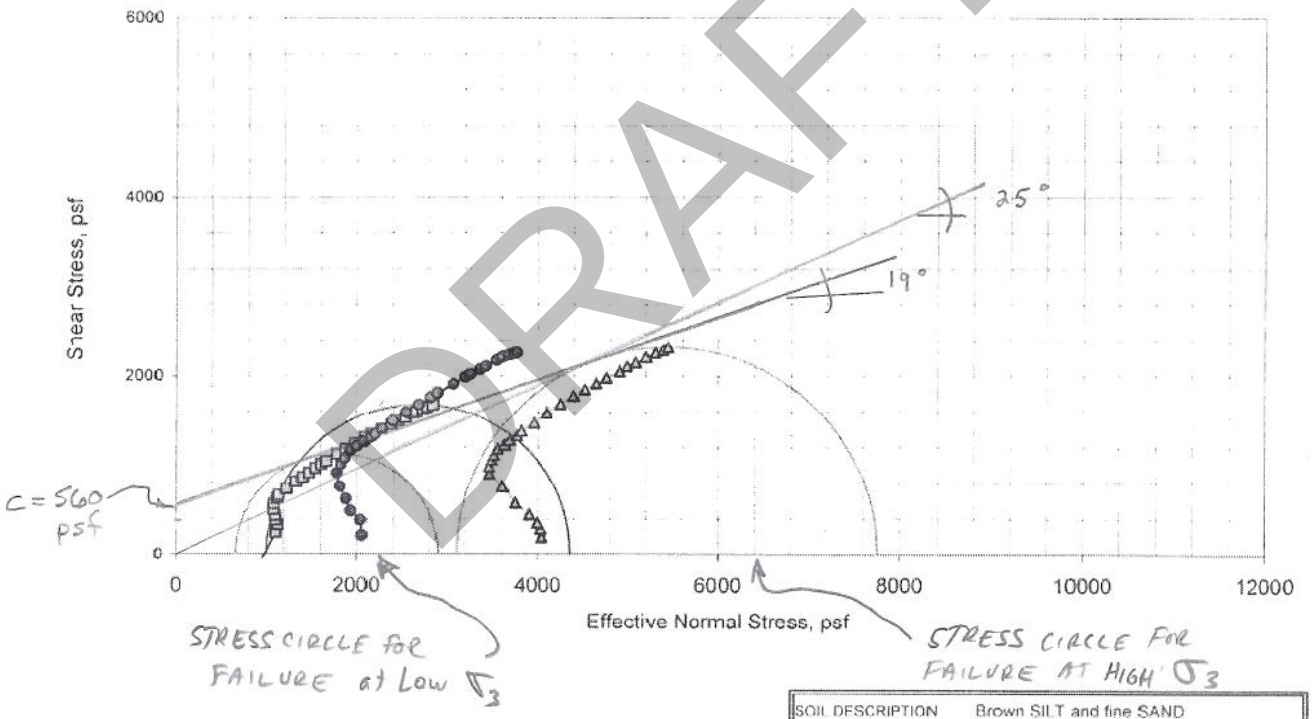
REMARKS:

NRG Huntley Embankment Evaluation
Tonawanda, NY
TRIAXIAL COMPRESSION TESTS (CIU)

BORING: B-1	FILE NO: 21.0056497.00
SAMPLE: ST-1	Date: 5/13/2009
DEPTH:	Tech.: MST
TEST SERIES: 2	Reviewer: DAS

GZA GeoEnvironmental, Inc.





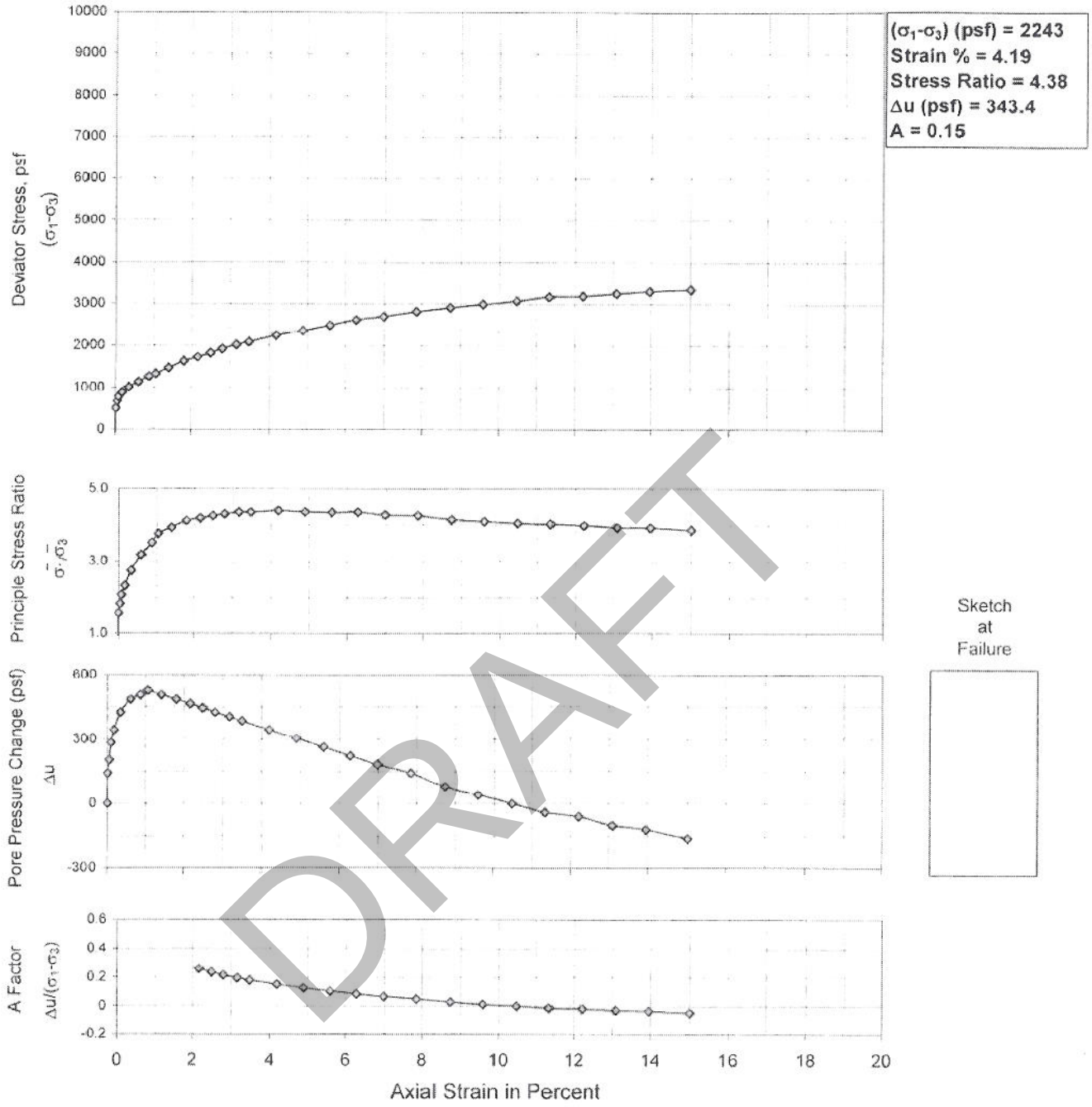
SOIL DESCRIPTION	Brown SILT and fine SAND				
LIQUID LIMIT:	NT	PLASTIC LIMIT:	NT	SPECIFIC GRAVITY	NT

FAIILURE CRITERIA:	σ_1/σ_3 MAX
REMARKS:	

NRG Huntley Embankment Evaluation
Tonawanda, NY
TRIAXIAL COMPRESSION TESTS (CIU)

BORING: B-1	FILE NO: 21.0056497.00
SAMPLE: ST-1	Date: 5/13/2009
DEPTH:	Tech.: MST
TEST SERIES: 2	Reviewer: DAS

GZA GeoEnvironmental, Inc.



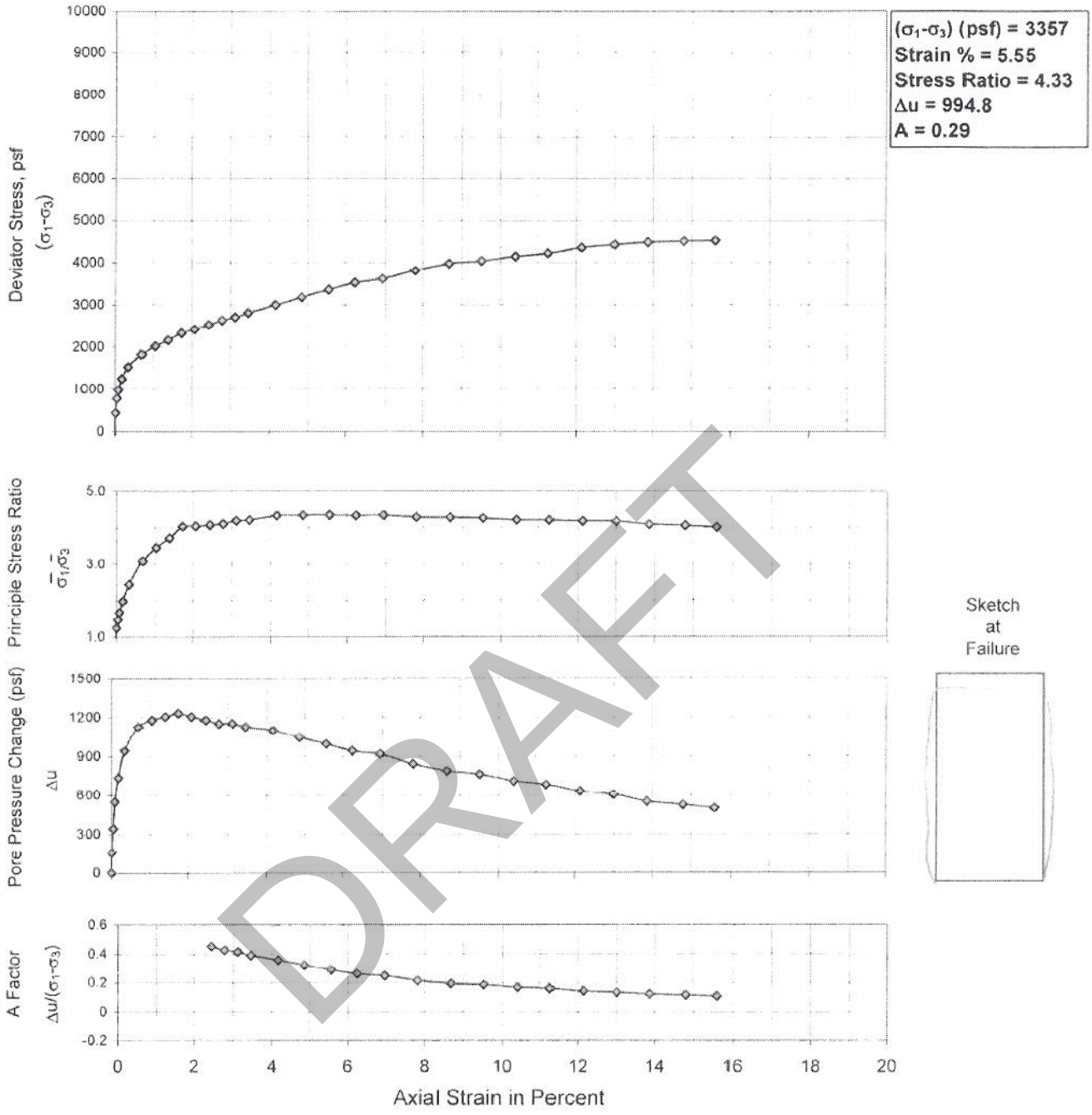
GZA GeoEnvironmental, Inc.

SOIL DESCRIPTION:	Brown SILT and fine SAND		
LIQUID LIMIT: NT	PLASTIC LIMIT NT	SPECIFIC GRAVITY	NT

TEST NO / SYMBOL	INITIAL CONDITIONS				CONDITIONS BEFORE SHEAR				FINAL CONDITIONS		RATE OF STRAIN, PERCENT PER MINUTE
	INITIAL WATER CONTENT, %	INITIAL DRY UNIT WEIGHT, pcf	SAMPLE HEIGHT, IN	SAMPLE DIAMETER, IN	INITIAL STRESS, ksf $\bar{\sigma}_1=\bar{\sigma}_3$	FINAL BACK PRESSURE, ksf	VOLUMETRIC STRAIN, %	PORE PRESSURE RESPONSE, %	FINAL WATER CONTENT, %	FINAL DRY UNIT WEIGHT, %	
T2.1.1	30.6	90.5	5.77	2.88	1.01	13.0	2.05	98.2	29.0	92.4	0.069

NRG Huntley Embankment Evaluation
Tonawanda, NY
TRIAXIAL COMPRESSION TESTS (CIU)

BORING: B-1	FILE NO: 21.0056497.00
SAMPLE: ST-1	Date: 5/12/2009
DEPTH: 14.3-14.8'	Tech.: MST
TEST NO: T2.1.1	Reviewer: DAS



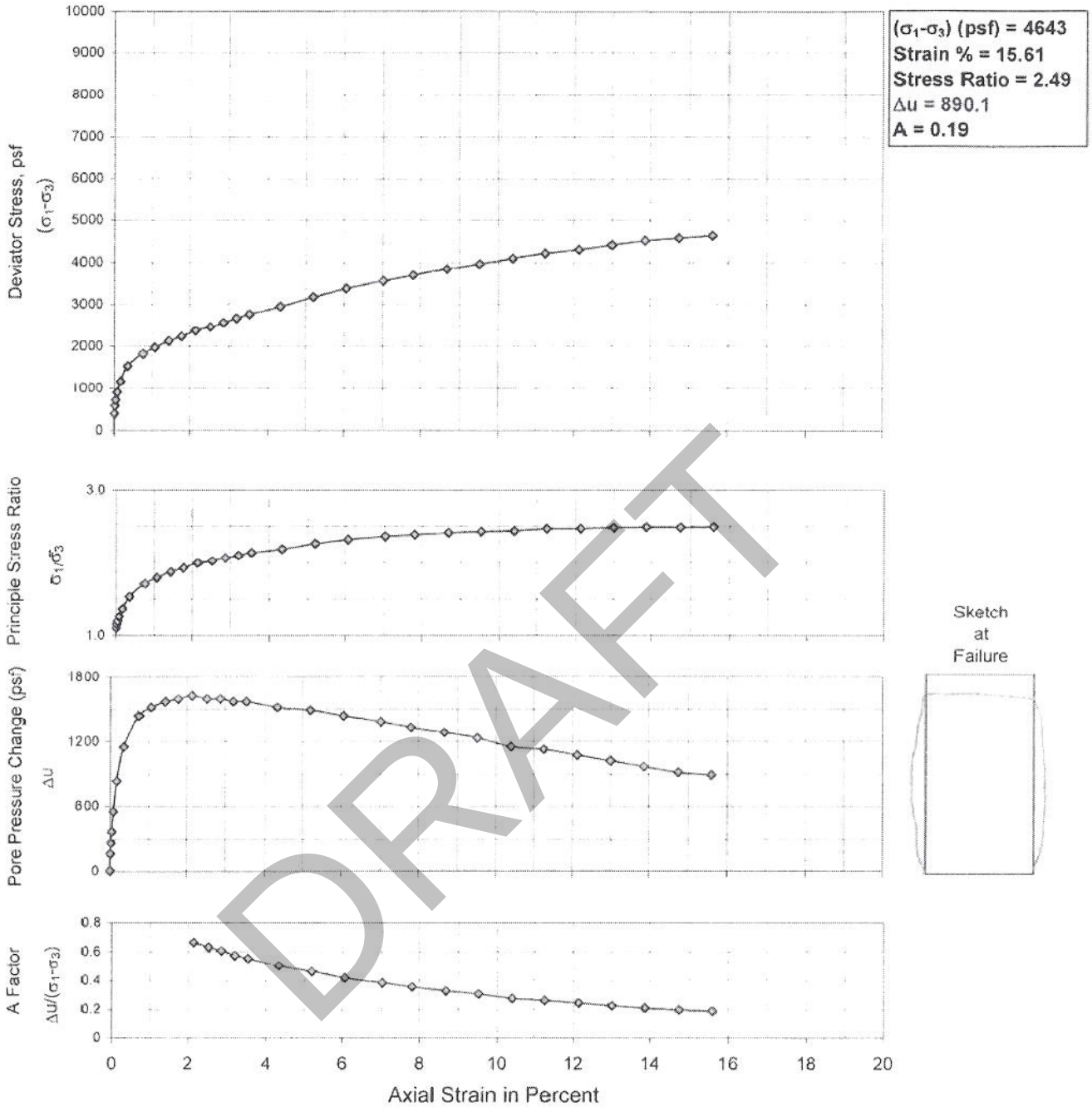
GZA GeoEnvironmental, Inc.

SOIL DESCRIPTION:	Brown SILT and fine SAND		
LIQUID LIMIT: NT	PLASTIC LIMIT NT	SPECIFIC GRAVITY:	NT

TEST NO / SYMBOL	INITIAL CONDITIONS				CONDITIONS BEFORE SHEAR				FINAL CONDITIONS		RATE OF STRAIN, PERCENT PER MINUTE
	INITIAL WATER CONTENT, %	INITIAL DRY UNIT WEIGHT, pcf	SAMPLE HEIGHT, IN	SAMPLE DIAMETER, IN	INITIAL STRESS, ksf $\sigma_3=\sigma_3$	FINAL BACK PRESSURE, ksf	VOLUMETRIC STRAIN, %	PORE PRESSURE RESPONSE, %	FINAL WATER CONTENT, %	FINAL DRY UNIT WEIGHT, %	
T2.1.2	29.4	93.0	5.82	2.85	2.00	13.0	2.68	96.3	28.3	95.6	0.103

NRG Huntley Embankment Evaluation
Tonawanda, NY
TRIAXIAL COMPRESSION TESTS (CIU)

BORING: B-1	FILE NO: 21.0056497.00
SAMPLE: ST-1	Date: 5/12/2009
DEPTH: 14.8-15.3'	Tech.: MST
TEST NO: T2.1.2	Reviewer: DAS



GZA GeoEnvironmental, Inc.

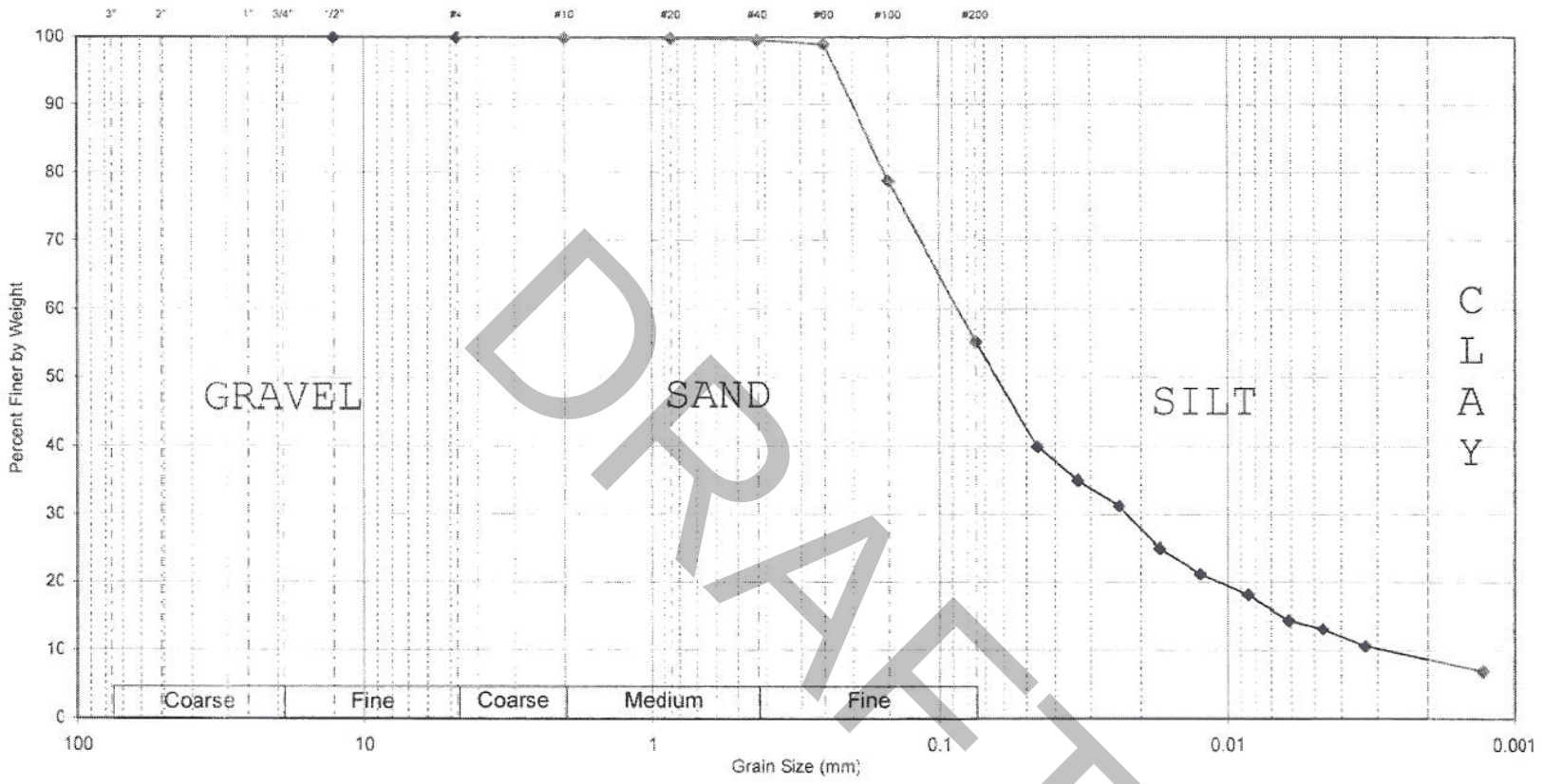
SOIL DESCRIPTION:	Brown SILT and fine SAND				
LIQUID LIMIT:	NT	PLASTIC LIMIT	NT	SPECIFIC GRAVITY	NT

TEST NO / SYMBOL	INITIAL CONDITIONS: INITIAL WATER CONTENT, %	INITIAL DRY UNIT WEIGHT, pcf	SAMPLE HEIGHT, IN	SAMPLE DIAMETER, IN	CONDITIONS BEFORE SHEAR: INITIAL STRESS, ksf $\bar{\sigma}_3=\bar{\sigma}_3$	FINAL BACK PRESSURE, ksf	VOLUMETRIC STRAIN, %	PORE PRESSURE RESPONSE %	FINAL CONDITIONS: FINAL WATER CONTENT, %	FINAL DRY UNIT WEIGHT, %	RATE OF STRAIN, PERCENT PER MINUTE
T2.1.3	30.0	91.4	5.82	2.86	4.00	13.0	2.72	98.2	28.7	94.0	C.069

NRG Huntley Embankment Evaluation
Tonawanda, NY
TRIAXIAL COMPRESSION TESTS (CIU)

BORING: B-1	FILE NO: 21.0056497.00
SAMPLE: ST-1	Date: 5/13/2009
DEPTH: 15.4-15.8'	Tech.: MST
TEST NO: T2.1.3	Reviewer: DAS

U.S. STANDARD SIEVE AND HYDROMETER



Gravel	Sand	Fines
0.0%	44.7%	55 3%

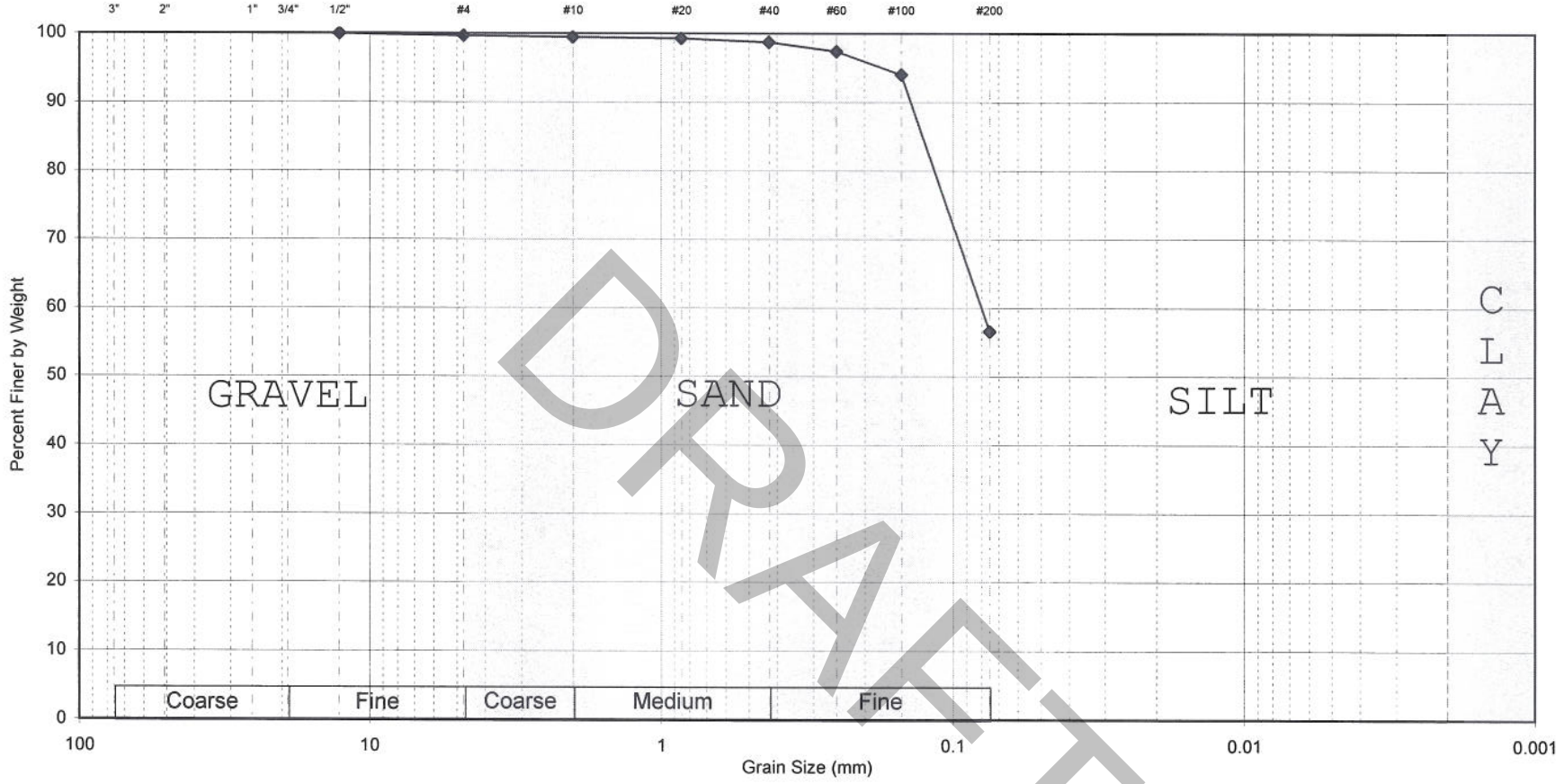
Lab #	Exploration	Sample	Depth (ft)	Description	WC	LL	PL	PI
2	B-2	S-9	16-18'	Brown SILT and fine SAND				

GZA

NRG Huntley Embankment Evaluation
Tonawanda, NY
GZA File # 21.0056497.00

Tested by: PEC Date: 5/8/09
Reviewed by: MBP Date: 5/14/09

U.S. STANDARD SIEVE AND HYDROMETER



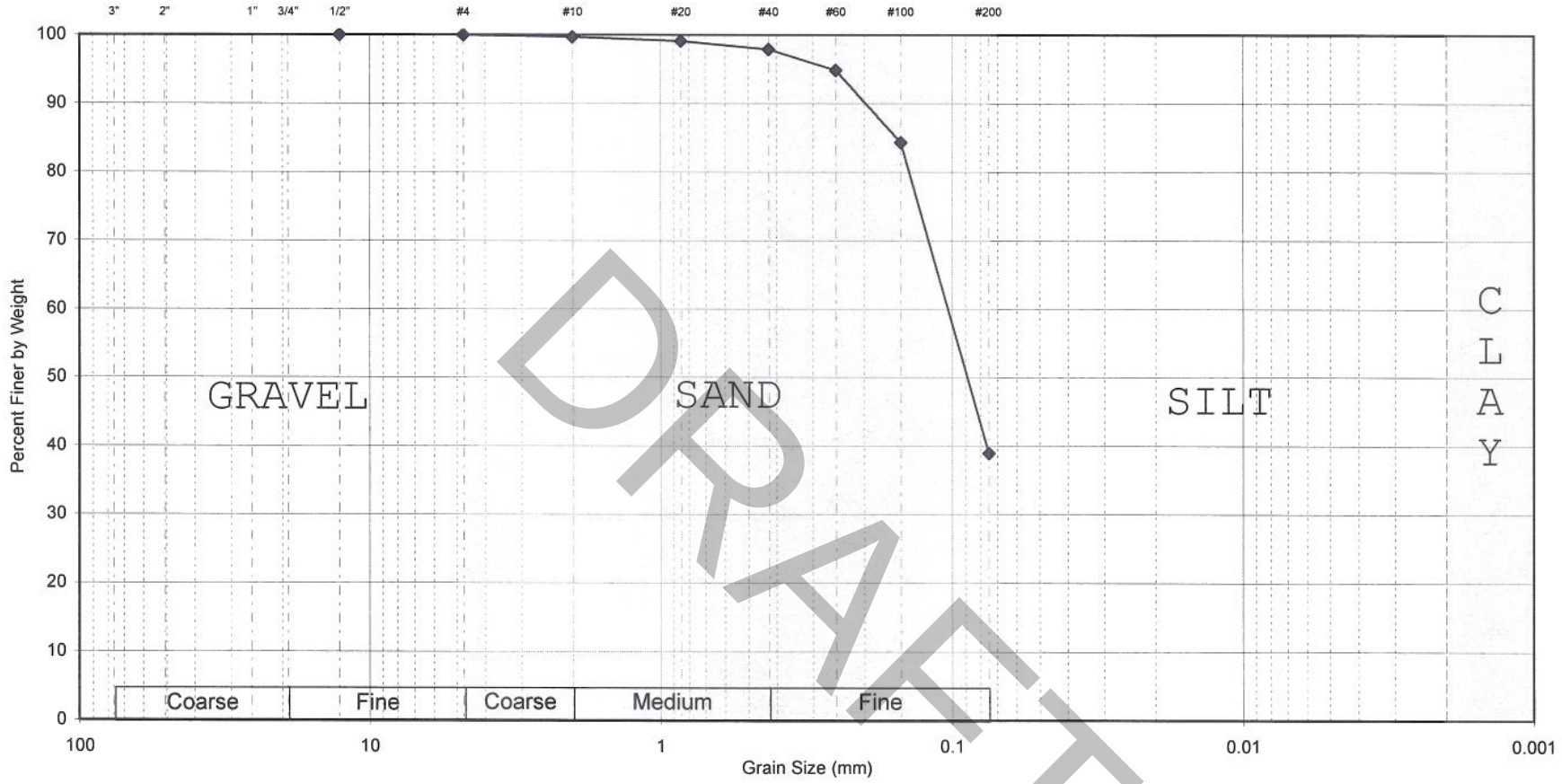
Gravel	Sand	Fines
0.3%	43.1%	56.6%

Lab #	Exploration	Sample	Depth (ft)	Description	WC	LL	PL	PI
2.1.1	B-1	ST-1	14.2-14.8'	Brown SILT and fine SAND				

NRG Huntley Embankment Evaluation
Tonawanda, NY
GZA File # 21.0056497.00

Tested by: PEC Date: 5/18/09
Reviewed by: MBP Date: 5/19/09

U.S. STANDARD SIEVE AND HYDROMETER



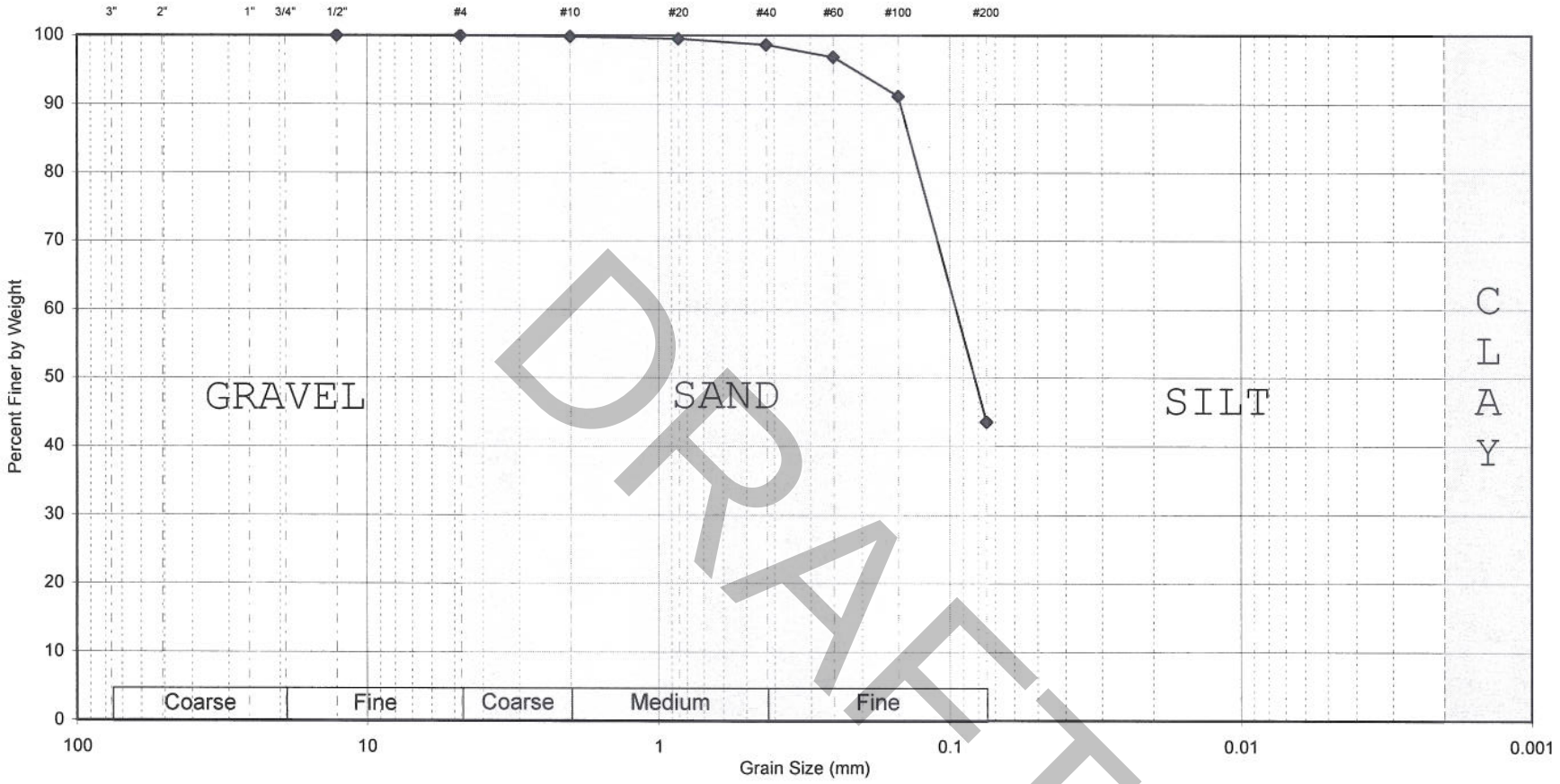
Gravel	Sand	Fines
0.0%	61.1%	38.9%

Lab #	Exploration	Sample	Depth (ft)	Description	WC	LL	PL	PI
2.1.2	B-1	ST-1	14.8-15.3'	Gray fine SAND and SILT				

NRG Huntley Embankment Evaluation
Tonawanda, NY
GZA File # 21.0056497.00

Tested by: PEC Date: 5/18/09
Reviewed by: MBP Date: 5/19/09

U.S. STANDARD SIEVE AND HYDROMETER



Gravel	Sand	Fines
0.0%	56.4%	43.6%

Lab #	Exploration	Sample	Depth (ft)	Description	WC	LL	PL	PI
2.1.3	B-1	ST-1	15.4-15.8'	Gray fine SAND and SILT				

NRG Huntley Embankment Evaluation
Tonawanda, NY
GZA File # 21.0056497.00

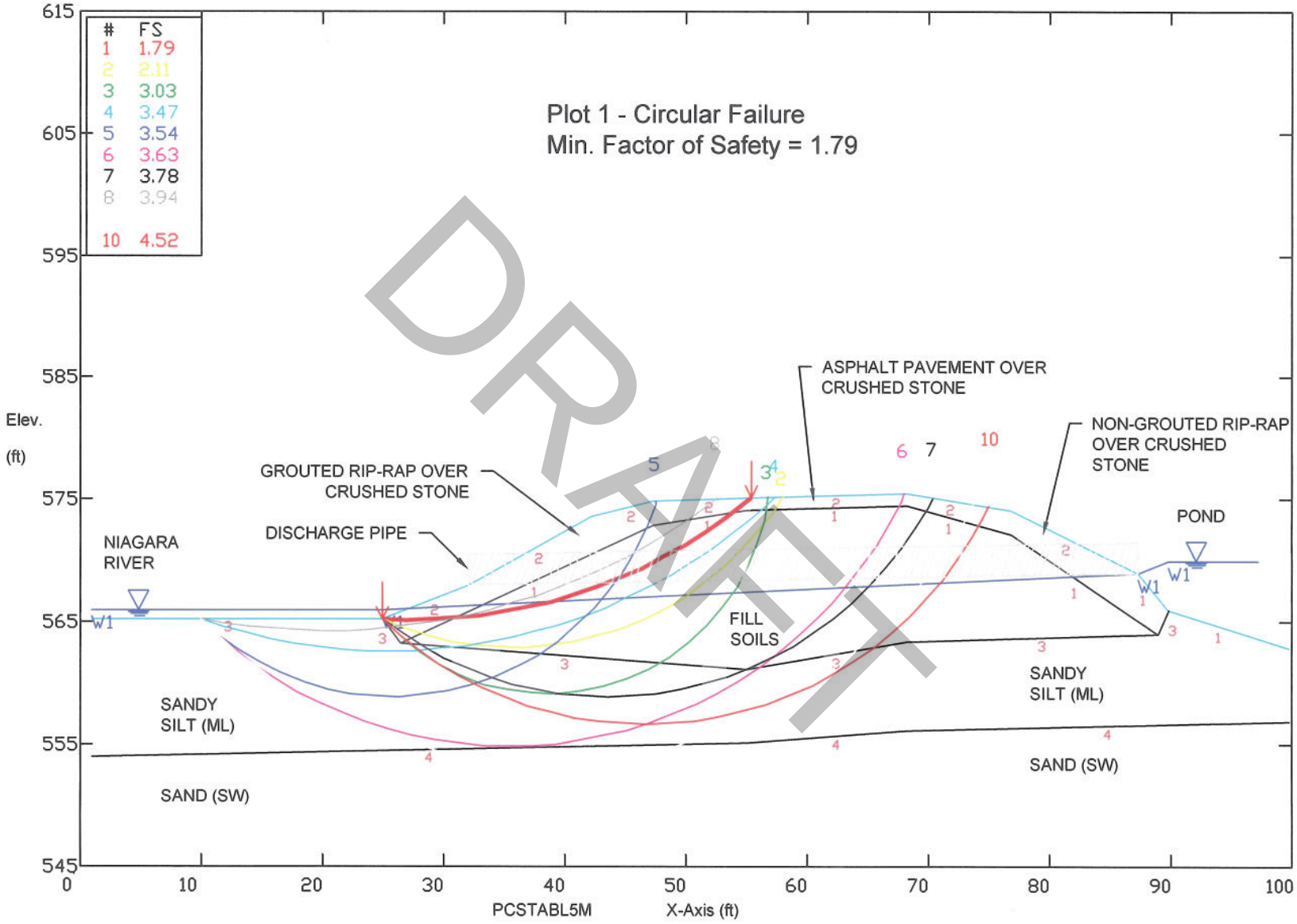
Tested by: PEC Date: 5/18/09
Reviewed by: MBP Date: 5/19/09

ATTACHMENT 3

SLOPE STABILITY MODEL ANALYSIS

NRG Embankment Evaluation

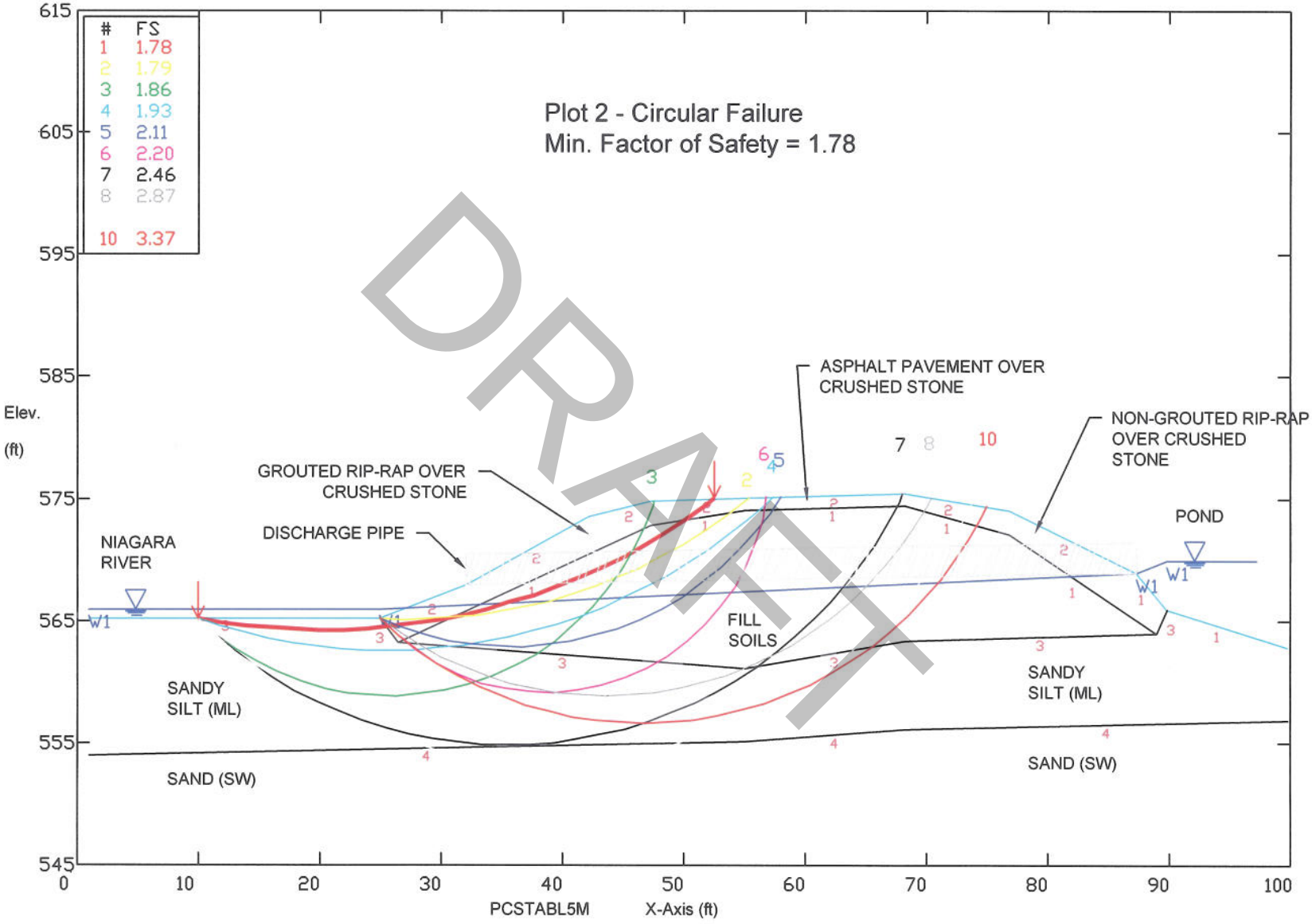
Ten Most Critical. C:NRG2.PLT By: djt 05-20-09 1:21pm



Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 FILL	128	130	0	30	0	0	0
2 RIP-RAP	140	140	0	40	0	0	0
3 SANDY SILT	120.5	124.5	560	19	0	0	0
4 SAND	130	132	0	32	0	0	0

NRG Embankment Evaluation

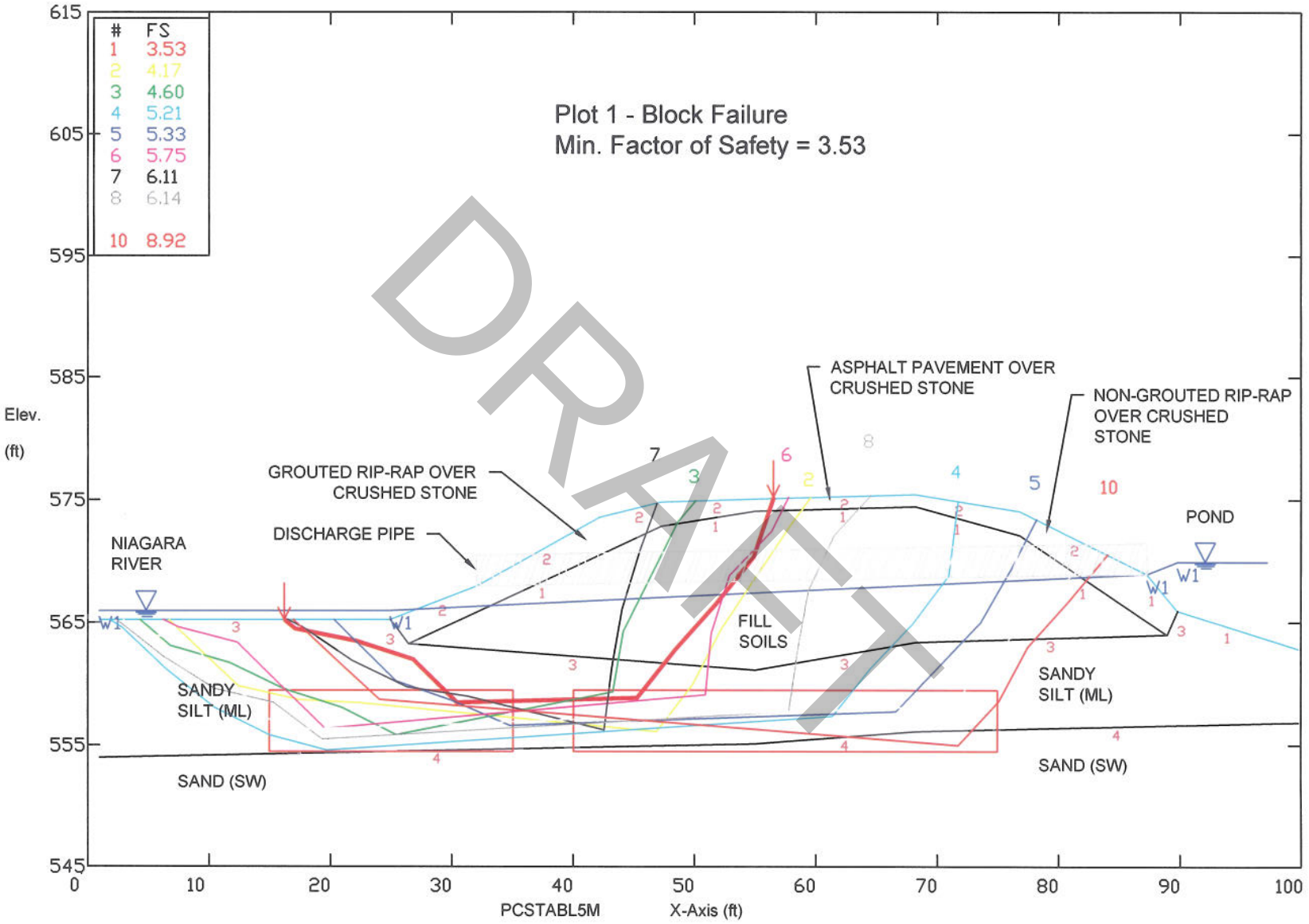
Ten Most Critical. C:NRG1.PLT By: djt 05-20-09 1:16pm



Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 FILL	128	130	0	30	0	0	0
2 RIP-RAP	140	140	0	40	0	0	0
3 SANDY SILT	120.5	124.5	0	25	0	0	0
4 SAND	130	132	0	32	0	0	0

NRG Embankment Evaluation

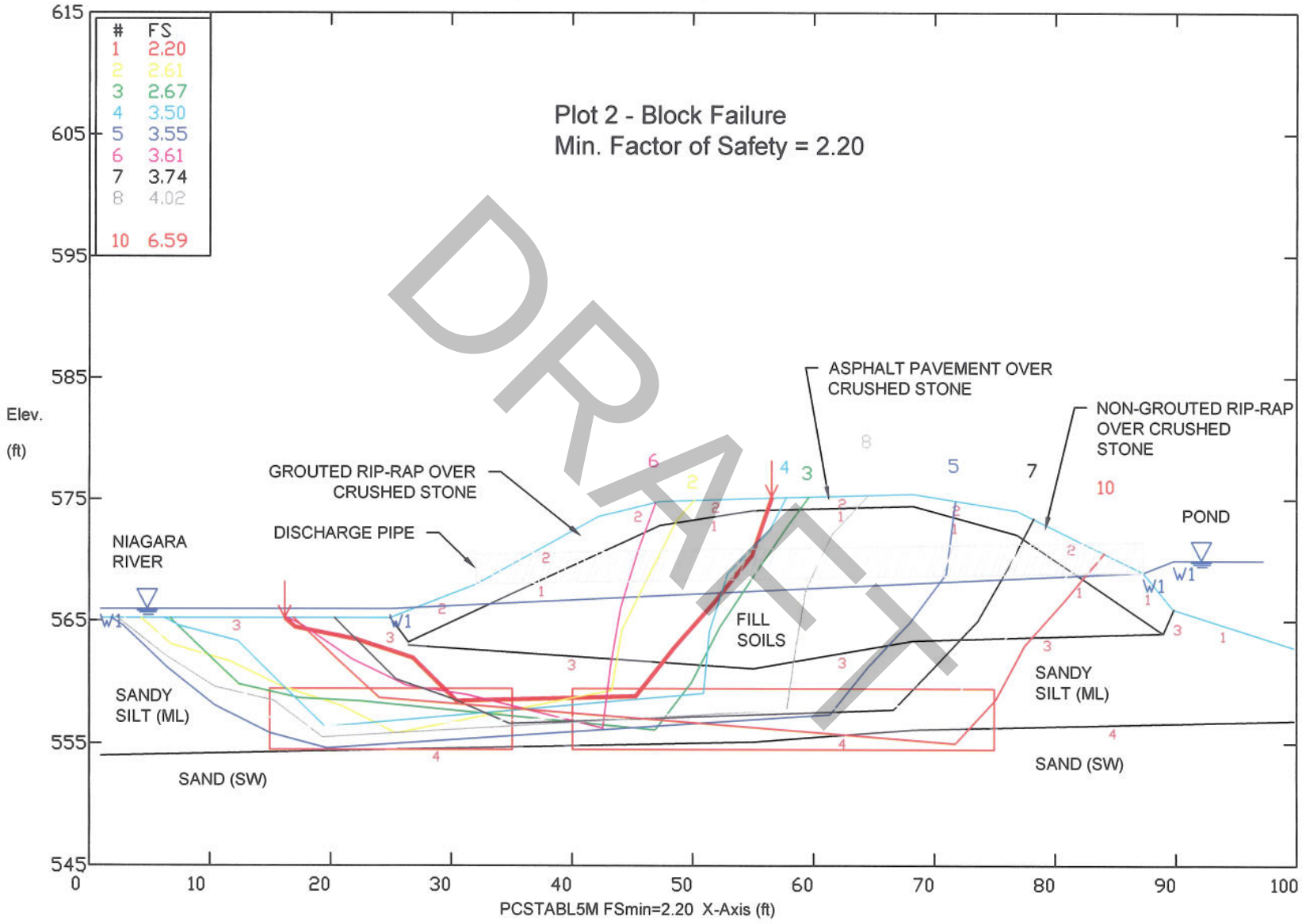
Ten Most Critical. C:NRG4.PLT By: djt 05-20-09 1:25pm



Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 FILL	128	130	0	30	0	0	0
2 RIP-RAP	140	140	0	40	0	0	0
3 SANDY SILT	120.5	124.5	560	19	0	0	0
4 SAND	130	132	0	32	0	0	0

NRG Embankment Evaluation

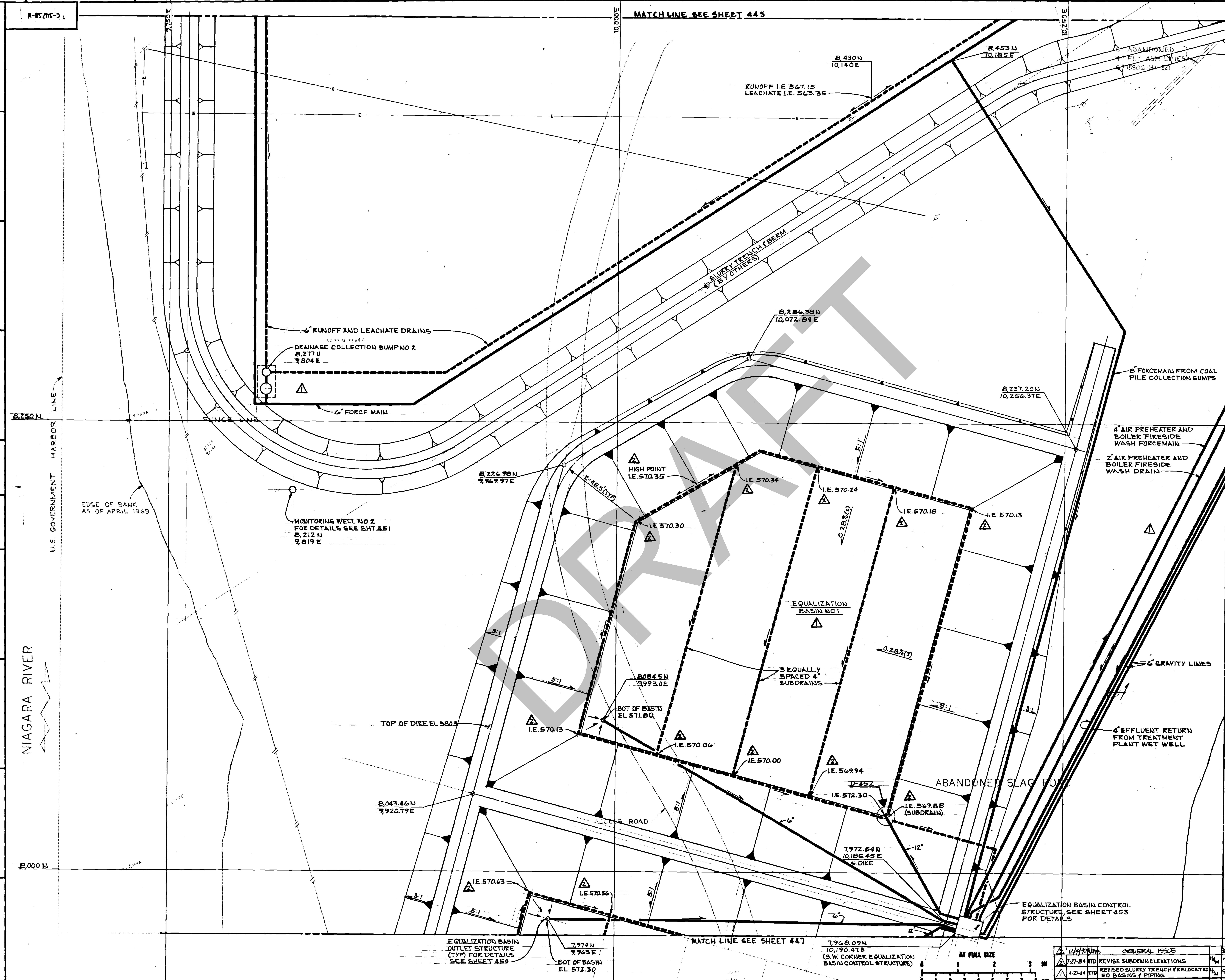
Ten Most Critical. C:NRG3.PLT By: djt 05-20-09 1:23pm

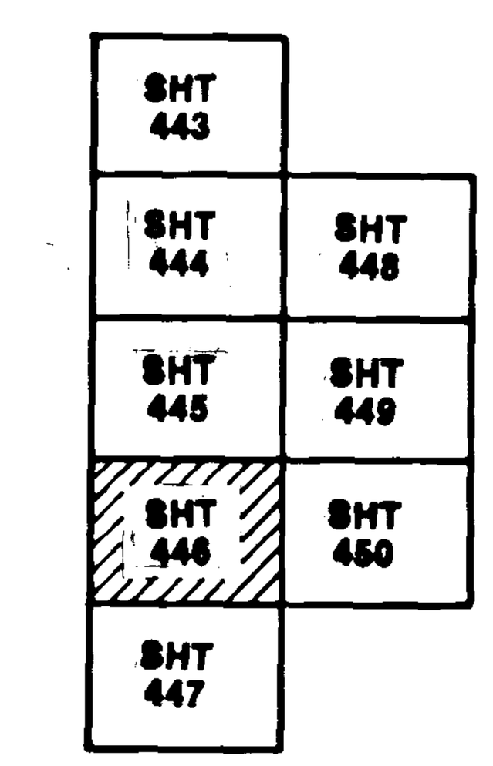


Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 FILL	128	130	0	30	0	0	0
2 RIP-RAP	140	140	0	40	0	0	0
3 SANDY SILT	120.5	124.5	0	25	0	0	0
4 SAND	130	132	0	32	0	0	0

APPENDIX E

DRAWING C-34738


MATCH LINE SEE SHEET 445
9,750E
10,000E
10,250E
8,430N
10,140E
8,453N
10,185E
ABANDONED
4 FLY ASH LINES
(18806-H1-521)
RUNOFF I.E. 567.15
LEACHATE I.E. 563.35
SLURRY TRENCH & BERM
℄ (BY OTHERS)
6" RUNOFF AND LEACHATE DRAINS
DRAINAGE COLLECTION SUMP NO 2
8,277N
9,804E
6" FORCE MAIN
8,286.38N
10,072.84E
8" FORCEMAIN FROM COAL PILE COLLECTION SUMPS
8,237.20N
10,256.37E
4" AIR PREHEATER AND BOILER FIRESIDE WASH FORCEMAIN
2" AIR PREHEATER AND BOILER FIRESIDE WASH DRAIN
8,250N
FENCE LINE
U.S. GOVERNMENT HARBOR LINE
EDGE OF BANK AS OF APRIL 1969
MONITORING WELL NO 2
FOR DETAILS SEE SHT 451
8,212N
9,819E
8,226.98N
9,969.97E
HIGH POINT
I.E. 570.35
I.E. 570.34
I.E. 570.24
I.E. 570.18
I.E. 570.13
I.E. 570.30
0.28%(±)
EQUALIZATION BASIN NO 1
0.28%(±)
3 EQUALLY SPACED 4" SUBDRAINS
8084.5N
9,993.0E
BOT OF BASIN
EL 571.80
TOP OF DIKE EL 580.3
I.E. 570.13
I.E. 570.06
I.E. 570.00
I.E. 569.94
D-452
I.E. 572.30
I.E. 569.88
(SUBDRAIN)
ABANDONED SLAG POND
8,043.46N
9,920.79E
ACCESS ROAD
6"
12"
7,972.54N
10,185.45E
℄ DIKE
5:1
3:1
8,000N
NIAGARA RIVER
I.E. 570.63
I.E. 570.56
6"
12"
EQUALIZATION BASIN OUTLET STRUCTURE (TYP) FOR DETAILS SEE SHEET 454
7,974N
9,963E
BOT OF BASIN
EL. 572.30
MATCH LINE SEE SHEET 447
7,968.09N
10,190.47E
(S.W. CORNER EQUALIZATION BASIN CONTROL STRUCTURE)
EQUALIZATION BASIN CONTROL STRUCTURE, SEE SHEET 453 FOR DETAILS
6" GRAVITY LINES
4" EFFLUENT RETURN FROM TREATMENT PLANT WET WELL
MATCH LINE SEE SHEET 450
1.5' (N.T.S.)
1.5' (N.T.S.)
N
DRAFT



KEY PLAN

NOTES:

1. THE SIZE, NUMBER AND LOCATION OF BURIED UTILITIES SHOWN ON THIS DRAWING ARE BASED ON THE BEST INFORMATION AVAILABLE; HOWEVER, EXTREME CARE SHOULD BE TAKEN DURING CONSTRUCTION SINCE LOCATION MAY NOT BE AS SHOWN, AND THERE IS THE POSSIBILITY THAT SOME UTILITIES MAY NOT BE SHOWN ON THIS DRAWING.
2. SCREENED LINES INDICATE ITEMS AND NOTES PERTAINING TO EXISTING FACILITIES AND ARE PROVIDED FOR INFORMATION ONLY. WORK TO BE PERFORMED BY THIS CONTRACT IS INDICATED BY SOLID LINES EXCEPT AS NOTED.
3. THE COORDINATE SYSTEM SHOWN ON THIS DRAWING IS BASED ON A EAST-WEST BASE LINE OF 10,000 EAST LOCATED AT STATION NO. 2 COLUMN ROW "C" AND A NORTH-SOUTH BASE LINE OF 10,000 NORTH LOCATED AT STATION NO. 2 COLUMN ROW "1".

ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL ENGINEER IS ILLEGAL.

Charles L. Meyer
6/27/83

NO.	DATE	BY	DESCRIPTION OF REVISION	CK.	APP.
3	12/4/90		GENERAL ISSUE		
2	7-27-84	RTD	REVISE SUBDRAIN ELEVATIONS		
1	6-27-84	RTD	REVISED SLURRY TRENCH & RELOCATED EQ BASINS & PIPING		

AT FULL SIZE

SC SHEET NO 446

NIAGARA MOHAWK RECORDS

NIAGARA MOHAWK POWER CORPORATION

C.R. HUNTLEY STEAM STATION
COAL PILE DRAINAGE COLLECTION SYSTEM
AND EQUALIZATION BASINS
ENLARGED SITE PLAN
SHEET 4 OF 8

DATE 6-27-83 SCALE 1" = 20'

3-HO-524

NO. C-34738-W