Ash Ponds Closure

# Hydrogeologic Site Investigation

Hutsonville Power Station AmerenEnergy Medina Valley Cogen, L.L.C. Crawford County, Illinois

September 8, 2014







#### **Table of Contents**

1. Introduction	4
2. Project Background 2.1 Physical Setting 2.2 Geologic Setting 2.3 Climate Data	4 4
3. Previous Investigations.         3.1 Hanson 1983.         3.2 Hanson 1984a.         3.3 Hanson 1984b.         3.4 STMI 1998.         3.5 NRT 2001.         3.6 NRT 2004.         3.7 Geotechnology 2010.         3.8 Hanson 2011.	7 7 7 8 8 8
<ul> <li>4. Site Geology</li></ul>	9 9 9 9 9 16
<ul> <li>5. Site Hydrogeology</li> <li>5.1 Hydrogeologic Characteristics</li></ul>	16 16 17 17 18 18 20 21 21
6. Summary and Conclusions	
7. Licensed Professional Acknowledgement	22
8. References	23

#### Appendices

Appendix A Boring Location Map, Field Boring Logs and Water Well Records Appendix B Potentiometric Surface Maps Appendix C Groundwater Quality Information



### **Figures and Tables**

#### Figures

5
6
10
11
12
13
14
15

#### Tables

Table 1: Average Annual Climate Data for Terre Haute, IN	7
Table 2. Monitoring Well Slug Test Results	
Table 3. Flow Direction and Gradients	
Table 4. Ash Pond Monitoring Wells – Historic Median Concentrations (1999-2012)	19
Table 5. Ash Pond Monitoring Wells – Recent Median Concentrations (2013-14)	20
Table 6. Additional Detections Above Class I Standards	

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#### 1. Introduction

The AmerenEnergy Medina Valley Cogen, L.L.C. Hutsonville Power Station (Site) is situated on the west bank of the Wabash River, and approximately one and one-half miles north of the Village of Hutsonville in Crawford County, Illinois. The Site is located generally in the Southwest ¼ of Section 17, Township 8 North, Range 11 West of the Second Principal Meridian (see Figure 1). The focus of this investigation is for the water treatment devices at the Site known as Ash Pond A, Ash Pond B, Ash Pond C and the Bottom Ash Sluice Pond. Ash Pond D, the largest and oldest of the four ash sluice ponds at the Site, was covered and closed in 2012-13 under the Title 35, Illinois Admin. Code (IAC), Part 840 rules (Illinois PCB, 2011). The layout of the Site and the ash ponds are depicted on Figure 2.

In consultation with the Illinois Environmental Protection Agency (Illinois EPA), Ameren pursued an additional rulemaking before the Illinois Pollution Control Board (IPCB) to provide for sequential corrective actions and/or closure of other Ameren Energy Resources (AER) Company ash ponds. The IPCB issued a stay on AER's proposed rulemaking and in October 2013, Illinois EPA filed a rule of general applicability for coal combustion waste surface impoundments at power generating facilities. It sets forth a process to monitor ash ponds and groundwater, as well as a process for preventive response, corrective action and closure (Illinois PCB, 2013). That rulemaking is continuing.

This Hydrogeologic Site Investigation report generally conforms to 35 IAC 840.110 and the proposed rule at Section 841.200 (when judged appropriate) that is currently under development. This Investigation provides information to define the hydrogeology and assess any groundwater impacts associated with the Site, to evaluate a Groundwater Management Zone (GMZ), and to establish a groundwater monitoring system for the Site.

#### 2. Project Background

#### 2.1 Physical Setting

The Site is located at the eastern margin of the Springfield Plain of the Till Plain Section of the Central Lowland (Physiographic) Province (Leighton et al., 1948). The topography consists of generally flat agricultural land with shallow, entrenched drainage.

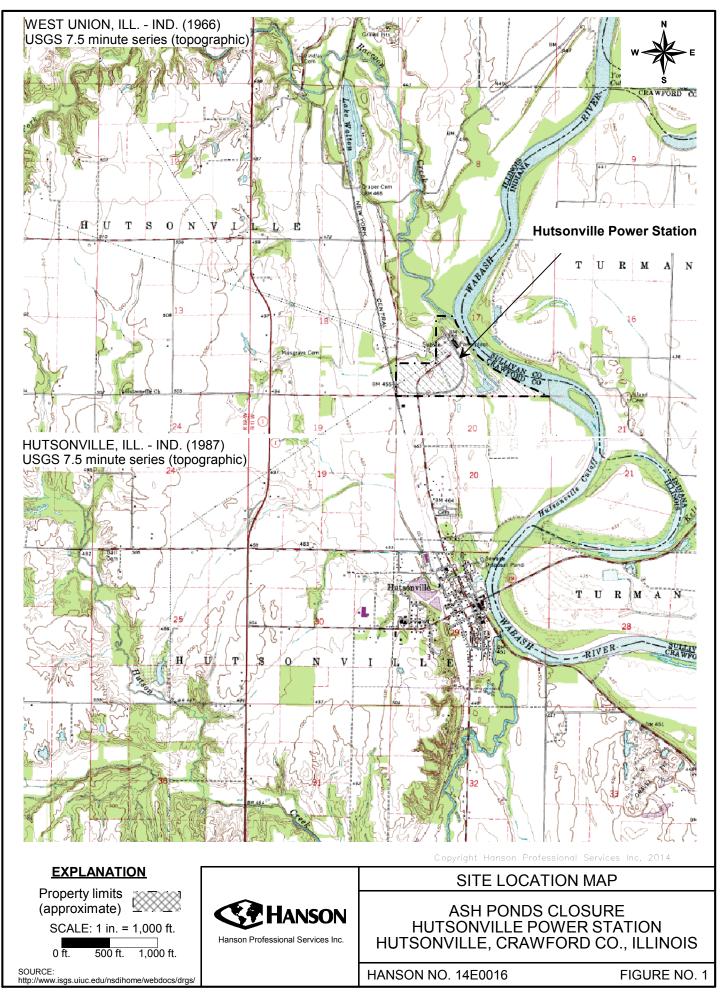
### 2.2 Geologic Setting

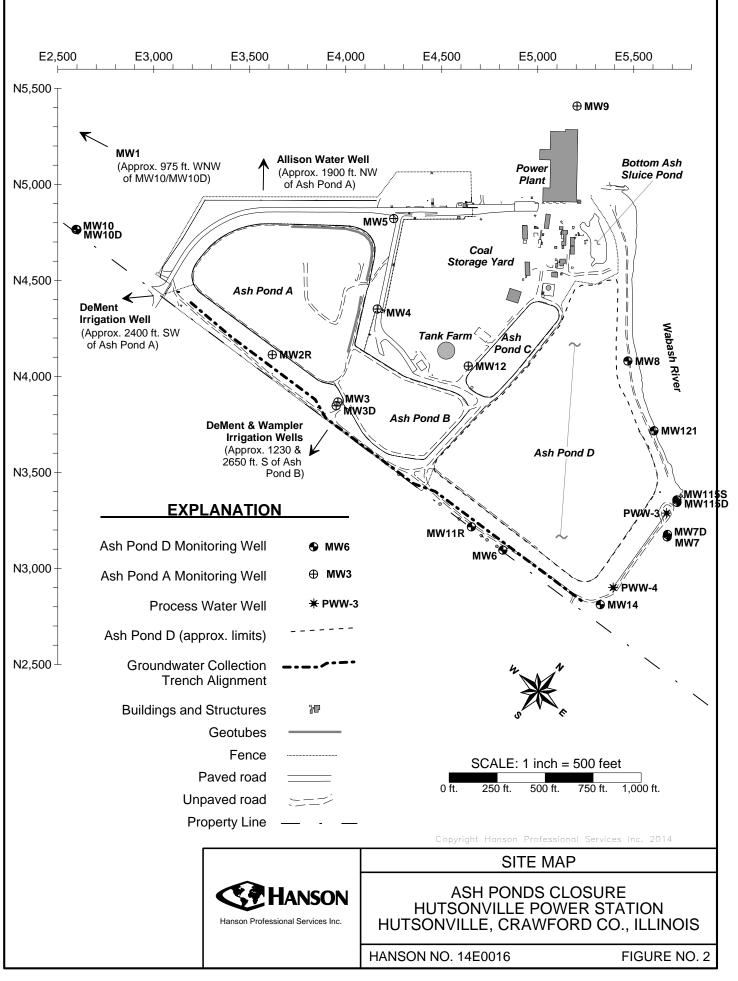
The Site geology consists primarily of Wisconsinan Stage fluvial deposits with some Illinoian Stage diamictons overlying Pennsylvanian bedrock. The surficial (unlithified) materials consist of the Cahokia Formation (fluvial deposits), Henry Formation (glacial outwash deposits), and diamictons of the Glasford Formation (Willman et al., 1975; Hansel & Johnson, 1996).

Regional bedrock is composed of Pennsylvanian Age shale, sandstone, limestone and coal of the Desmoinesian Stage Modesto Formation of the McLeansboro Group (Willman et al., 1975). There are no active geologic structures or faults in the vicinity of the Site (Nelson, 1995).

#### 2.3 Climate Data

Climatic data was obtained from the Indiana State Climate Office (ISCO, 2014). The data was recorded between 1954 and 2014 in Terre Haute, Indiana, which is located approximately 30 miles northeast of the Site. The average values of the data are summarized in Table 1.





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#### Table 1: Average Annual Climate Data for Terre Haute, IN

Avg. Annual Max. Temp°F	63.1	Avg. Annual Mean Temp°F	52.1
Avg. Annual Min. Temp°F	41.7	Avg. Annual Precipin.	41.77

SOURCE: http://iclimate.org/data\_archive\_v3.asp?rdatatype=cn

#### 3. Previous Investigations

Several subsurface investigations previously completed at the Site are summarized below. A map, depicting the location of the various borings and wells, is included in Appendix A. Boring logs for the various field investigations are also included in Appendix A. All borings drilled as part of the various investigations would have been abandoned (sealed) to the standard of the day. Monitoring wells and piezometers installed as part of an investigation but have since been abandoned/sealed are noted at the end of each sub-section and highlighted on the Boring Location Map in Appendix A.

#### 3.1 Hanson 1983

Hanson Professional Services Inc. (Hanson) completed a geotechnical evaluation for a proposed lined ash pond (Ash Pond A) in August 1983, when the power plant was owned by Central Illinois Public Service Company (CIPS). This investigation advanced 4 borings around the proposed Ash Pond A, and one boring near the southwest corner of the existing, unlined ash pond (Ash Pond D). All borings were advanced to bedrock using hollow stem augers, and two borings were cored approximately 10 feet into bedrock.

#### 3.2 Hanson 1984a

A series of monitoring wells were installed in February 1984. These wells (MW1 through MW9) continue to be used at the Site, and are located around Ash Ponds A and D. Samples of the coarsegrained materials above the bedrock were collected during the installation of these wells. MW2 was replaced in 2012 by MW2R due to its proximity to the Groundwater Collection Trench.

#### 3.3 Hanson 1984b

The 1983 geotechnical investigation was augmented during July 1984 to provide additional information for the berm design around Ash Pond A. Six borings to bedrock were planned. During the course of the investigation, boring SW-2 encountered bedrock at a much lower elevation than in other borings (31 feet versus less than 10 feet). Two additional borings were drilled on either side of SW-2 (SW-2A and SW-2B) to determine the extent of the bedrock feature. Based on the borings, Hanson interprets the bedrock feature as an erosional cut, likely caused by post-glacial outwash events.

#### 3.4 STMI 1998

Due to elevated readings of boron and sulfate in several monitoring wells at the Site, Ameren<sup>\*</sup> directed that an extensive environmental assessment be performed by Science & Technology Management Inc. (STMI). The first phase was performed during August 1998, when 23 locations were investigated using direct-push sampling methods. Two temporary piezometers were also installed in Ash Pond A and have since been removed.

<sup>&</sup>lt;sup>\*</sup> In 1995, CIPS merged with Union Electric of St. Louis, Missouri. Ameren Corporation (Ameren) was incorporated in August 1995 to be the holding company for the two merged utilities.



The second phase of STMI's investigation was the installation of seven new monitoring wells. One shallow well (MW10) was added to augment the upgradient water quality data. MW11, MW12 and MW13 were added to characterize aquifer properties/groundwater flow and further delineate the extent of impacts that appeared to be associated with the ash ponds. MW3D, MW7D and MW10D (upgradient well) were added to determine if the sandstone bedrock was a potential pathway for the apparent impacts identified by the shallow monitoring wells. MW13 was sealed shortly after installation to allow construction of the new, lined ash ponds (Ash Pond B and Ash Pond C).

#### 3.5 NRT 2001

Two more wells (MW14 and TW, now called MW121) were installed on the east side of Ash Pond D during October 2001 as part of an investigation completed for Ameren by Natural Resource Technology, Inc. (NRT). These wells were installed to evaluate potential migration pathways to the deep fluvial sands identified in the bedrock valley below the current Wabash River. MW11 was also replaced with MW11R at this time.

#### 3.6 NRT 2004

Seven additional wells were installed to the east and south of Ash Pond D during late-April and early-May of 2004 (TW-115S, TW-115D, and TW-116 through TW-120). These wells were installed to evaluate potential off-site migration pathways in the shallow and the deep fluvial sands.

#### 3.7 Geotechnology 2010

Four borings were advanced and two piezometers were installed near the northeast side of Ash Pond D during June 2010 by Geotechnology, Inc. The data collected during this field investigation was used as part of a global stability evaluation of the perimeter embankment of Ash Pond D.

#### 3.8 Hanson 2011

As part of the activities necessary to implement the closure of Ash Pond D required under the promulgated rules at the Illinois Pollution Control Board [Illinois IPCB, 2011], additional subsurface information was obtained for the final cover and the groundwater collector trench design required by the rulemaking. Four additional borings were advanced on the south-side of the Site to provide additional bedrock elevation and geotechnical data adjacent to Ash Pond D. Two additional borings were drilled in Ash Pond D to evaluate the ash and the subsurface material. A temporary piezometer was installed in the northeast ash pond boring (B11-6) to monitor ash pond water levels before and during the proposed construction activities. B11-6 was removed during Ash Pond D cover construction.



#### 4. Site Geology

#### 4.1 Stratigraphic Units

Based on information from the Site subsurface investigations summarized above, and published reports, the geology of the Site consists primarily of Wisconsinan Stage fluvial deposits with some Illinoian Stage diamictons overlying Pennsylvanian bedrock. There are various fill materials along with three surficial (unlithified) units identified at the Site (oldest to youngest): silty/clayey diamictons of the Glasford Formation, poorly sorted, outwash sands and gravels of the Henry Formation, and fine-grained fluvial deposits classified as Cahokia Alluvium (Willman et al., 1975; Hansel & Johnson, 1996; Fafalios & Hensel, 1999). Cross sections illustrating the geologic interpretation of the Site are presented in Figure 3, Figure 4, Figure 5, and Figure 6. Site geology was also confirmed using the ISGS ILWATER database and review of nearby water well records (see Appendix A). The Allison (2007) water well log confirms this reports stratigraphic interpretation. Figure 7 depicts the expected Site stratigraphy to a depth of approximately 100 ft.

#### 4.2 Bedrock Deposits

Bedrock at the Site is composed of Pennsylvanian Age rock of the Missourian Series Mattoon Formation of the McLeansboro Group. Two lithologies are present at the Site. To the west, the upper bedrock is composed of sandstone of the Merom Sandstone Member (Willman et al., 1975). Closer to the Wabash River, there is a well incised bedrock valley [depths to bedrock vary from 10-15 feet below ground surface (ft. bgs) in the uplands on the western parts of the Site to over 90 ft. bgs in the southeast corner of the Site (Fafalios & Hensel, 1999)]. In the bedrock valley (below elevation 405 ft.), post-glacial erosion has exposed the lithified silts and clays of an undifferentiated shale<sup>†</sup> of the Mattoon Formation. A bedrock surface contour map based on the information from the site boring and monitoring wells is shown on Figure 8.

#### 4.3 Unlithified Materials

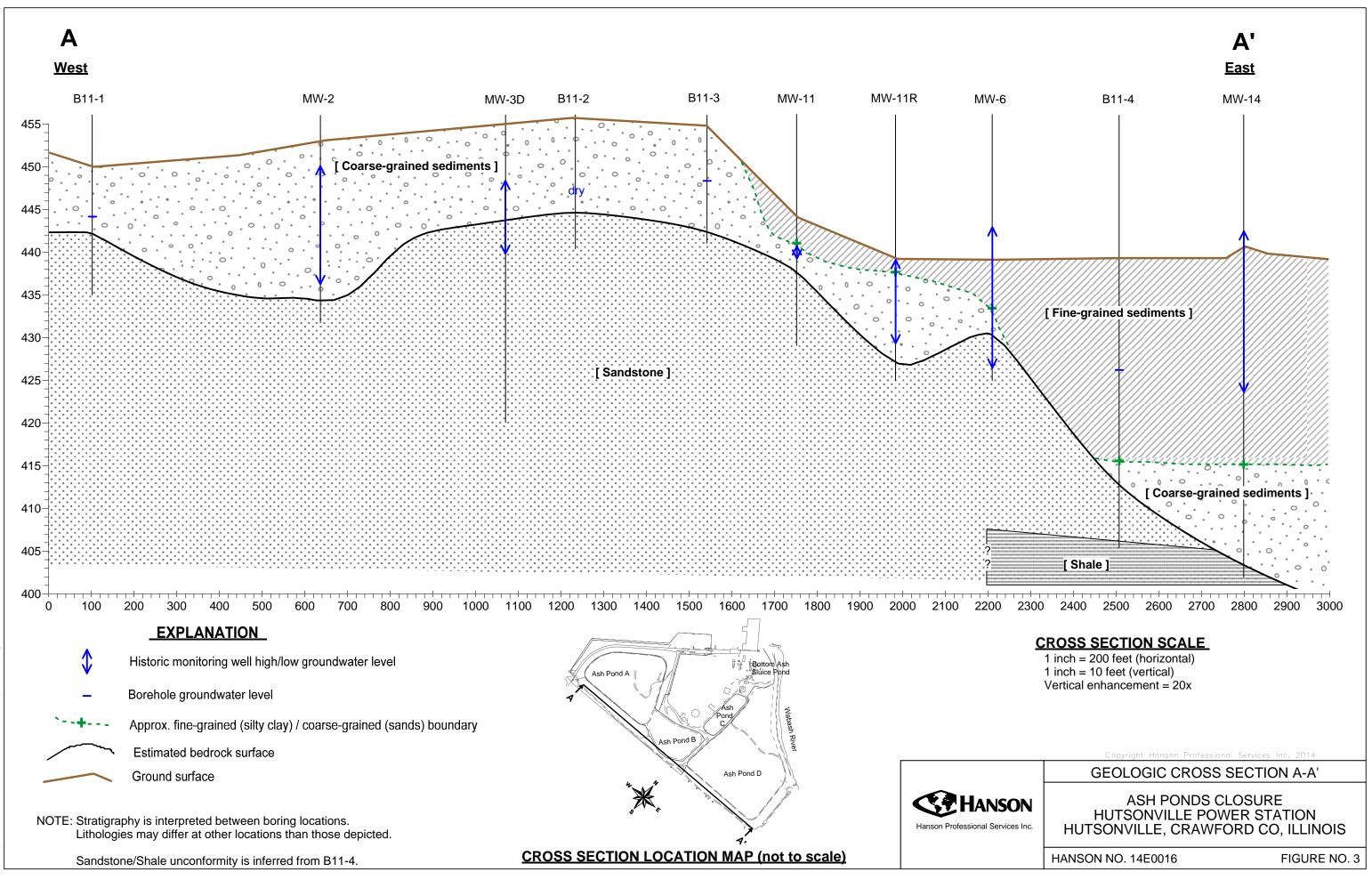
#### 4.3.1 Glasford Formation

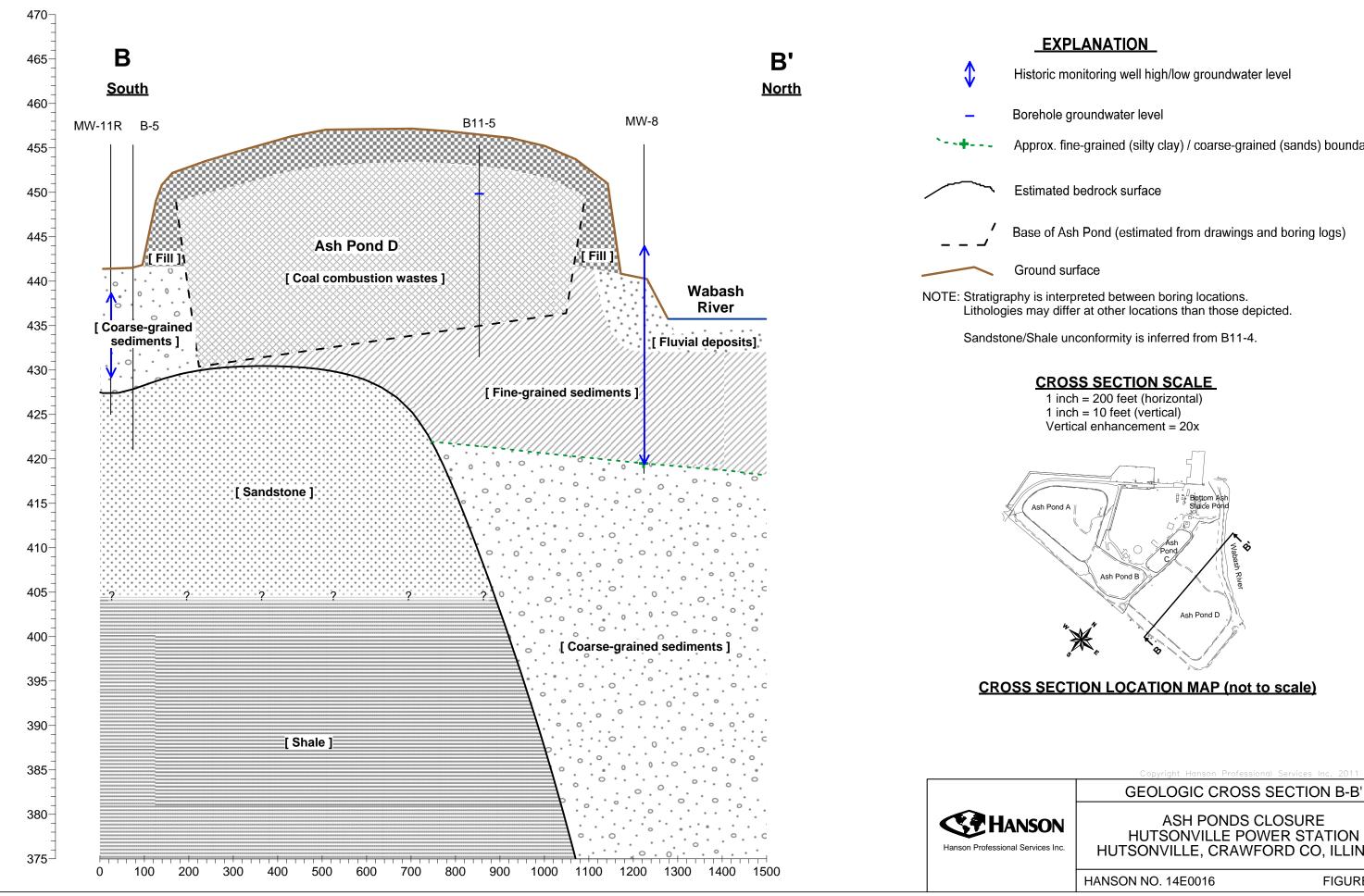
Several borings contained silty clay with sand and gravel (e.g., MW2, GP-7, GP-8, GP-13, GP-20, and GP-21). This material is interpreted to be Illinoian Stage diamictons of the Glasford Formation (either undifferentiated or part of the Vandalia Till Member). The spotty presence of the till is likely due to post-glacial erosion. It is generally located in the southern portion of the Site, and can be found in excess of 5 feet thick down to a few inches in thickness.

#### 4.3.2 Henry Formation

The Henry Formation is a Wisconsinan Stage glacial outwash sand and gravel, and is the predominant unit in the upland ash pond areas and deep portions of the Wabash River bedrock valley (Berg & Kempton, 1987). These fluvial deposits can range from a few feet to over 65 feet thick. The Henry Formation was not observed in the northern portion of the Site near the Plant.

<sup>&</sup>lt;sup>†</sup> The sandstone/shale unconformity has been placed at 405 ft. based on information from B11-4. Other borings (e.g., TW-116, TW-117, etc.) encountered the shale at a deeper elevation, but these borings were located in the Wabash River valley. The contact has been eroded at these locations.





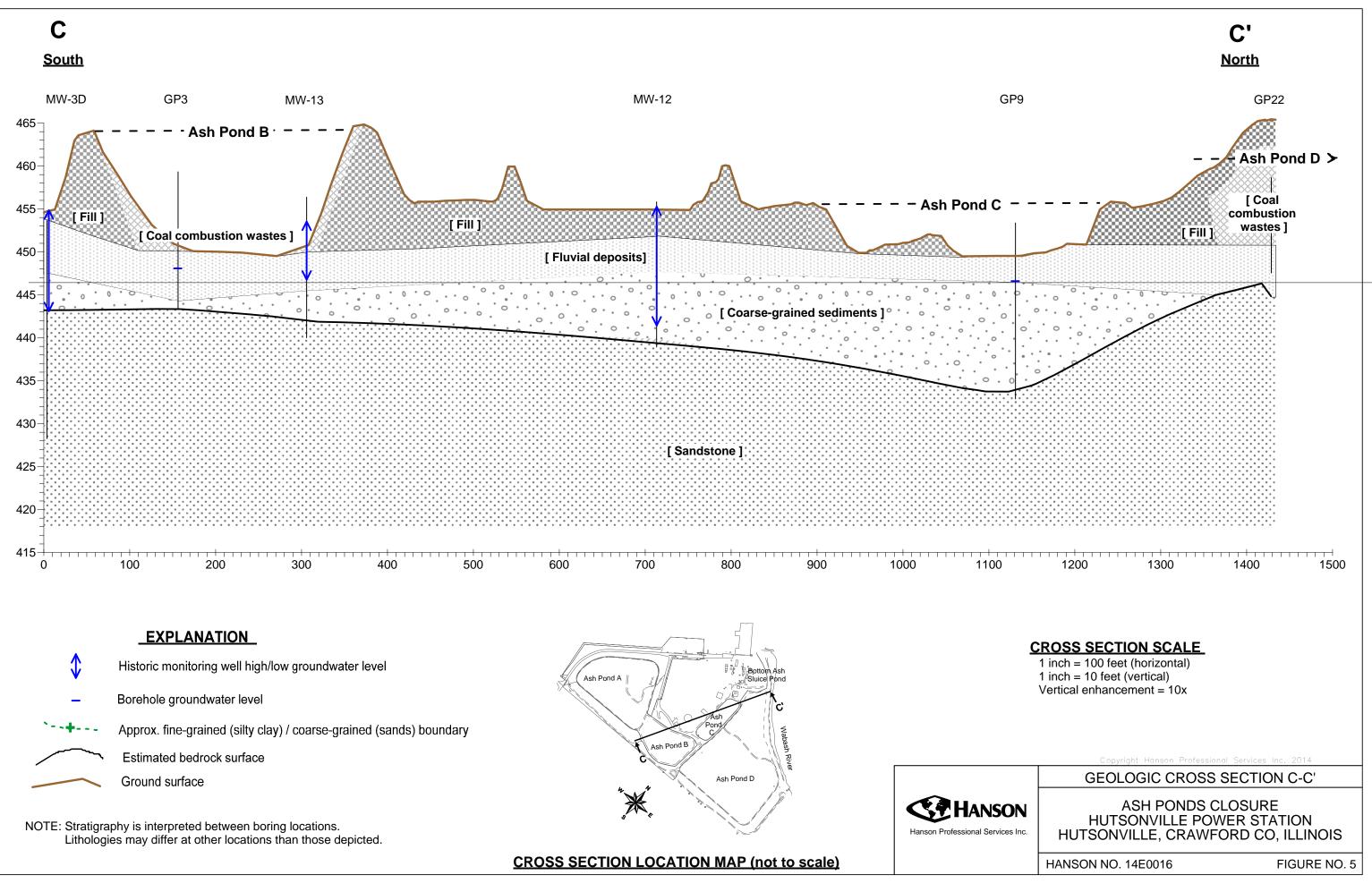
Historic monitoring well high/low groundwater level

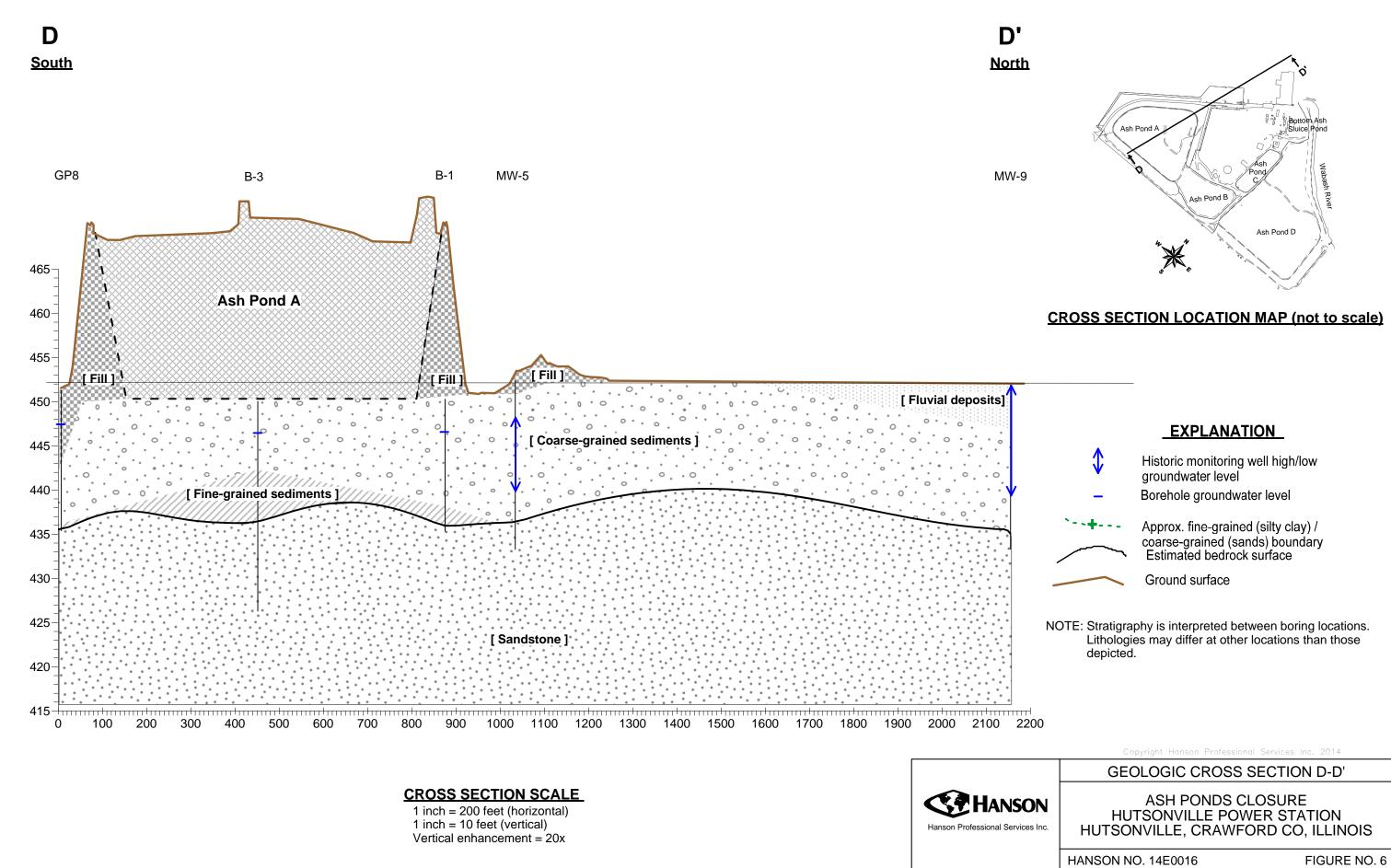
- Approx. fine-grained (silty clay) / coarse-grained (sands) boundary
- Base of Ash Pond (estimated from drawings and boring logs)

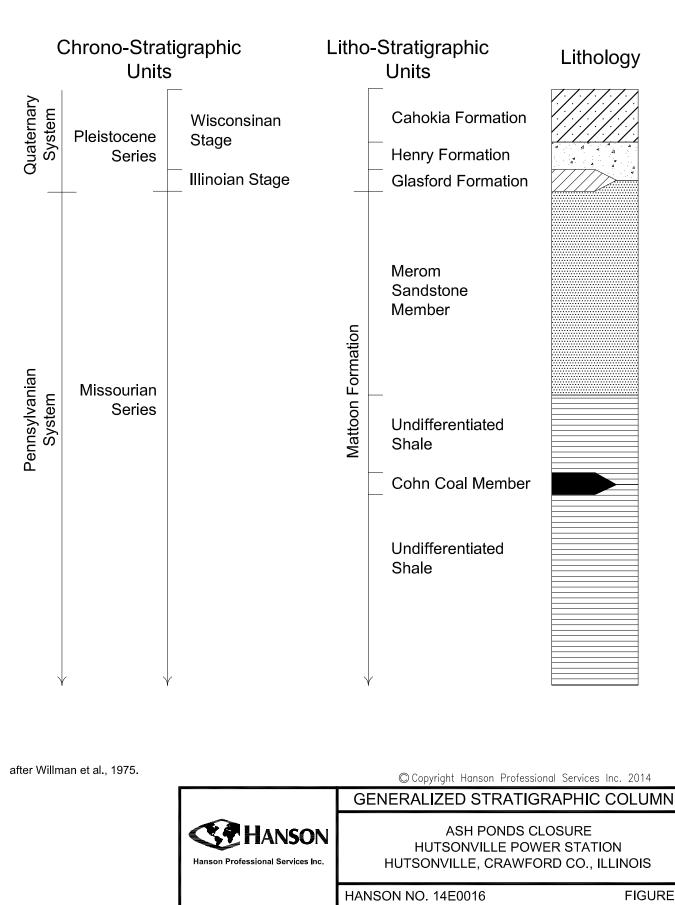
### **CROSS SECTION LOCATION MAP (not to scale)**

#### ASH PONDS CLOSURE HUTSONVILLE POWER STATION HUTSONVILLE, CRAWFORD CO, ILLINOIS

FIGURE NO. 4

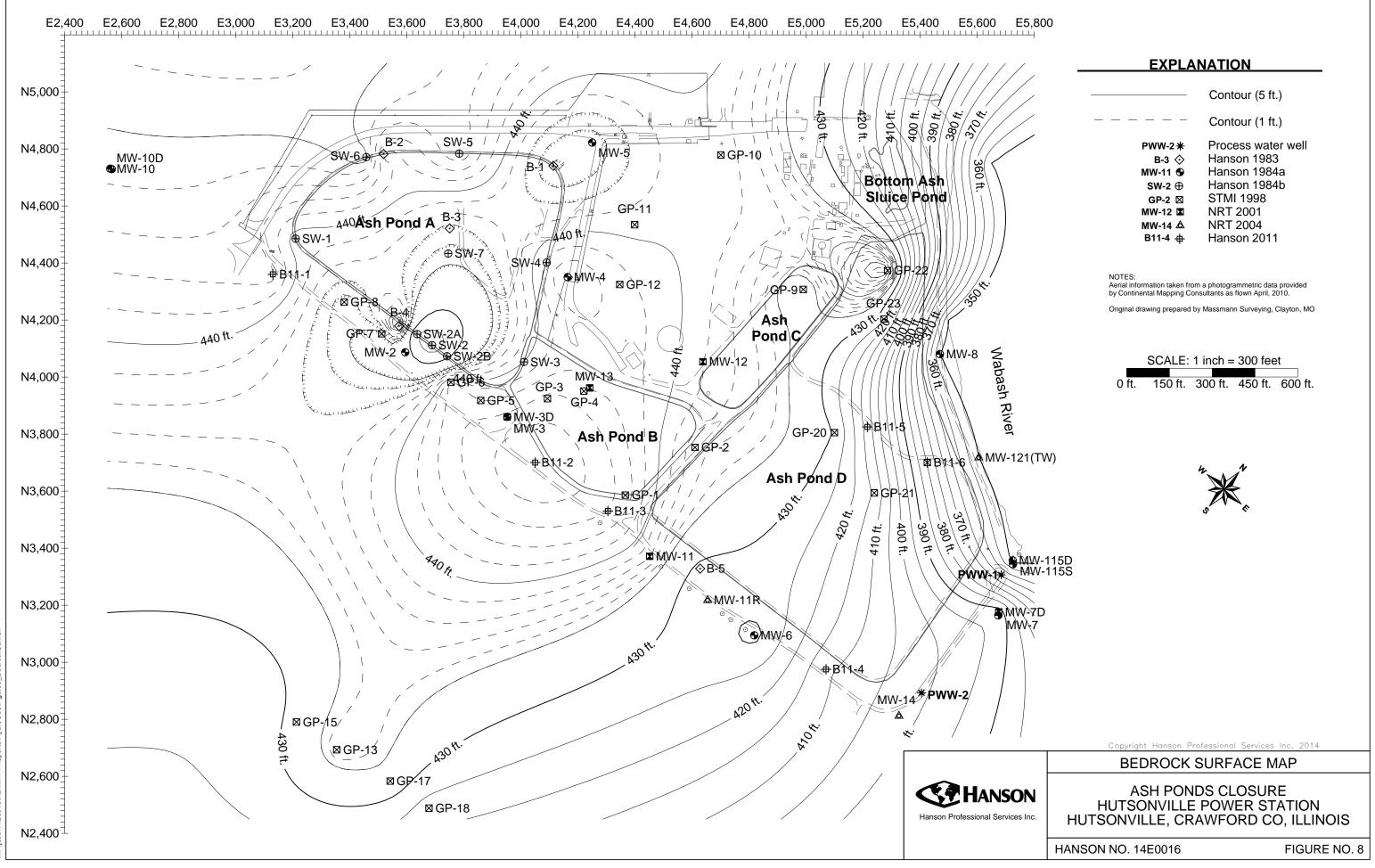






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**FIGURE 7** 



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### 4.3.3 Cahokia Formation

The Cahokia Formation was derived from post-glacial erosion of the surficial loess and tills and can be found in the flood plains and channels of modern rivers and streams (Berg & Kempton, 1987; Hansel & Johnson, 1996). At the Site, this alluvium is composed of silts, clays and clayey sands with occasional wood and/or shell fragments. Localized lenses or coarser materials (sands) may occur within the alluvium, but these lenses are not laterally extensive. At the Site, the thickness of the alluvial deposits can range from 0 to 15 feet, but can reach 25 feet in the bedrock valley per the NRT report (Fafalios & Hensel, 1999).

#### 4.3.4 Fill Materials

#### 4.3.4a Earthen Fill

Earthen Fill is present across much of the site, and consists of sandy silts and silty sands that were likely created from on-site or nearby excavations. Fill has been used to elevate depressions and construct the berms surrounding the various ash ponds and structures on Site. Where present, the earthen fill can range from less than 2 to over 10 feet thick.

#### 4.3.4b Coal Combustion Wastes

Coal combustion waste (CCW) is a term for several types of materials, typically bottom ash, fly ash and/or flue gas desulfurization (scrubber) sludge. At the Site, the CCW present are bottom and fly ash. CCW is primarily found in the Site's ash ponds. A total of six borings were completed in Ash Pond D (4 direct push borings by STMI and two recent auger borings by Hanson). The thickness of CCW in these borings ranged from about 12 feet (north-end) to 31 feet (center).

CCW is also stored in the lined Ash Pond A and Ash Pond B. Prior to construction of Ash Pond B, the area was the CCW laydown location, and ash in this area could be up to 12 feet thick at times (Fafalios & Hensel, 1999). It is believed that no CCW remains after construction of the liner for Ash Pond B.

#### 5. Site Hydrogeology

#### 5.1 Hydrogeologic Characteristics

Shallow groundwater in the surficial deposits and the upper bedrock are controlled by the Wabash River, a regional groundwater sink or discharge zone. Groundwater elevations have been measured and recorded at the Site since 1984. Groundwater flow beneath the Site discharges toward and is controlled by the Wabash River within the surficial deposits and upper bedrock in the vicinity of the Site.

### 5.1.1 Hydraulic Conductivity

Fafalios & Hensel (1999) completed an analysis of hydraulic conductivity for eleven monitoring wells at the Site using the Bouwer and Rice (1976; Bouwer, 1989) slug test analysis method. Results of the slug tests range from a minimum of  $2.6 \times 10^{-4}$  cm/sec to a maximum of  $4.8 \times 10^{-2}$  cm/sec (see Table 2). The calculated geometric mean of the hydraulic conductivity of the sediments is  $6.5 \times 10^{-3}$  cm/sec, and the arithmetic mean of the two sandstone bedrock test results is  $4.7 \times 10^{-4}$  cm/sec.



Hydraulic Conductivity (in cm/sec)	Geologic Material
2.7 x 10 <sup>-2</sup>	Silty sand & gravel
5.4 x 10 <sup>-4</sup>	Sandstone
8.0 x 10 <sup>-3</sup>	Silty sand & gravel
3.2 x 10 <sup>-2</sup>	Clayey gravel, silty sand & sandstone
2.6 x 10 <sup>-4</sup>	Sandy silt, sand & gravel
4.8 x 10 <sup>-2</sup>	Silty sand & gravel
8.3 x 10 <sup>-4</sup>	Silt, silty sand & gravel
6.2 x 10 <sup>-4</sup>	Silty sand & gravel
4.0 x 10 <sup>-4</sup>	Sandstone
2.6 x 10 <sup>-2</sup>	Sand
1.8 x 10 <sup>-2</sup>	Clayey sand & gravel
	(in cm/sec) 2.7 x 10 <sup>-2</sup> 5.4 x 10 <sup>-4</sup> 8.0 x 10 <sup>-3</sup> 3.2 x 10 <sup>-2</sup> 2.6 x 10 <sup>-4</sup> 4.8 x 10 <sup>-2</sup> 8.3 x 10 <sup>-4</sup> 6.2 x 10 <sup>-4</sup> 4.0 x 10 <sup>-4</sup> 2.6 x 10 <sup>-2</sup>

#### Table 2. Monitoring Well Slug Test Results

#### 5.1.2 Groundwater Flow Direction/Gradient

Groundwater flow was evaluated as part of the NRT study (Fafalios & Hensel, 1999). The NRT study further subdivided the groundwater regime into two zones, the shallow and deep groundwater zones. The shallow groundwater zone is comprised of the surficial and shallow materials and the upper, permeable portions of the sandstone bedrock. The deep groundwater zone was defined as the alluvium found in the Wabash River valley.

Several potentiometric surface maps were included in the NRT report. Five of the more recent, complete potentiometric data sets (5 shallow and 4 deep groundwater zone plots from 2007, 2010, 2012 and 2013) along with 4 potentiometric surface maps using the NRT data sets (2 shallow and 2 deep groundwater zone plots from November 1998 and April 1999) have been plotted for this report and are included in Appendix B.

Groundwater flow within the shallow zone generally flows from west to east, based on the plotted potentiometric surface data included in Appendix B. Groundwater in the deep zone generally flows from southwest to northeast, almost perpendicular to the banks of the Wabash River. From the maps in Appendix B, gradients were calculated in the vicinity of the Ash Ponds. Values for the shallow groundwater zone ranged from 0.0104 to 0.0183, with an average gradient of 0.0156. Gradients in the deep zone range from 0.0067 to 0.0152, with an average gradient of 0.0114. Table 3 lists the flow direction and gradient values calculated for each plotted monitoring event and monitoring zone presented in Appendix B. Groundwater velocities, based on these gradients, are of the same order of magnitude as described in the NRT report (Fafalios & Hensel 1999).

#### 5.2 Groundwater Classification

Illinois EPA requires that groundwater at regulated sites be classified in accordance with 35 IAC 620.210(a)(4)(B)(ii). The groundwater at the Site has been classified as a Class I: Potable Resource Groundwater. This classification is based on:

- 1. Groundwater is greater than 10 feet bgs;
- 2. Hydraulic conductivities can exceed  $1 \times 10^{-4}$  cm/sec; and
- 3. No criteria are met that would classify groundwater as a Special Resource (Class III) or Other (Class IV) Groundwater.



Monitoring Event	Flow Direction	Gradient	Monitoring Zone
18 Nov 1998	Northeast	0.0106	Shallow
30 Apr 1999	East	0.0104	Shallow
2 July 2007	East	0.0168	Shallow
2 Oct 2007	East	0.0175	Shallow
13 Apr 2010	East	0.0172	Shallow
13 Apr 2012	East	0.0182	Shallow
10 Aug 2013	East	0.0183	Shallow
18 Nov 1998	Northeast	0.0123	Deep
30 Apr 1999	Northeast	0.0067	Deep
2 July 2007	Northeast	0.0116	Deep
2 Oct 2007	Northeast	0.0152	Deep
13 Apr 2010	Northeast	0.0119	Deep
10 Oct 2013	Northeast	0.0106	Deep

#### **Table 3. Flow Direction and Gradients**

#### 5.3 Nearby Groundwater Users

Water well logs for the sections surrounding the Site were previously obtained from the Illinois State Geological Survey and/or Illinois State Water Survey and referenced in the NRT report. The process water wells, PWW-3 and PWW-4<sup>‡</sup>, on the Site are located in the Southeast ¼ of Section 17 (depths of 88 and 90 feet bgs, respectively) and just east of Ash Pond D (see Figure 2). The next nearest water supply wells are a trio of irrigation wells, which obtain irrigation water from the coarse-grained sediments located in the bedrock valley. These irrigation wells provide water to the Dement and Wampler farms in Section 20, just south of the Site. A more recent potable water well was installed at the Allison residence, located approximately 1900 ft. northwest of Ash Pond A. These water well records are included in Appendix A.

#### 5.4 Groundwater Quality

Groundwater quality was assessed in NRT's 1999 report (Fafalios & Hensel, 1999), which identified the parameters of concern (POCs): boron, sulfate, iron, manganese, pH and total dissolved solids (TDS), and the wells (MW2, MW3, MW3D, MW6, MW8, MW9, & MW11) with concentrations that exceeded the Class I Potable Resource groundwater standard (35 IAC 620.410). Additional data collected at the Site since 1999 is included in the analysis for this report. The POC data, from 1999 to 2012, is summarized as a series of box-whisker plots in Appendix C. The 1999-2012 monitoring data is overlain by another set of box-whisker plots representing the most recent four quarters of data (July 2013 – June 2014). In general, the 2013-2014 data trend is toward lower median values relative to the older data.<sup>§</sup>

A comparison of Class I standard to the median POC concentrations (1999-2012 data) is presented in Table 4 for the Site monitoring wells. The 16 wells in Table 4 (2 upgradient and 14 downgradient) are the monitoring points that are located to provide early indication of possible impacts by the Ash Ponds, based on the groundwater flow directions and gradients depicted on the potentiometric surface maps in Appendix B, and summarized in Table 3.

<sup>&</sup>lt;sup>‡</sup> In the previous Hydrogeologic Site Investigation (Hanson, 2011a), PWW-3 and PWW-4 were identified as PWW-1 and PWW-2, respectively. These wells were re-numbered for this report to match the numbering on the ISGS well records located in Appendix A.

<sup>&</sup>lt;sup>§</sup> The recent (2013-2014) data is limited (typically only 4 data points). As such, the interquartile ranges may be small, misrepresenting any outlier values in the dataset.



Well ID	Boron <sup>1</sup>	Sulfate	Iron	Manganese	pН	TDS
	(2 mg/L)	(400 mg/L)	(5 mg/L)	(0.15 mg/L)	(6.5 < x < 9.0)	(1,200 mg/L)
MW1 <sup>‡</sup>	0.12	29	0.031	0.057	7.20	278
MW2(R) <sup>2</sup>	5.10	340	0.020	0.008	7.32	790
MW3	3.40	1300	0.020	0.710	6.73	2300
MW3D	4.20	1700	0.020	2.4	6.10	2650
MW4	0.25	67	0.020	0.003	7.20	390
MW5	0.22	47	0.020	0.002	6.93	238
MW6	16.00	499	0.031	0.420	6.84	980
MW7	1.95	270	0.028	0.051	6.90	850
MW7D	0.220	56.75	1.130	0.620	7.20	380
MW8	15.70	810	0.700	2.5	6.99	1600
MW10 <sup>‡</sup>	0.12	26	0.072	0.057	7.03	370
MW10D <sup>+</sup>	0.098	32	0.020	0.009	7.21	270
MW11(R) <sup>2</sup>	10.75	600	0.020	0.074	6.81	1200
MW14	0.774	180	0.120	0.525	6.90	750
MW115S	0.081	33	1.088	0.749	7.30	330
MW115D	0.077	37	3.265	0.517	7.30	385
MW121	0.090	105	1.479	0.820	7.31	340

#### Table 4. Ash Pond Monitoring Wells – Historic Median Concentrations (1999-2012)

<sup>1</sup> parameter's name with Class I groundwater standard value below. Median values exceeding the Class I Std. are italic and bold.

<sup>2</sup> data from MW2 / MW2R and MW11 / MW11R may be combined.

<sup>+</sup> upgradient monitoring well.

<sup>3</sup> Ash Pond A Deep Zone monitoring wells not recently sampled.

A similar comparison of median groundwater concentrations to Class I standards are also made in Table 5 for the data from July 2013 through June 2014. The red highlighted median concentrations are those values that exceeded the median values for the long-term concentration presented in Table 4. The limited data for the recent monitoring results (4 quarters) versus the data used to calculate the historic median does slightly skew the data presentation. The percent increase from historic to present median values is generally less than 10% for TDS, Sulfate, and some of the Boron values. The high percent change for the Iron and Manganese median values may be indicative of a change in RedOx (oxidation-reduction) potential in the groundwater as a result of the capping of Ash Pond D. Although the concentrations are increasing, this may actually be a positive sign.



Well ID	Boron <sup>1</sup> (2 mg/L)	Sulfate (400 mg/L)	lron (5 mg/L)	Manganese (0.15 mg/L)	<b>pH</b> (6.5 < x < 9.0)	<b>TDS</b> (1,200 mg/L)
MW1 <sup>+</sup>	0.0158	17.35	0.292	0.040	7.29	218
MW2(R) <sup>2</sup>	1.76	111	0.426	0.005	7.28	491
MW3	4.585	1135	0.698	0.009	6.90	1745
MW3D <sup>3</sup>						
MW4	0.231	51.65	0.320	0.002	7.30	245
MW5	0.168	25.05	0.271	0.002	7.09	186
MW6	4.76	298.5	0.663	0.118	6.96	785
MW7	1.435	245.5	0.683	0.028	6.94	758
MW7D	0.389	58.95	1.208	0.572	7.07	415
MW8	17.05	560.5	1.995	3.43	7.77	1345
MW10 <sup>‡</sup>	0.097	23.2	0.334	0.001	7.07	380
MW10D <sup>‡</sup> 3						
MW11(R) <sup>2</sup>	6.805	610.5	0.874	0.369	6.49	1210
MW14	0.832	196.5	0.622	0.446	6.92	815
MW115S	0.124	27.05	0.921	1.285	7.60	359
MW115D	0.062	31.75	0.802	0.414	7.67	320
MW121	0.044	28.05	1.612	1.275	7.39	388

#### Table 5. Ash Pond Monitoring Wells – Recent Median Concentrations (2013-14)

<sup>1</sup> parameter's name with Class I groundwater standard value below. Median values exceeding the Class I Std. are italic and bold. <sup>2</sup> data from MW2 / MW2R and MW11 / MW11R may be combined.

\* upgradient monitoring well.

<sup>3</sup> Ash Pond A Deep Zone monitoring wells not recently sampled.

### 5.4.1 Parameters of Concern (POCs)

The following observations have been made for each POC:

Boron	– MW2/MW2R, MW3, MW3D, MW6, MW8, and MW11R have concentrations historically above the Class I standard. Recent monitoring indicates that wells along the south property boundary, MW11R, MW6, MW2(R), appear to have improving water quality since the capping of Ash Pond D.
Sulfate	<ul> <li>MW3, MW3D, MW8 and MW11R have historically been above the Class I standard, and MW6 had an inter-quartile range that straddle the Class I standard. Sulfate concentrations have displayed improvement in the past 4 quarterly sampling events.</li> </ul>
Iron	<ul> <li>minimal data available at some wells, but no well has historic concentrations above the Class I standard.</li> </ul>
Manganese	<ul> <li>minimal data available at some wells. MW1, MW3, MW3D, MW6, MW7D, MW8, MW11R, MW14, MW115D, MW115S, MW117 and MW121 have concentrations historically above the Class I standard. Recent data indicates generally higher Manganese concentration from wells adjacent to the Wabash River (MW7, MW7D, MW8, MW115S, MW115D, and MW121) appear higher than historically observed.</li> </ul>
TDS	<ul> <li>MW3, MW3D and MW8 are above the Class I standard, and like Sulfate display stable to improving recent concentrations.</li> </ul>



 pH – All wells show at least one pH reading below the lower limit Class I standard, but only MW3D shows consistent readings (3<sup>rd</sup> quartile and below) less than the lower limit Class I standard.

As shown in Appendix C, Table 4, and Table 5, five of the monitoring wells have had readings of the POCs generally trending above the Class I standards. Wells MW3, MW3D, MW6, MW8, and MW11/MW11R have generally shown elevated levels of boron, sulfate, pH and TDS. However, recent monitoring results indicate that water quality appears to be improving at these wells, especially for Boron, Sulfate and TDS. These wells, and the other Ash Pond monitoring wells, will continue to be evaluated as part of the ongoing Ash Pond monitoring activities (Hanson, 2014).

#### 5.4.2 Other Parameters

Several other parameters have had intermittent exceedances of the Class I groundwater standards over the past several years (monitoring for these parameters began in 2011). These parameters are listed in Table 6.

Parameter	Well ID	Comment
dissolved Arsenic	MW1, MW115D, MW115S, MW121 & MW7D	Found in upgradient well Concentrations now below Class I limit
total Cyanide	MW1	Found in upgradient well
dissolved Lead	MW115S, MW121, & MW7	Not confirmed the following period
dissolved Nickel	MW7 & MW7D	Not confirmed the following period
dissolved Nitrate	MW6	Only one detect (Fall 2013)
dissolved Thallium	MW1, MW10, MW115D, MW14, MW7 & MW7D	Found in upgradient wells Not confirmed the following period

#### Table 6. Additional Detections Above Class I Standards

The six parameters identified in Table 6 are not considered POCs for purposes of this report. Concentration exceedances are either intermittent or have an upgradient (detection) component.

#### 5.5 Hydrostatic Equilibrium of Ash Ponds

An estimate of the time for the groundwater beneath Ash Pond D to reach hydrostatic equilibrium was required by 35 IAC 840.130(I). However, evaluating hydrostatic equilibrium within the HDPE-lined Ash Pond A is not required. Instead, the groundwater flow model used to evaluate conditions associated with the Groundwater Management Zone will be used to evaluate ash pond to groundwater interactions.

### 6. Summary and Conclusions

The NRT report (Fafalios & Hensel, 1999) presented several conclusions, including:

- Upland hydro-stratigraphy consists of a thin layer of sand-rich material overlying sandstone and siltstone bedrock;
- There are three areas with CCW, the unlined Ash Pond D, the lined Ash Pond A, and the former ash laydown area now located beneath Ash Pond B;



- Water samples collected during the STMI investigation were high in boron, sulfate, manganese, and TDS in ash leachate, but only manganese concentrations were high in Ash Pond D leachate;
- No evidence of impacts was detected in direct push samples south of the impoundments;
- High iron and nickel were observed in locations where coal was present near the ground surface.

Hanson has reviewed the earlier studies, and based on our analyses concur with the NRT conclusions summarized above. In addition, Hanson has the following supplemental conclusions:

- Boron concentrations above the Class I groundwater standard continue to be observed in the shallow wells immediately downgradient of the Ash Ponds (MW2, MW3, MW3D, MW6, MW8, and MW11R), but recent monitoring results show an improving trend;
- Manganese concentrations above the Class I groundwater standard continue to be observed in the Site monitoring wells (MW1, MW3, MW3D, MW6, MW7D, MW8, MW11R, MW115S, MW115D, and MW121). Fafalios & Hensel (1999) indicated that elevated manganese and nickel may be indicative of coal or coal stockpile impacts. Hanson concurs, and also notes that Manganese has been observed above the Class I standard at upgradient well MW1;
- Recent (2013-2014) Iron (median) concentrations appear to be higher than those observed historically (1999-2012). Hanson believes that this increase is groundwater chemistry-related and not an indication of further impairment.
- Concentrations of the other POCs in the deep monitoring zone (monitoring wells MW7D, MW14, and MW115D) continue to be below Class I standards; and
- Based on the hydrogeologic information summarized in this report, the installed groundwater collector trench required under 35 IAC 840.120, the impermeable cap placed on Ash Pond D, the proposed cap for Ash Pond A, and the clean closure of Ash Pond B, Ash Pond C and the Bottom Ash Sluice Pond provide the best alternative for reducing off-site impacts to groundwater in the vicinity of the Site.

#### 7. Licensed Professional Acknowledgement

The geological work product contained in this document has been prepared under my personal supervision and has been prepared and administered in accordance with the standards of reasonable professional skill and diligence.

Rhonald W. Hasenyager, P.G. Hanson Professional Services Inc. 1525 South Sixth Street Springfield, IL 62703-2886 (217) 788-2450 Registration No. 196-000246	Seal:
Signature: Donald Whom me	Expires 3/31/2015 Date: 25072014



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## **Appendix A**

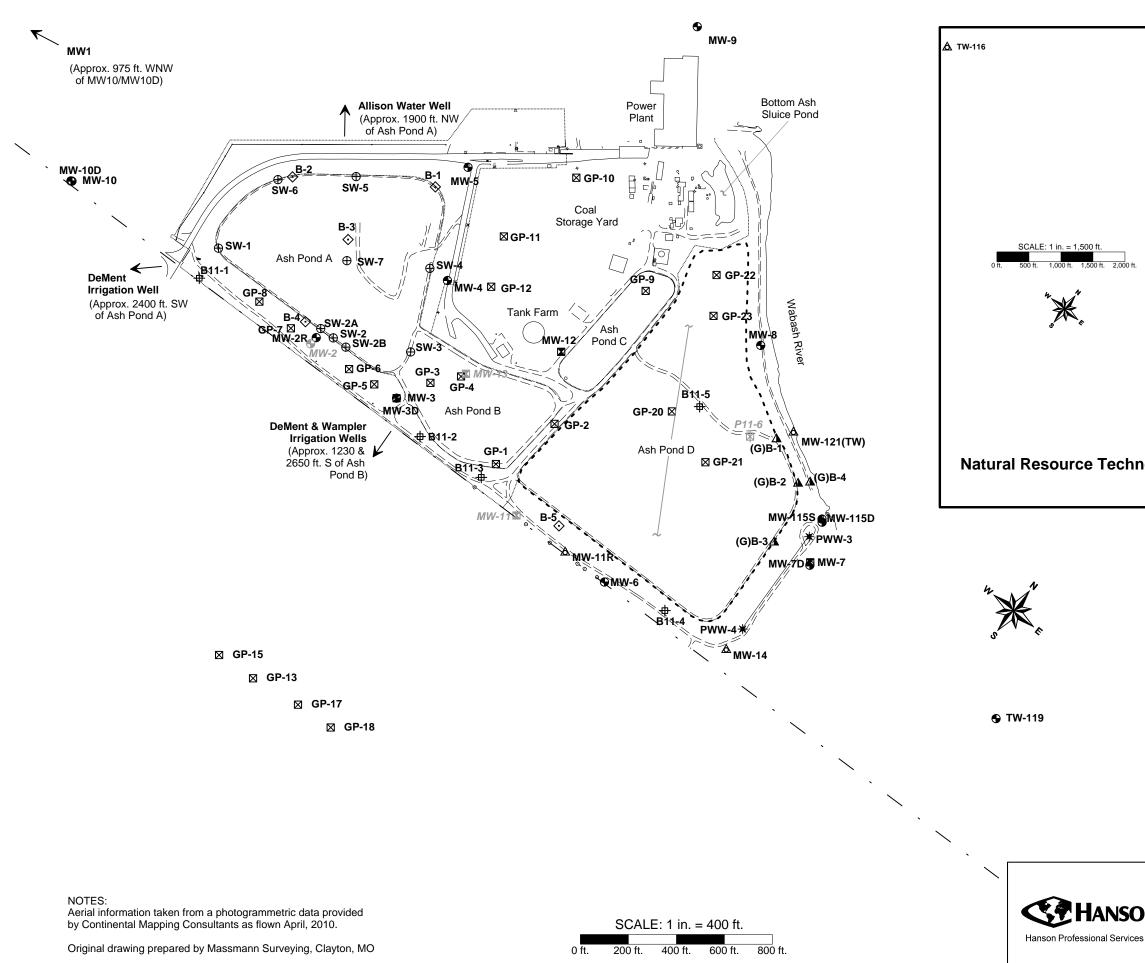
## Boring Location Map, Field Boring Logs and Water Well Records





## **Appendix A-1**

**Boring Location Map** 



tiobs/14E0016/Admin/14-Reports/HvdroGeo/EigureA1\_Boring/

Ash Pond A Ash Pond B Ash Pond B Ash Pond D

🛕 TW-119

TW-120 🛕

<u>A</u> TW-117

#### Natural Resource Technology (NRT) 2004 Boring Locations

🛕 TW-118

#### EXPLANATION

PWW-3 米	Process water well
в-з 🗇	Hanson 1983
MW-11 🕤	Hanson 1984a
SW-2 🕀	Hanson 1984b
GP-2 🛛	STMI 1998
MW-12 🗖	NRT 2001
MW-14 🛆	NRT 2004
(G)B-1 🛆	Geotechnology 2010
B11-4 🕂	Hanson 2011
MW-13 🗖	Sealed Well / Piezometer
, ^	Ash Pond limits (approx.)
•	Fence
	Property Line

	Copyright Hanson Professio	onal Services Inc. 2014
	BORING LOCA	TION MAP
S Inc.	ASH PONDS ( HUTSONVILLE PO HUTSONVILLE, CRAWI	WER STATION
	HANSON NO. 14E0016	FIGURE NO. A-1



## **Appendix A-2**

Hanson 1983 Boring Logs

Canonie Constru	Job No. DD-0162
Canonie Construc	Date 8-9-83
Canonia Canonie Test Bori	Total Footage 25'6"
Canonie Canonie Test Bori	Foreman Steve Berlin
Hamilton Lakes, 500 Park Boulevard, Suite 1212, Itasca, Illinois 60143, 3	312-773-4877 Classification By Foreman
Client Hanson Engineers	Geographic Location Hutsonville, IL
Boring No. B-1 O.G. EL.	Boring No. B-2 O.G. EL.
Coordinates	Coordinates
Ground Surface 0'0"	Ground Surface 0'0
Black TOPSOIL 1'0"	Black TOPSOIL. 1'2"
Brown fine SAND with	Gray & brown SAND with
small to medium gravel <u>4-3-5</u>	clay and small to <u>3-5-7</u>
and some clay. 3'6"	medium gravel. 3'6"
	Vonu donce gnay and
2-2-3	Very dense gray and brown fine SAND with
	small gravel and clay.
Net Losson CAND and	
Wet brown SAND and <u>3-3-4</u>	Vous dance brown SAND 37-70-91
	Very dense brown SAND with small gravel.
<u>1=1=2</u>	10'0' Brown SANDSTONE. 100/6" 10'6'
	Brown SANDSTONE. 100/6" 10'6'
3-3-3	End of Boring
13'0"	Water level is 5'6" below
Gray silty CLAY with organic material.	ground surface 1/2 hours after
Blue and Black SAND- 9-12-71 14'8"	completion.
STONE.	
End of Boring	Water at 8'0"
Water level is 3'6" below	
ground surface 1.0 hours	
after completion.	
Water discovered at 3'6"	
A All borings are plotted to a scale of 1"=	undsurface as a fixed datum.
BClassifications are made from visual inspection of samples an	
CWater Levels (WL). Figure indicates time of reading (hours)	
observed when borings were made, or as noted. Porosity of t	the soil strata, variations of rainfall, site topography, etc.,
may cause changes in these levels.	
DFigures in right hand column indicate number of blows required	to drive 2" O.D. sampling
spoon ( 6" u.n.o.), using a 140 lb. weight falling 30 inches	

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B-157C

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						CLAY wi	th small				
	Drown and grave CA		3-3-3			medium	gravel.		3-4-3		
	Brown and gray SA with trace of cla					Gray fi	ne SAND w	ith			5'
	small gravel.						o medium	1		· • •	
			3-4-7			gravel	and clay.		100/6"		
			n E service de la companya de la comp E service de la companya de la compa				ine SAND		100/5"		8'
				9'6"	an a	small g	ravel_and		100/5		9'
	Brown and gray si	1ty	7-12-36			Gray SA	NDSTONE.				
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	small gravel.		22 25 61				boring				
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ł	with small gravel	• }	100/4"	13'6" 14'0"		ground s complet	surface 1	/2 hou	after		
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`  -	End of Boring			24'0"							
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	Classifications are made fro										
C	Water Levels (WL). Figure	e indicate	s time of reading	(hours)	after com	pletion of bor	ring. Water k	evels india	ated are th	ose	
	observed when borings were may cause changes in these	e levels.	as noted. Moros	SILY OT TH	e son stra	la, variation	s of raintall, s	site topog	rapny, etc.,		
D	.Figures in right hand column		number of blows	required +	a deine al						

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Client	ton Lakes, 500 Park Boulevard, Suite 12 Hanson Engineers,			Classification By Hutsonville, Il	•
Boring			Boring No.	O.G. EL	•
	Coordinates			Coordinates	
	Ground Surface Black TOPSOIL with black coal. Brown silty CLAY with fine sand and small to medium gravel. Brown SAND with small gravel.	0'0" 1'0" <u>7-7-7</u> 3'0" <u>4-4-5</u> 5'6"			
	Brown SAND with small to medium gravel.	1-1-2			
	Brown SANDSTONE	1-2-2			
	Cored 9'0" Recovered 7'3"	81%			
	End of Boring Water level is 5'6" be ground surface 1/2 hour after completion.				
	Water at 5'6"				
В.	All borings are plotted to a scale of Classifications are made from visua Water Levels (WL). Figure indicat observed when borings were made, of may cause changes in these levels.	I inspection of samples a tes time of reading (hours or as noted. Porosity of	nd are our opinion there after completion of	eof. boring. Water levels in	dicated are those ography, etc.,

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## **Appendix A-3**

Hanson 1984a Boring Logs



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# LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 G (309) 662-5968

	CTED WITH HANSON ENGINE NAME HUTSONVILLE: POWER		TION		1.1				М-		
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50,7											
			-	6-54-	3	ss	14	2.2	2		
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CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701



## LOG OF BORING

(309) 662-5968

CONTRA	CTED WITH HANSON ENGINE	CRS				во	RING N	o	: 	M-2
	NAME HUTSONVILLE POU	VER SI	ATIO	N		_ co	NTRAC	T NO		
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						ŀ				3.0' surface
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439.2			•							#A Blk. coal
	Brngray m-c sand,		-14	6-8-10	<u> </u>	SS	- 17			refuse 4" wf.
	wf. f-m gravel					-				occas. silt fil
			-							wet
_	wet									
436.0		17.3	Γ.	10-13-	2	ss	17			
	Grav silty clay, wf.		L	13.		]				
	tr. f. sand, occas.					4				
	f. gravel		F							
	till moist			5-10-	8	ss	18	4.2		
			-20	13	<b></b>	1		•		
1		1 .	1 .	トーノ	1	1	1 1		1 1	



## LOG OF BORING

4.

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701

(309)	662-5968

	TED WITH HANSON ENGINE NAME HUTSONVILLE PO		TATI	ON			0 T NO	
	N Per PLan	•						
ATUM_	HAMMER WT	140#			ROP 3	0"		8"
URFACE	E ELEV COR			•				
ATE STA	ARTED 2-10-84 COM	PLETED_	2-	10-84		DRILLIN	NG METHOD	HSA
<u> </u>	•		1					
ELEV.	DESCRIPTION		DEPTH	BLOWS FT.	SAMPL	ES		NOTES
453.3					NO. TTPE	RECOV.	QP	
131.8		21.5		5-7-11		01		
-21.0		121.0		>-/-⊥-	<u> </u>	s to.	4.0	
	END OF BORING 21.5'		T					
		·						
			i tota and and and a second	name and state and state and state and state			n 1989 - Manor Andri I. y y y y y y y y y y y y y y y y y y	<ul> <li>A server and a server server and a server server server and a server s</li> </ul>
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# LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 G (309) 662-5968

ROJECT	NAME HUTSONVILLE POL	VER ST	ATIC				TRACT	D		
	N PER PLAN	•		•						
DATUM_	HAMMER WT	140#_	I	HAMMER D	ROP_	3	0"	_ но	E DIA	8"
URFACE	ELEV CORE	DIA		•			ASING			
ATE STA	ARTED 2-9-84 COMP	PLETED_	2	-9-84		C	RILLIN	G ME	тнор.	HSA
ELEV.	DESCRIPTION	STRATA DEPTH	DEPTH	BLOWS FT.		MPLE	S RECOV.	·····		NOTES
752.1		0.0	30							
151.7	See #A	0.4				.				
			-	4-6-8	1	SS	14"		. ·	
	Rust brn. silty sand,		L.							· · · · · · · · · · · · · · · · · · ·
		, an and a second s						•		na manana na manana na manana na kanana na kana na sa manana na sa manana na sa manana na manana na manana na m
	fill v. moist		- 5	4-3-4	2	ទន	16			
45.8	Brn. 1-C gravel, wf.	6.3	-							
44.5	m-c sand, occas. sandstone wet	7.6		8-19- 11	-3	sš	18			WATER 1-9-84 DD 5.5' 2:30t
743.2	F-m sand V. moist See #B	8.9								BAR 6.0' 2:45 AAR
42.7	END OF BORING 9.4"		10	15-85/ 5"		SS	17		•	WL 5.0' 4:45
•		•	-					4 		#A Blk. coal
										refuse, 4" cj wf. silt fill v. mois
			- _15							#B Brn. sands wf. f-m sand
			-				•	•		Screen 9.4'- 2"PVC Pipe 4
				•						Gravel 9.4 Bentonite 4. 2.
								-		Plug 1.5'-su Grout 2.5'-1 4"standpipe 3.9'

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# LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 G (309) 662-5968

	T NAME HUTSONVILLE, POWE	R STA	TION				RING N NTRAC			
	DN PER PLAN			· · · · · · · · · · · · · · · · · · ·					1	
DATUM	HAMMER WT.	140;	#	HAMMER C	ROP	3	0"	_ но	LE DIA	8"
SURFAC	E ELEV CORE ARTED COMF	DIA	- 11 - 14 - 12	•		¢	CASING	;	et e	
DATE ST	ARTED_2-13-84 COMF	PLETED_	2-1	3-84		C	RILLI	NG ME	тнор	HSA
	1	<u></u>				MPLE				
ELEV.	DESCRIPTION	STRATA DEPTH		BLOWS FT.				QP	1	NOTES
454.4		0.0	30		· ·		1			
and the second	Blk. asphalt 1.0"			İ		•				
453.1	F-m gravel 1.0", brn,									
433.1	elayey silt wf. f m	1.3								
	gravel pavement mater	-								
	ials moist			5-5-7		SS	16"			
451.3	Blk, silt, wf, f-c gravel fill moist	3.1>		(1) A. Strand and the state of the state		-	a <b>Anna an Anna an Anna an Anna</b> Anna Anna an Anna Anna Anna Anna Anna A	and a second		
	ETSTOT TITL MOIDU			· .	$\left  - \right $			•		
	Brn. silty sand, wf.		-							
	occas. f-m gravel		5	4-3-3	2	នន	18	0.9		
1100	moist									
448.5		5.9	_							
	Br. f-m sand wf.	1997) 1997)								
•	silt		-	3-3-4	3	នន	18			
111 9	v. moist	8.2				66	10			WATER 2-13-84
446.2		0.2								
	Br. f-m gravel, wf.									DD 8.0 9:45am
	c-m sand, silt							÷.,	.	BAR 8.0 10:30a AAR
•	wet		-10	3-3-3	4	88	17	0.6		NL 7.5 11:45a
443.5		10.9								
			-			'		-		
	Ltbr. sandstone	•		23-77/	5	នន	11			Screen 12.5 -5
				5"				a ga di		2"PVC Pipe 5.0 3.0
441.0		13.4	-		$\vdash$		1.	1		Gravel 13.4 -4
				100/4"	<del>-0, </del>	ss	4	4.5	t	Bentonite 4.0
	END OF BORING 13.4"		-							2.0*
			-15							Plug 2.0'-surf
		•	)				•			
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# LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPAN 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 G (309) 662-5968

	ON ENGINEERS		BORING NO.	4 <b>-</b> 5
PROJECT NAME HUTSONVILLE	POWER STATION		CONTRACT NO.	
LOCATION PER I	PLAN			2
DATUM HAMM	ER WT. 140#	HAMMER DROP_	30" HOLE DIA	8"
SURFACE ELEV.	CORE DIA	•	CASING	•
DATE STARTED 2-13-84	COMPLETED	2-13-84	DRILLING METHOD_	HSA

ELEV.	DESCRIPTION	STRATA	DEPTH		S	AMPL	Es -			T
	DESCRIPTION		SCALE	BLOWS FT.			RECOV.	QP		NOTES
452.3		0.0	30						1	
	l" coal refuse, brn. c	lavev			· .					
457.1	silt, wf. f.c gravel	1.2	L							
6	occas. organic fibers		Г.,		·					
	fill moist		L			-				
			7	4-5-5	7	SS	14"			
449.2	See #A	3.1	-							
	Brn. f. sand, wf.			1. (	nagani nagani r	na parte de l'esta de la companya d	1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 -	•		and the second se
	occas. c. sand, f.		-			1.				WATER 2-13-84
	gravel moist v.						3-0			-
	moist		-5	3-2-4	2	នន	17	0.1	4	DD 8.0 2:50pm
446.4		5.8								BAR 11.0 3:50 pm
	Br. f-m sand, wf/ c			'						AAR
	s_nd									WL 6.5' 5:45pm
	- 9			3-3-4	3	SS	18	0.6		
	wet		-	· · ·					1	
493.9		8.4								Old metal draina
			•			,				pipe 1.0' west o
	Brn. m-c sand, wf. f-		7.0	3-4-4	4		18	0.9	1	boring running
	c gravel occas. blk.		-10	J=4=4	<u> </u>	. 88	. 10		•	from road to sta tion
441.7	coal refuse mottling	10.6					•	1.6	]	CION
			-			•				
	Brngray m-c sand, wf. f-m gravel									Screen 18.0'-5.0
	WI . I - M RIAVEL			0-3-3	5	នន	16			2" PVC pipe 5.0
•	wet		_			• .				3.0' stick u
			-			ē.	н. С			Gravel 18.0'-4.0
			-	•						Bentonite 4.0'-2
•										Backfilled 19.2
			-15	5-6-11	6	ទន	12			18.0' wf. grave
0.21.1		16 0		•		· · · ·				Plug 2.0'-surfac
436.1		16.2	<b>→</b>					· ·	÷.	1-4" stand pipe
435.4	Brngray sandstone, w	16.9		16-15	7		12			#1 Dans
	sand v. moist		<u>ن</u> ۲						12	#A Brn. grav sil
			_	27	-4	3° 55	O I			m-c sand, wf. f-c gravel, occ
	Gray sandstone		-							white rock fill
433.1		19.2	.	30-70	8	ss	8	4.4	t	wet
	THE POLY OF 20 21		.	2"	2.1					
	END OF BOHING 19.2'		_ 20	•	A states &	,.				
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		4	-							
L]				-		· 1				

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# LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701

ROJECT	NAME HUTSONVILLE POL PER PLAN						BORING NO				
N									·.	8"	
	HAMMER WT								LE DI	<b>A.</b>	
	ELEV CORE	DIA	0 0				CASING			TT (1) 4	
ALE STA	ARTEDCOMP	LETED_	2-9.	-04		[	DRILLI	NG ME	THOD	HSA	
ELEV.	DESCRIPTION	STRATA DEPTH	DEPTH	BLOWS FT.	S/ NÒ.		ES RECOV.	QP		NOTES	
138.9		0.0	30	4.000							
100 A.A.	Brn. clayey silt wf. tr. f-m sand, occas. organic fibers moist	1.2	-		-				•		
35.5	Brn. clovey silt, wf. f-m sand, occas. f gravel moist	<u>3.4</u>		<u>1-2-4</u>	1	<b>8</b> 8	13"	1.2	•		
433,3	Gray-brn. silty clay, wf. tr. f. sand, occa f. gravel moist	5.6		3-4-5	2	88	16			WATER 2-9-84	
431.6	moreo	7.3	-	8-8				 		BAR 9.0 10:30 AAR WL 6.0 1:00p	
231.0	Br. sand, tr. sandsto		-							Screen 11.4'-	
30,5	Br. f-m sand wet Lt. br. sandstone, wf f. sand	8.4	-10	80-20/ l"	4	, SS	7			2" PVC pipe 5 5.0' st Gravel 11.4'-4 Bentonite 4.0 Plug 2.0'-sur Standpipe 3.0	
27.5		11.4	-	100/4.	55		1. 5			Branopipe J.	
•			. ·	1 (10 <b>7•</b>		סס	4.5				
	END OF BORING 11,4'		-								
			<b>h</b>								
			-15								
			-  -	•			-				
		•	_20			•					

# LOG OF BORING

	CTED WITH <u>HANSON ENG</u> NAME <u>HUTSONVILLE</u> POW	T R STATION					_ BORING NO					
	N PER PLAN					- 00	NTRAC	T NO.				
	HAMMER WT	14	Ö#			30	) **			8"		
IDEACT							CASING			·		
ATE ST.	arted 2-8-84 comp		2-	8-84			DRILLI		THOD	HSA		
	•	· · · ·										
ELEV.	DESCRIPTION	STRATA DEPTH	SCALE	BLOWS FT.		AMPLI			1	NOTES		
437.9		0.0		BLOWS FI.	NO.	TTPE	RECOV.	QP				
	Br	0.0				· ·		an sh				
	Br. clayey sflt, wf. tr. f. sand, occas.	- 1.										
436.5	organic fibers moist	1.4	<b>F</b>			ł						
1.11		•	-									
	Br. clayey silt, sand	•		3-2-7	<b> </b>	SS	17"		•			
	wf. occas. blk. cin- ders fill roist	3.9			a and a signal and		n an	<ul> <li>Second State (Second State (Sec</li></ul>				
34.0	10280	<i>۲۰۶</i>	L .					·				
							<b></b>					
	T + 3, 3		5	2 <b>-</b> 3-4	2	ss	14					
	Lt. brnbrn. sandy silt, wf. clay							•				
	SILO, WI CLAY		<b>F</b> .			-						
			-							-		
	moist	8.1		3-3-5	3	<b>S</b> S`	16	1.7		WATER 2-8-84		
29.8		0.1	-							אין בי איז איז		
						-				DD 11.5 11:4 BAR 11.5 3:00		
	Brn. sandy silt,						<b>.</b>	_		AAR		
•	wf. tr. elay		-10	2-2-3	4	. 55	14	1.2	•	WL 11.5 5:15		
						•	•					
	very moist		-							Screen 25.0'-		
								1		2" PVC pipe		
		12.9		0-0-3	. <u>5</u>	SS	15	1.3		5.0' stick		
25.0		12.07	÷ .							Gravel 25.0'		
	Brn. silt, wf. f.									Bentonite 14. 12.		
	sand									Plug 2.0'-sur		
			25	2-2-4	6	SS	16	1.7	•.	Bentonite-cla		
	very moist-wet	•								12.0'-2.0'		
•			-							Standpipe 3.0 5.1' stic		
$(-,+)^{(1)}$		•										
20.3		17.6		2-2-3	7	ss	18	1.4				
			-	•								
						· •						
		1.										
<sup></sup>		• • •	-20	0-1-3	8	នន	17	1.2				
	•	• `										
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# LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 G (309) 662-5968

ROJEC	T NAME HUTSONVILLE POU	VER SI	<u>ATIO</u>	<u>N</u>	B			
OCATIC	PER PLAN	•		•				
ATUM_	HAMMER WT	14'0#		HAMMER D	ROP 30	rt i		8"
ATE ST	e elev Cori arted2-8-84 Com	PLETED		2-8-84				HSΛ
						DRILLI	NG METHOD	
ELEV.	DESCRIPTION		DEPTH		SAMP	ES		NOTES
				BLOWS FT.	NO. TYP	E RECOV.	QP	NOTES
437.9		0.0	30					and the second sec
	Brn. sandy silt wf.	21.4			· ·	·		
	lenses, f. sand wet							
	Brn. f. sand							
0.00			F	5 A.			1997 - 1997 1997 - 1997	
414.5		23.4						
	m-c sand, tr. silt wet							
429	wet	25.0		7-7-9	9 ss	5 I2		• •
		T						
	END OF BORING 25.0'							•
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# LOG OF BORING

	TED WITH HANSON ENG					BORI			M-8		
	NAME HUTSONVILLE POWE	R PLAI	NT				RACT N	· ·			
	N PER PLAN	•		•				0			
	HAMMER WT.	1407	<u>#</u>	HAMMER D	ROP_	30	<b>II</b>	OLE DI	A8"		
DATE CT	E ELEV CORE	E DIA		2-7-84		CA	SING				
	COMI	PLETED_		2=/=04		DR	DRILLING METHOD HSA				
ELEV.	DESCRIPTION	STRATA	DEPTH	BLOWS FT.		MPLES		P	NOTES		
439.4		0.0									
438.7	Brn. clayey silt, wf. tr. f. sand, occas. organic fibers moist	1									
436.3	Brn. silty sand	3.1		2-5-7		ss ]	18" 1	.6			
	Brn. silty sand, wf. tr. f. sand moist			2-3-5	2 8	38 7	7 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
		, •.	-								
431.0		8.4	-	3-5-5	3	ss \ 1	8 3.	2	WATER 2-7-83		
428.5	Brn. clayey silt, wf. tr. f. sand moist	10.9	- -10	2-3-3	<u>4</u> s	s 1	8 1.	8	DD 13.0 11:45an BAR 19.0 3:45pr AAR WL 12.0 8:30an 2-8-84		
	Brn. gray clayey silt wf. tr. f. sand, sm. gray silt pockets		-	2-2-2	<u> </u>	sl	8 1.	2	Screen 21.5'-16 Gravel 21.5'-15 Bentonite 15.5'		
	moist		-15	2-2-3	<u>6</u> s	s  1	8 1.	7	13.5 Clay & Bentonit 13.5'-4.0' 2" PVC pipe 16.		
<del>9-22.0</del>	Brn. sandy silt, wf.	17.4	-	1-2-2	<u>7</u> s	s 18	3 1.	2	4.9' stick up Bentonite cemen grout 4.0'-2.0' Plug 2.0'-surfa Standpipe 3.0'-		
<del>9</del> 19.6	occas. f. sand lens wet very moist	<u>19.8</u>	20	0-1-2	<u>8</u> 5	s 18	3 1.	2	Baled well at 5:15pm 2-9-84 11.0' water lev		
		1	•			1					

# LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 G (309) 662-5968

		HAN				MTON		- BO	RING N	0	14	-()	
PROJEC			DIAN	<u>بط، ار</u>	POWER	STA	TION			NTRAC			
	DN N	ren	I I LIMIN										
DATUM_		F	AMMER V	мт	140#		HAMMER D	ROP	30"		_ но	LE DIA	8"
SURFAC	E ELEV.			CORE	E DIA		•			CASING			
DATE ST	ARTED	2-7-84		COM	2-8-84				DRILLING METHOD			HSA	
			- <b>-</b>										
ELEV.		DESCRIP	TION		STRATA			SA	MPL	ES			NOTES
120 1			n an An Nation		1		BLOWS FT.	NO.	TYPE	RECOV.	QP		
439.4-	Br. si	lty son	d wot		0.0								
417.9	DI. 51.	LUY San		, 	21.5		0-0-0	9	SS	18"	1.	4	
						-							
	END OF	BORTNO	27 5	Г.,									
		DOILTING	· ~ · · · ·	, · · · ·		<b>h</b>							
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and the second sec				-	e and the second se			19. anii 19. anii 19. anii 19. 19. anii 19.					
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# LOG OF BORING

1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701

CENTRAL ILLINOIS DRILLING COMPANY

	NAME HUTSONVILLE POW		TTTOP	1						
	N 33.0" E. OF :		- ''							
	HAMMER WT		10#	HAMMER D	ROP	30	<b>)"</b> .	но	LE DIA	8"
ATE ST	ELEV CORI			2-14-8	7.	<b>ç</b>	CASING	3		7104
, i E 3 I	COM	PLETED_		2-1-4-0	₩ 	I	DRILLI	NG ME	THOD.	HSA
ELEV. DESCRIPTION		STRATA	DEPTH	1	SA	MPLE	s			
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP		NOTES
52.0		0.0	30							
51.2	See #A	0.8			·	. •				
250.7	See #B	1.3	-							
	Brn. silty sand, wf. coal refuse, occas.		<b>F</b>	5-10-1	<u>1</u>	SS	18"	2.3		
48.6	f. gravel fill mots	3.4	-		1. 		· · · · · · · · · · · · · · · · · · ·		- "	#A Brn b74
	Brn. sandy silt, wf. f-m gravel concrete			- MARY - 2010 - 10 - 10 - 2010 - 10 - 2010 - 10 -				eren al and rate on the same		sand, wf. coa refuse, 5.0"
46.1	fill moist	5.9	_5	4-19- 18	2	ss	14			wf. f. sand, organic fiber
70.1	Brn. sandy silt, wf.	5.9	-	10						fill wet
	ash coal refuse, tr. clay fill moist		-	2-1-2	: 3	ទទ`	זינ	2.2		#B Brn. f-m
43.9		8.1	-	~-1-2		. 55	10	2.2		wf. silt fil moist
	Gray sandy silt, wf. occas. f. gravel	ی مرکز ایران مرکز ایران	-							Water 2-14-84 DD 8.0 1:15mm
41.4	wet	0.6	10	2-2-1	_4	SS	10	1.0	•	BAR 17.0 2:30
	Brn. f. sand		-							WL 9.0 4:15p
	saturated		• .	0-1-1	_5	ss	8			Concrete frag 3.5'-4.0'
38.6	Gray clayey silt, wf	3.4	-							Cobbles, conc
	f. sand, occas. f. gravel	-		0-3-3	6	SS	14	2.3		2.6'-3.0
36.5		5.5		ر <i>ر</i> حر ح		00		ر•~		Screen 18.5'- 2" PVC pipe 8
35,6	Br. m-c.sand, wf. f-	6.4			7	ss	13	4.5		3.0 stick un Gravel 18.0'-
	Brn. sandstone			18-72- 22/1"		66	±⊅ .	~*• )		Bentonite 8.0 Cement Grout
3.2		8.8	-	100/3"		ss	0			Plug 2.0'-sur Standpipe
	END OF BORING 18.8"		_20							
	•	•		•						



M-1	
ELEVATION	456.5
PIPE & SCREEN	
_	

7'	pipe			459.5 -	452.5
51	pipe screen			452.5 -	447.5
1.1.1	00100		1 A A A A A A A A A A A A A A A A A A A	· · ·	

#### BACKFILL MATERIALS

concrete grout collar	456.5 - 455.0
bentonite seal	455.0 - 453.5
1/8" gravel pack	453.5 - 447.4

#### M-2

ELEVATION	453.3		
PIPE & SCREEN			
8' pipe 13' screer	1	456.3 - 448.3 -	
BACKFILL MATER	RIALS		• • •
concrete bentonite 1/8" grav		453.3 - 451.3 - 449.3 -	449.3

NOW IN OUR THIRTH TH YEAR OF SERVICE.

1525 SOUTH SIXTH STREET SPRINGFIELD, ILLINOIS 62703-2886 217/788-2450 TWX 910-242-0519 SPRINGFIELD, ILLINOIS PEORIA, ILLINOIS ROCKFORD, ILLINOIS



M-3			
ELEVATION 452.1	·. ·		
PIPE & SCREEN	· · ·		
7.9' pipe 5' screen		455.6 - 447 447.7 - 442	
BACKFILL MATERIALS			

concrete_grout_collar	452.1 - 450.1
bentonite seal	450.1 - 448.1
1/8" gravel pack	442.7 - 448.1

#### M-4

ELEVATION 454.4

PIPE & SCREEN

8'	pipe	· . · ·	457.4 - 449.4
1.5	screen		449.4 - 441.9

#### BACKFILL MATERIALS

concrete grout collar	454.4 - 452.4
bentonite seal	452.4 - 450.4
1/8" gravel pack	450.4 - 441.0

NOW IN OUR THIRTH TH YEAR OF SERVICE

1525 SOUTH SIXTH STREET = SPRINGFIELD, ILLINOIS 62703-2886 = 217/788-2450 = TWX 910-242-0519

SPRINGFIELD, ILLINOIS PEORIA, ILLINOIS ROCKFORD, ILLINOIS



36 0	
IVI	<b>`</b>
	,

ELEVATION		452.3
-----------	--	-------

PIPE & SCREEN

8' pipe	455.3 - 447.3
13' screen	447.3 - 434.3

#### BACKFILL MATERIALS

concrete grout collar	452.3 - 450.3	
bentonite seal	450.3 - 448.3	
1/8" gravel pack	448.3 - 433.1	

#### M-6

ELEVATION	438.9	
PIPE & SCREEN		
10' pipe 6.4' screen		443.9 - 433.9 433.9 - 427.5
BACKFILL MATERI	ALS	

concrete grout collar	438.9 - 436.	9
bentonite seal	436.9 - 434.	9
1/8" gravel pack	434.9 - 427.	5.
• • •	and the second	

#### NOW IN OUR THIRTH TH YEAR OF SERVICE

1525 SOUTH SIXTH STREET = SPRINGFIELD, ILLINOIS 62703-2886 = 217/788-2450 = TWX 910-242-0519

SPRINGFIELD, ILLINOIS = PEORIA, ILLINOIS = ROCKFORD, ILLINOIS



M-7	
ELEVATION	437.9
PIPE & SCREEN	
20' pipe 10' screen	

442.9 - 422.9 422.9 - 412.9

BACKFILL MATERIALS

concrete grout collar	437.9	- 435.9
bentonite & auger cutting	435.9	- 425.9
bentonite seal	425.9	- 423.9
1/8" gravel pack	423.9	- 412.9

#### M-8

ELEVATION 439.4

PIPE & SCREEN

21.4'	pipe	444.3 - 422.9
5.0'	screen	422.9 - 417.9

#### BACKFILL MATERIALS

concrete grout collar	439.4 - 437.4
bentonite & auger cutting	437.4 - 425.9
bentonite seal	425.9 - 423.9
1/8" gravel pack	423.9 - 417.9

NOW IN OUR THIRTH TH YT AR OF SERVICE

1525 SOUTH SIXTH STREET SPRINGFIELD, ILLINOIS 62703-2886 = 217/788-2450 = TWX 910-242-0519

SPRINGFIELD, ILLINOIS = PEORIA, ILLINOIS = ROCKFORD, ILLINOIS



М-9		
ELEVATION	452.0	
PIPE & SCREEN		
11.5' pipe 10' screer	1. 1. 1.	455.0 - 443.5 443.5 - 433.5

#### BACKFILL MATERIALS

concrete grout collar	452 - 450
bentonite, cement & sand	450 - 446
bentonite seal	446 - 444
1/8" gravel pack	444 - 433.2

NOW IN OUR THIRTH TH YEAR OF SERVICE

1525 SOUTH SIXTH STREET = SPRINGFIELD, ILLINOIS 62703-2886 = 217/788-2450 = TWX 910-242-0519

SPRINGFIELD, ILLINOIS PEORIA, ILLINOIS ROCKFORD, ILLINOIS



**Appendix A-4** 

Hanson 1984b Boring Logs

#### LOG OF BORING

ONTRAC	TED WITH HANSON ENG		_	PONT			RING N		<u> </u>
ROJECT	NAME PROPOSED FLYASH	DISPU	SAL	POND		_ CO!	NTRAC	T NO	
	NO + 80 CENTERLI		#	HAMMER D			0"		8"/NX
	HAMMER WT.	T40	<i>m</i> 1	HAMMER D	ROP_				
SURFACE	E ELEV CORE	DIA					ASING		HSA HSA
DATE ST	ARTED 7-24-84 COMF	LETED_		7-24-84	F	C	DRILLIN	NG METHO	
			-	·					
ELEV.	DESCRIPTION	STRATA	DEPTH	BLOWS FT.		MPLE		QP	NOTES
				BLOWS FT.	NO.	1166	RECUT.		
		0.0	30						
	Brn. silty f. sand, W	1.0 7 7							
	occas. organic fibers	*•*	-			-			
	fill dry Gray-brn. sandy silt								-
	wf. occas. f. gravel		┝	3-4-4	-		7:2"	11 5:4	
	WI. UCCAS. I. STAVEL			P		00		1.1	
	fill moist	3.3	<b> </b>	· .					
	Gray-brm. f-c silty					an a	-		
	sand wf. f-c gravel		F						
	fill very moist	4.9		3-3-4	2	ss	17	2.0	
	Brn. f. sand wf.		-5			1	- ·		WATER 7-24-84
	: andstone								
		5.6	F			1			DD 4.0 10:20a BAR surface 0
·	moist				3	99	16	4.5	
	Lt. brn. brn. silty f	•	Г	k1-33-	ビ				3:45pm AAR 3.5 3:55p
	sand, wf. tr. sandsto	ng 2	L		1				AAA J.
à ann an				62/3/1	<b> </b>	-			
	Blue gray f. sand,		L						
	wf. tr. silt, tr.			45-18-	11	as	172		Packer pressu
	sandstone, occas.			82/4/1	K	Ţ	1-1		test ran at 9
•	brn. mottling	10.8		2					& below within
			L						HSA & core ho
	Gray sandstone			200/4/	5	SS	5		wf. nitrogen
	Gray Sandscone		<u>-</u>	p/2		· ·			water. To me
									permeability
			-						16.5. Packer
	moist								permeability
			F						in 2nd 5' cor
									hole 16.5-21.
		15.3.		5	6	NX	59/	4.5+	
		1					11/2		
			Γ			4			
	Gray sandstone, wf.					·			
	blk. coal seams		Γ		1				
			4						
				2		·			
			L			1			
			-			·			
			-2	d			· ·		
ı		1	1 ~	1	1	T I	1		
1		1			1		1.		

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 G (309) 662-5968

# <u>çî</u>

#### LOG OF BORING

ROJECT	HANSON ENGIN	DISPO	SAL 1	POND		_ CON	TRACT	NO	·····	
111111	PER PLAN									Rit /htv
ATUM_	N HAMMER WT. 1	40#	۲	AMMER D					DIA.	0 / WA
URFACE	E ELEV CORE	DIA	7 1	24-84			ASING			HSA
ATE STA	E ELEV CORE	PLETED_		24-04		D	RILLIN	GMET	HOD_	HSA
ELEV.	DESCRIPTION	STRATA				MPLE				NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP		
		0.0	30							
	moist	21.5			<u>-7</u>	NX	60"	4.5		
			-				2			
	END OF BORING 21.5"									
						-				
			-			1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.				
		an a			1					
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#### LOG OF BORING

1909 OAKWOOD AVE. **BLOOMINGTON, ILLINOIS 61701** (309) 662-5968

CENTRAL ILLINOIS DRILLING COMPANY



SW-2 HANSON ENGINEERS BORING NO. CONTRACTED WITH \_ PROJECT NAME PROPOSED FLYASH DISPOSAL POND CONTRACT NO. -LOCATION \_\_\_\_\_ PER PLAN 8"/NX \_ HAMMER WT. \_\_140# 30" \_ HAMMER DROP\_\_\_ HOLE DIA. DATUM CASING\_ SURFACE ELEV.\_ \_\_\_\_ CORE DIA. \_\_\_ 7-24-84 7-25-84 HSA DATE STARTED\_\_\_ \_ COMPLETED\_ DRILLING METHOD STRATA DEPTH SAMPLES ELEV. NOTES DESCRIPTION DEPTH SCALE BLOWS FT. NO. TYPE RECOV. QP 0.0 30 Blk. sandy cinders 0.8 fill moist

Brn. silty sand, wf. f-m gravel. occas. hlue gray silty s nd' 2.4 8-3-2 ٦ ss 15" 2.5 pockets fill moist Reddish brn. silty WATER 7-24-84 & f-c sand, wf. f-m 7-25-84 ss 18 1-3-3 2 gravel -5 5.6 moist f111 DD 6.5 4:20pm BAR 6.0 8:20am Brn. m-c sand, wf. AAR 6.0 8:45am ss 17 1-2-2 3 occas. f. gravel wet <u>10</u> **1**-1-2 ss 17 4 ss | 16 3-4-5 13.I Brn. f-m sand, wf. occas. f. gravel 15 5-7-10 6

15.4

17.5

Brn. m-c sahd, wf.

Gray silty clay, wf. tr. f. sand, occas. f. gravel, wood',

f-m gravel

mat

ss 18

ss 17

ss 18

4.4+

7

8

5-10-

8-11-

14

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#### LOG OF BORING

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1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701

LOG OF BORING

(309) 662-5968

CENTRAL ILLINOIS DRILLING COMPANY

OJECI	NAME PROPOSED FLYASH						TIRAL				-
CATIO	N 50.0° W. O	<u>רי שר</u> 140#	<u> </u>		POP	3	30**	но	E DIA.	8"/NX	•
							CASING				
URFAC	E ELEV CORE CORE CORE CORE			7-25-8	34				THOD_	HSA	-
ATE SI				•							1
ELEV.	DESCRIPTION	STRATA	DEPTH			MPLE		IOP	<u>.</u>	NOTES	
				BLOWS FT.	NO.	TYPE	RECOV.	Ψ <u></u>			ł
		0.0	30								
	Blk. f. sand, wf. cind f-m gravel, grav silt.	0.9									
	organic fibers fill		<b>h</b>								
			-								
	Ban. f. sand, wf. occa	S .	T								
	f. gravel, tr. silt	3.1									
	fill moist Brn. silty f. sand, wf	the state was been as a first state of the	-								: 
dalara da antidada da a	occas. f-m gravel		-								
	fill moist		5								
(		5.0								WATER 7-25-	84
	Brn. f-c sand, wf.		-			ŀ.	ļ			DD 6.0 8:55 BAR 6.0 10:	a⊡ do
	f-m gravel									AAR 6.0 10	
											Ţ
			-							Coal seam 3	4.
	wet									3	4.
•	Web		10								
								· ·			
	· ·		1								1.
			-								
		13.5	-								
	Brn. f-c sand, occas.		Γ								
	f. gravel		15								
	wet		-								
		17.2		· ·							
		1				1					
	Gray silty clay, wf.		-		Ì						
	tr. f. sand, occas. f. gravel										
	I . ELAVUL		-								
			_20								
[			1	1	1	1	1	1.	1	<i>i</i> .	1

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# OG OF BORING

CENTRAL ILLINOIS DRILLING COMPA 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 (309) 662-5968

CONT	RACTED WITH HANSON ENGINE	ERS						
PROJ	ECT NAME PROPOSED FLYASH	DISPO	Q A T	Dolla		BORING NO	D	SW-2A
LOCA	TION 50.0' W. OF SW	-2	JAL .	POND		CONTRACT		
DATU	M HAMMER WT							
SURF				HAMMER	DROP		HOLE DIA.	8"/NX
DATE	STARTED 7-25-84					_ CASING.		/ 14/L
		PLETED_		7-25-8			S METHOD_	HSA
ELEV	DESCRIPTION	STRATA	DEPTH	1				
		DEPTH	SCALE	BLOWS FT.	NO. TY	PLES		NOTES
	till moist		30			FE RECOVIL		
	THE MOISE	9.8	- 20-					
			-					
	Gray silty clay, wf.							
	sandstone, tr. shale	ŀ	•					
	occas. wood							
· ·····		F	25		1 NZ	( 30" -	n an hair i le sgann angaine ann le sa an hair an	
	moist							
		7.4		·				
				_	<u>.</u>			
	Gray sandstone wf.							
	occas. blk. coal seams	Γ				.		
	5Camb							
	moist	Γ	ŀ					
			30 -		2   NX	59		
		1	-					
1	Wh. limestone wf. ce- mented gravel, tr. coal seams moist	3-						
	mented gravel, tr. coal							
1	Segms moist p2			-	-			
·	END OF BORING 32.1'	-						
		L	35					
	· · · · · · · · · · · · · · · · · · ·	· . [						
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## LOG OF BORING

(309) 662-5968

CONTRA	CTED WITH HANSON ENGI	TODOO				BORING N			
PROJEC	T NAME PROPOSED FLYASH D	I OTI O	AL P			CONTRAC	T NO		
LOCATIC	50.0° E. OF	<b>DW-</b> 2	щ			2011			8"/NX
DATUM	HAMMER WT	140	#1	HAMMER DR	OP_			E DIA	
SURFAC	E ELEV CORE	DIA		7-25-	01.	CASING	;		HSA
DATE ST	ARTED 7-25-84 COMF	LETED_		7-25-	04	DRILLI	NG MET	HOD	
	T	r	T	<b>I</b>					
ELEV.	DESCRIPTION	STRATA		BLOWS FT.		MPLES	QPI		NOTES
		· ·	1	BLOWSFILL					
		0.0	30	ł 1		2			
	Blk. silty sand, wf. o	r na si	15						
	occas. f. gravel, or-	רייר	$\vdash$						14 A
	ganic fibers fill dry	1	1						
	Barn at 1 + st f gand								
	Brn. silty f. sand, wf. occas. f. gravel								
-	fill moist	2 2							
	Reddish brn. f. sand,					<ul> <li>A second distance of the second se</li></ul>			
	wf. f. gravel	and the second se	-						
	WI . I . BLAVOL				1				
	fill moist	5.6	5						
			-						
	Brn. m-c sand, wf.								
	f-m gravel		F						WATER 7-25-84
		1	L						WAIER 7-25-04
	wet		Γ						DD 6.0 10:25am
									BAR 6.0 11:20am
			-						AAR 6.0 11:50am
			-10					:	AAN O.O II. Jugm
									Sm. cobbles 15.3
			-		·				15.7
			L						
			-						
			-						
		15.7	-+5						
	Gray silty clay, wf.		-					- ·	
	tr. f. sand, occas.	· ·		· ·					
	f. gravel		<b>F</b>						
		1	F						
					· · · ]				
	<b>*</b> .		1				•		
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#### LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. **BLOOMINGTON, ILLINOIS 61701** (309) 662-5968

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CONTRAC	TED WITH HANSON ENG	INEER	5			BOF		o	SW-2B
ROJECT	NAME PROPOSED PLYASH	DISPO	SAL :	POND		_ cor	NTRACT	NO	
OCATION	50.0' E. OF SW	-2					0.11		QNONV
DATUM		<u>140#</u>	I	HAMMER D	ROP		0"	- HOLE D	IAO'INA
SURFACE	ELEV CORE	DIA		7-25-84	,		ASING		HSA
DATE STA	ELEV CORE RTED7-25-84' COMF	PLETED_				(	DRILLIN	G METHO	D
ELEV.	DESCRIPTION	STRATA	DEPTH			MPLE			NOTES
ELEV.	DESCRIPTION		+	BLOWS FT.	NO.	TYPE	RECOV.	QP	
· .		0.0	30						
			-						
	till moist	23.5	Γ						
	The second stand		_						an tao 1 m ta Managamana ang kalakan 1 m ta Sang pangan ang kanana ang kanana ang kanana ang kanang kanang kana
	Blue-gray sandstone wf. occas. brn. mot-			(a) A second			ana haka atau ku		and the second secon
	tling wood		25		,				
	wet	26.2	L						
	Gray sandstone wf.		Γ						
	blk. coal seams		-					с. С	
	moist	27.8							
	Gray brn. sandstone		-			.			
	moist	29.4	-						
						NTV	-		
	Gray sandstone wf. blk. coal seamen		-30		1	NX	. 59"		
			4						
·	moist	31.5				4			
			-						
	END OF BORING 31.5"		L						
			Γ						
			L						
			35						
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		•							
						1			
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# LOG OF BORING

(309) 662-5968

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CONTRA	CTED WITH HANSON ENGI	NEERS				BO	RING N	~		SW-3	
PROJECT	NAME PROPOSED FLYAS						NTRAC				•
LOCATIO	PER PLAN	//					0.0.11			Cit Ant	÷ •
	HAMMER WT			HAMMER C	ROP		30"	- HOL	E DIA	8"/NX	
SURFAC	E ELEV CORE ARTED7=25=84 COME	DIA		7-25	-84		CASING				
DATE ST	ARTEDCOMP	PLETED_					DRILLIN	NG ME	тнор	HSA	
ELEV.	DESCRIPTION	STRATA	DEPTH		SA	MPL	ES			NOTES	
ļ		1	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP	·	ROIES	
		0.0	30					-			
	Lt. brn. f. sand dry	0.8									
	Reddish brn. f. sand		F								
· ·	wf. occas. f. gravel		Ļ								
				3-4-3		SS	18"				
	-dry	3.1	<u> </u>								
	Reddish brn. silty f.	·						•	ningan ta biy 1.914 (Bada ) Y		an an an tanana pana
	sand					•	-0		· ·	WATER 7-25-84	4
			5	3-4-5		SS	10				-
	very moist									DD 5.5 11:45	am
			-							BAR 6.5 2:45	pm
	•• • • • • • • • • • • • • • • • • • •	- 1	L							AAR 6.5 3:05	pm
	Brn. m-c sand, uf.	7.4		2-3-4		SS.	μo –				
	f-m gravel	-	+							Water loss 1	3.6-
										18.6	
	wet				٫.						
		10.6	H10	2-2-2	_4	. 88	17				
		1010								• • • • • • • • • • • • • • • • • • •	
	Brn. f. sand, wf.		Γ								
	occas. f. gravel		╞	3-4-8	5	SS	I2				
	wet	13.3		-							
			-			-					
	Tan It. gray sand-										
	stone						·				
	moist	15.6	15								
1		·									
	Brn. sandstone				6	NX	60				
	moist		F								
			ŀ								
		18.6									
	Tan & brn. sandstone		-								
	Lan a Sine Bandboone		-20			•					
	•		-	:							
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#### LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 **G** (309) 662-5968

ONTRAC	TED WITH HANSON ENGI	NEERS				BOF		0		SW-3
ROJECT	NAME PROPOSED FLYA	SH DIS	SPOS	AL POND	)	_ COM	TRAC	T NO		
OCATIO	N PER PLAN	7/10	4				2011			
	HAMMER WT			HAMMER D					E DIA	
SURFACE	E ELEV CORE ARTED 7-25-84 COM	E DIA PLETED_		7-25-8	14	C	ASING	NG ME	тнор.	HSA
ELEV.		STRATA	DEPTH		S		S		•	NOTES
ELEV.	DESCRIPTION	DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	9P		NOTES
11 		0.0	30							
			-							
										•
	moist	23.6			7	XX	60"			:
							an anna an anna an anna an anna a'		angeland o a tanta ta ta ta Ta ta	
			-25							
	END OF BORING 23.6"									
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		-								•
				•						
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### LOG OF BORING

(309) 662-5968

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ONTRAC	HANSON ENGI			Daim						SW-4
TOJECT	NAME PROPOSED FLY ASE		POSAL	POND		_ CON	ITRACT	Г NO		
CATIO	N+16_+_00	740	4		<u>i</u> 	30	) <b>18</b>			8"/NX
	N			HAMMER D					E DIA.	
JRFACE	E ELEV CORE	DIA	· · · · · · · · · · · · · · · · · · ·		01.	c	ASING	· .		HSA
ATE STA	ARTED 7-25-84 COMP	LETED_		7-25-	84	C	RILLIN	IG MET	HOD-	
		STRATA	D C D T U		SA	MPLE	s			NOTES
ELEV.	DESCRIPTION	DEPTH	SCALE	BLOWS FT.				QP		NUTES
		0.0	30							(1,1,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
	Lt. brn. f. sand, wf. silt fill dry	1.4	-							
	Reddish brn. silty sand, wf. occas. f. gravel			4-3-3	1	SS	17"	1.5		
	fill moist			and a second				Martine Contractor (1997)		
		4.3		and a second	2.46					
	Lt. brn. brn. sandy silt wet	5.6	_5	2-2-2	2	SS	18			
	Brn. m-c sand		-				- 0			WATER 7-25-8
	wet	7.9	[	3-3-4	3	នន្	18			DD 4.0 3:25p
-	Brn. f-m gravel, wf. m-c sand wet	9.7				- -				BAR 3.0 5:45 AAR 4.5 7:20
	Lt. reddish sandstone moist			1-2-2		_ SS	17			Permeability pressure tes
	Lt. brn. sandstone			100/3	1 3	_ ss	3			at 13.5' wf. & nitrogen i rock core ho
<b>,</b>	moist		-		: 1					
				5	6	N2	¢ 56			
			-			+.				
• •	Gray sandstone wf.	17.9			- 7	7 N	x 40			
	blk. coal seams moist	19.6	2 _2	0						
	END OF BORING 19.6"		-							



# LOG OF BORING

ONTRAC	TED WITH HANSON ENG	TSPOS	AT. P	OND			RING N			
		AN	nu -			_ COI	NTRAC	T NO		
OCATIO	N 8 + 50 PER PI	140	#			3	0 <sup>#</sup>		EDIA	8" /NX
	E ELEV CORE			HAMMER D	ROP		ASING		E DIA	
URFACE	arted 7-26-84 com	. DIA		7-26-8	<u>1</u> ,					HSA
ATE ST	COM	LETED_		7-20-0	<del>- •</del>	C	DRILLIN	IG MET	THOD.	
ELEV.	DESCRIPTION	STRATA	DEPTH		S	MPLE	s		-	NOTES
	DESCRIPTION	DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP		
		0.0	30							
	Lt. brn. silty sand,	1								
	wf. organic fibers									
		1.8								
	fill dry		·L							
	Brn. f-m gravel, wf.			5-7-?	1	SS	17"			
	f-c sand, tr. silt		L							
	fill dry	3.6								-
	Reddsih brn. m-c			and a second				innen medienen sorr	aan am ar in	ann an
	sand, wf. occas. f.									
	gravel tr. silt fill	5.5	4	5-4-7	2	ss	18			
	Gray brn. m-c sand,		-							
	wf. occas. f. gravel		-							WATER 7-26-84
	wet	6.9								
			1	0.33			18			DD 6.0 7:40am
	Reddish lt. brn.			3-11-	<u>'</u>	20				BAR 2.0 10:20an
	sandstone		-	53	11	3775				AAR 2.5 10:25an
	moist	9.1			<u> -4</u>	NX	9			D
	Gray sandstone wf. bl	. r. e	<b>-</b>							Permeability pa ker pressure te
	coal bands moist	9.8								ran at 9.5' wf
· .			<del>] 1</del> 0							water & nitroge
			L	1.11						in 1st rock con
	Gray sandstone wf.									hole. Also
· .	occas. blk. coal		<u> </u>							permeability te
	seams									at 12.8' in 2nd
	moist		-		5	NX	58			core hole
	morse				<u> </u>	÷.				
			-							
			+25							
	•									
					6	NX	62			
			L							,
•		18.5	Γ			1			l	
			L							
	END OF BORING 18.5"	1				1 :				
		1	_20							
	· · · · ·	1.	1	1	1	1	1	1	1	

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### LOG OF BORING

	THANSON ENGI	H DIS	PUSA	T LOND		_ CON	ITRAC	T NO		
CATIO	N = 8 + 50 PEH PLAN									·
	HAMMER WT	140	#i	HAMMER D	ROP	30	11	_ HOL		8"/NX
IRFAC	E FLEV CORE						ASING			· · ·
TE ST	ARTED 7-26-84 COMP			7-26-	84		RILLIN	IG MET	HOD.	HSA
ELEV.	DESCRIPTION	STRATA	DEPTH			MPLE				NOTES
				BLOWS FT.	NO.	TYPE	RECOV.	QP		
		-0.0	30							
لي: ب	rn. sand, silt wr. ca rganic fibers fill	0.8								
. 1	lan brn. silty clay, vf. f-c sand, f-m gravel		-	3-3-5	<u>    1                                </u>	88	18"	2.5		
	fill very moist	4.8	- 5							
	Brn. sandstone moist	5.9		3-5-8	2	SS	17	0.5		
	Beddish brn. sandstone moist	8.1		25-45- 55/4"	3	្ទន	16			Water 7-26-84
	Lt. brn. sandstone		-	24-30- 48	<u> </u>	ទទ	18	•••		DD 4.0 10:35 BAR 6.0 1:00 AAR 5.5 1:15
	Reddish brn. sandstone tr. coal seams	<u>11.5</u> 13.2			5	NX	49			Bag Sampled #1 0.5-1.0 #2 1.0-2.0
	Gray sandstone moist occas. coal seams	14.0				-				
	END OF BORING 14.0		- <u>1</u> 5							
			-	•						
			2(	)						



# LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPAN' 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 G (309) 662-5968

OCATIO	NAME PROPSED FLY ASH			POND		CONTRAC	T NO	
ATUM_	HAMMER WT	14	<u>0#</u> i	HAMMER D	ROP			DIA. 8"/NX
ATE ST	e elev core arted_7-26-84 comp	DIA PLETED_		7-26	-84	CASING	S METH	DDHSA
ELEV.	DESCRIPTION	STRATA DEPTH		BLOWS FT.		APLES	QP	NOTES
		0.0	30					
	Brn. sandy silt	1.5	-					
	Lt. brn. silty f. sand		· ·					
-	moist fill	-3.4-	-					
	Reddish brn. silty		5					
	f-m sand, occas. f. gravel		1				-	
	wet		-					
			10					WATER 7-26-84
	Gray silty clay, wf. tr. f. sand, occas.	12.3	1					DD 3.5 1:20pm BAR 1.5 3:35pm AAR 3.0 3:45pm
	f. gravel till moist	13.6	-					
	Gray sandstone wf. blk. coal seams moist	15.7	- 		1 1	NX 59"		Bag Sampled 0.5-1.0
	Gray sandstone wf.		-					3 soft rock 1 17.5-22.5
	tr. blk. coal seams		1	•				Ran permeabili packer pressu test at 18.5" 2nd rock core
			- 20			•		run 17.5-22.5

CENTRAL ILLINOIS DRILLING COMPA 1909 OAKWOOD AVE. BLOOMINGTON, ILLINOIS 61701 G (309) 662-5968



# LOG OF BORING

		HANS	ON 31	IGINI	CERS		BORING N	D	SW-7
CONTRACTED W	PRO	POSED	FLY	ASH	DISPOSAL	POND			
LOCATION	PER	PLAN							
DATUM				WT	140#	HAMMER DROP_	30"	_ HOLE DIA	8*/NX
SURFACE ELEV.	1			COR					
DATE STARTED_	7-	26-84	•	COM	PLETED	7-26-84		IG METHOD	HSA

Г			STRATA	DEPTH		S	AMPLE	S			NOTES
	ELEV.	DESCRIPTION	DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP		
ł			0.0	30							
ł											
-	•				Sec. 2			: 			
ļ		moist	22.5	Γ		<del>  2</del>	NX	60"			
.		END OF BORING 22.5									
		END OF BURING 22.5								an a	
	1			-25							
				ر ۲							
					1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1						
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											and a second s
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**Appendix A-5** 

**STMI 1998 Boring Logs** 

Pro	oject Na Amerer	ame/No nCIPS -	Huts	onvill	le Pla	nt 249	9.03	Boring N GP-1	0.	Start Date 8/25/98	Page 1
	iller AEC, Ir	Idianan	olis I	N		Logged Stev	by: e Mueller/ST	M		End Date 8/25/98	Depth to Water 16.8 Feet
	ring De		· ·		Diam		Surface E		Drill Metho		Northing
во	17.3 Fe	•	1	_	nches		459.8 F		Geoprol	)e	3585.650
We	ll Dept	h	We	ll Dia	amete	er	TOC Elev.		Sample Me	thod	Easting
	na			na	,		па	<u> </u>	4-ft Mac	ro-Core	4366.050
	Se	1 (ft)					Desc	ription	•	llon	
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification					Well Completion	Comments
$\infty$						ASH,	silty texture,	trace coal fra	gments,		1
$\bigotimes$	na	 	100		Coal Ash		gray, moist (F	-			Geoprobe boring, no well installed
	na	 5	100		SP	media coars	D, well sorted/ um-grained, q e subangular ogy, light brow	uartz, trace s sand of non-	ilt, trace quartz		
	na		100		CL	little c	CLAY, roots coarse sand to I, olive gray to	o fine suband	ular	· ·	
	па	 	75 100		SM SC	trace CLAY trace	SAND, tine- fine gravel, d EY SAND, tir fine gravel, lig	ark gray, mois ie- to medium ght gray, satu	st I-grained, rated		insufficient water, no sample collected
		20 20 				END	of Boring -	- 17.3 feet (be	orock)		
							·	·			

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TSD 000240

Рго	oject Na Amerer	ame/No CIPS -	Huts	onvil	le Pla	nt 249	).03	Boring No GP-2	<b>D.</b>	Start Date 8/25/98	Page 1
	ller AEC, Ir	Idianao	olis. I	N		Logged Steve	by: e Mueller/ST	MI		End Date 8/25/98	Depth to Wate 9 Feet
	ring De				Diam		Surface El		Drill Metho		Northing
	20.0 Fe	-	1	-	nches		457.3 F	eet	Geopro	be	3753.193
We	ll Dept	h			amete		TOC Elev.		Sample Me		Easting
	na			na			na		4-ft Mac	ro-Core	4610.447
sample	Blows/6 inches	Sample Dépth (ft)	Кесоvегу (%)	Graphic Log	Classification		Desc	ription		Weil Completion	
ñ	Ĩ	Sa	Re	້ບ	ΰ					Ň	Comments
	na		87.5		Coal Ash SP	SANL	o dark gray, r , well sorted/i im-orained, qu				Geoprobe boring, n well installed
	na	5 	100			& ligh	t brown below silty texture, t	v 3.5 ft. (Fill) race coal frag coarsens belo t. (Fill)	ments		
	 na	 10	100		Coal Ash			- ,.4			
	na	 15	100		Coai	granu trace	les, coarse-gr	se sand-size ained quartz s (1/2-1"), bla	sand,		
	na		100	8-03	Ash SW-	CLAY	EY SAND & C	RAVEL, poo	dy		Groundwater sampl collected from 15-19 bgs.
		20 				vellow	orange, mois	d, fine-graine	/		
		25 						·			
		 30									

# TSD 000241

					le Pla	nt 249.03 Boring No. GP-3			Start Date 8/25/98	Page 1	
						Logged by:			End Date	Depth to Water	
	AEC, In						e Mueller/ST			8/25/98	11 Feet
Boring Depth Boring Diam 16.0 Feet 2.2 Inches										Northing 3924.268	
Well Depth Well Diameter										Easting	
na na									4-ft Mac		4092.856
Ī	-		-						, ,		
	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desc	Well Completion			
_											Comments
X				°.4	SM	damp	(Fill)	grained, yello			
	na		100		Coal Ash	ASH, ft. (Fi		olive gray, we	t below 3		Geoprobe boring, no well installed
緻											
X	ла		100			SAN	), well sorted/	rounded, fine	- to		
$\bigotimes$	110		100		SP	mediu moist	ım-grained, q (Fill)	uartz, light bro	own,		
X					Coal	COAL	, sand/grave	size, black, o	lamp		•
X						SANL	, well sorted/	rounded, fine	- to		
X	na	10	100			medit satura	im-grained, q ated below 11	uartz, light bri ft.	own,		
$\bigotimes$					SP						
Ŕ											
X	па		100								Groundwater sample collected from 12-16
X		 15	.00		sw-				tine 1		bgs.
$\mathfrak{A}$				0.0°	GW	medit	im-arained, a	poorly sorted uartz sand,	-		·
		- ~				fine-g browr	rained suban	gular gravel, i	· · · ·		
Į						END	OF BORING	- 16.0 feet (Be	edrock)		
		20									
		25									
									•		

TSD 000242

Pro	iject Na Ameren	me/No CIPS -	Huts	onvil	le Pla	nt 249	9.03	Boring N GP-4	0.	Start Date 8/25/98	Page 1	
Driller Logg						Logged	by:		<u> </u>	End Date	Depth to Wate	
4	AEC, In	dianap	olis, I	N		Stev	e Mueller/ST	MI		8/25/98	10 Feet	
Boring Depth Boring Diam									Drill Metho		Northing	
17.0 Feet 2.2 Inches									Geopro		3950.707	
	Nell Depth Well Diameter				amete	er TOC Elev.			Sample Method 4-ft Macro-Core		Easting 4220.706	
		<b>I </b>		na	,						4220.100	
		[	1									
		Ð					_		•	E		
	es	Sample Depth (ft)	~		E		Desc	ription		Well Completion		
	nch	ept	%)	.0	ţi					ple		
,	/6 i		ery	<u>.</u>	fice					L D	1	
	Blows/6 inches	dr	Recovery (%)	Graphic Log	Classification							
5	Ĕ	Sal	Re	ö	ប៊					Ň	Commente	
						CAN	), well sorted	rounded tine	- to		Comments	
$\otimes$						media	um-grained, q 10-1 ft, light b	uartz, little as	h cinder		Geographa having	
$\otimes$	na		68.8			grave	a o-a a, light t	nown, moist (	(-10)		Geoprobe boring, r well installed	
$\otimes$					SP							
쑀					·							
$\otimes$		5										
$\otimes$	na		81.2			SANI	), well sorted/ um-grained, q ground surfa	uartz, dark br	- 10 own 5.5-7			
X						ft (old satur	ground surfa	ice), light brov ) ft.	vn below,			
X			1					-				
$\otimes$	па	- 10	87.5									
$\bigotimes$			]		SP							
X												
$\bigotimes$											Groundwater samp	
$\bigotimes$	na		56.2								collected from 12-16	
$\otimes$		15		0.00	sw-	CLAY	EY SAND &	GRAVEL DOC	orly	1	bgs.	
쬤	na		100	0 0 0 0	1 mart	sortee	d, fine- to coa rained suban	rse-grained s	and,			
22				0.0		browr	n, saturated			-		
	-					END	OF BORING	- 17.0 Teet (Be	eurock)			
			1									
		20										
			1	1								
		<b>—</b>										
		[ ]										
		_30_			•							
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Project Name/No. AmerenCIPS - Hutsonville Pla						Boring No. Int 249.03 GP-5			Start Date 8/26/98	Page 1		
Driller AEC, Indianapolis, IN Boring Depth Boring Diam 11.25 Feet 2.2 Inches						Logged by: Steve Mueller/STMI				End Date 8/26/98	Depth to Water 6 Feet	
						eter Surface Elevation			Drill Method Geoprobe		Northing 3917.782	
Well Depth Well Diameter							Sample Method		Easting			
na na						na			4-ft Macro-Core		3858.831	
sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desc	ription	· ·	Well Completion	Comments	
	na	  5	100	P: 9: 9: 9: 9: 9: 9: 9: 9: 9 9: 9: 10: 10: 10: 10: 10: 10: 10: 10: 10: 10	SM SP	ft, pie 1.75 f SANL mediu coars	Y SAND, silty i ce of concrete t, brown, mois 0, well sorted/ um-grained, qu e subangular n, saturated bu	e, 1-in coal-rid st (Fill) rounded, fine uartz, trace to to subround	ch layer at		Geoprobe boring, n well installed	
	na		100	2.00 2.00 2.00 2.00 2.00	SW- GW	mediu	r SAND & GR im- to coarse fine-grained und gravel, lig OF BORING -	grained subr	ounded		Groundwater sampl collected from 7-11 bgs.	
		15 15  20					· .		•			
								<b>.</b>				

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Pro	oject Na Amerer	me/No CIPS -	- Huts	onvill	le Pla	int 249	9.03	Boring N GP-6	0.	Start Date 8/26/98	Page 1
Dri	ller					Logged	by:			End Date	Depth to Wate
	AEC, Ir	Idianap	olis, I	N		Stev	e Mueller/ST	MI		8/26/98	6 Feet
Bo	ring De	pth	Bo	ring	Diam	eter	Surface E	levation	Drill Metho	d	Northing
	10.5 Fe	et			nches		453.0 F		Geoprol		3981.359
We	II Dept	hi,	We	ll Dia	amete	er	TOC Elev.		Sample Me		Easting
	na	1		na	<b></b>		na		4-ft Mac	ro-Core	3754.280
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification			ription		Well Completion	Comments
$\otimes$				9. o. o	•	SILT silty t	Y SAND, tine-	to medium-g ass 0-1/2 ft, li	rained,		
$\otimes$	na		62.5		SM	orave	I little coal fra	agments 2-2.2 dark brown, n	25 ft.		Geoprobe boring, n
$\bigotimes$				9 			•				well installed
$\bigotimes$		L _			SP	medi	um-grained, q	rounded, line uartz, light br	- 10 own,		
$\otimes$		- 5				moist					
$\otimes$	na		100			SAND, poorly sorted, tine- to coarse-grained, subanguler to subround, trace to little gravel, light brown, saturated below 6 ft.				1	
$\otimes$											
$\mathfrak{X}$					sw	Delow					Groundwater samp
$\otimes$	na -		100								collected from 6-10 bgs.
X						END	OF BORING	- 10.5 feet (Be	edrock)	-	-3
		<u> </u>									
		F -									
- (											
		_20_									
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		25									
		[ ]								•	
		30									
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TSD 000245

Рго	oject Na Amerer	ame/No nCIPS -	Huts	onvil	le Pla	int 249	9.03	Boring N GP-7	0.	Start Date 8/26/98	Page 1
	ller					Logged	-			End Date	Depth to Water
	AEC, Ir	dianap	olis, l	N		Steve	e Mueller/ST	MI		8/26/98	4 Feet
	ring De 18.0 Fe		1	-	Diam nches		Surface E 452.0 F		Drill Metho Geoprol		Northing 4151.460
We	II Dept	h	We	l Dia	amete	er	TOC Elev.		Sample Me	thod	Easting
	na			па			па	-	4-ft Mac	ro-Core	3511.572
ole	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desc	ription	·	Weil Completion	
Sample	Blow	Samı	Reco	Grap	Clas					Well	Comments
	па		75	9 9 9 9 9 9 9	SM SP	silty t grave SANL	opsoil with gra I, dark brown D, well sorted um-grained, q	to medium-ga ass 0-1/2 ft, lin moist (Fill) rounded, fine uartz, light bro	- to		Geoprobe boring, n well installed
	na		50			SAN	D, poorly sorte e-grained, su to little gravel	ed, fine- to banguler to si , light brown,	ubround, saturated		
	ла	- 10-	100		sw						Groundwater sampl collected from 6-10 bgs.
	na	  15	100					estiff to bard			
*	na	 	100		ML	nonpl coars moist SANL	astic, trace and e sand to fine DSTONE, fine b light green	y stiff to hard, ngular to suba gravel, olive grained, qua 18.0 feet (Be	angular gray, rtz,		
		25 									
		 30									

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4	Ameren	me/No. CIPS -	Huts	onvill	e Pla	nt 249	9.03	Boring N GP-8	<b>.</b>	Start Date 8/26/98	Page 1
Dril	ller					Logged	by:			End Date	Depth to Water
	AEC, In	dianap	olis, l	N		Steve	e Mueller/ST	ГМІ	·	8/26/98	Est. 4 Feet
	ring De 16.0 Fe		1	-	Diam nches		Surface E 451.3 I		Drill Metho Geoprol		Northing 4262.600
	ll Depth na	1		ll Dia na	mete	er	TOC Elev na	•	Sample Me 2-ft split		Easting 3380.239
	<u> </u>					[			2100		
Although	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Deso	cription		Well Completion	Comments
$\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}{\overset{\times}$	na		100	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	ѕм	silty t grave	opsoil with g I, dark browr	- to medium-g rass 0-3/4 ft, li n, moist (Fill)	ttle		Geoprobe boring, n well installed
	ла		100		ML	trace (topso SILT) vertic	coal particle oil) 7 CLAY, stiff, al roots, little	nt stem fragm s at top, black, medium plast to some medi	, moist iaty, fine ium to		
	112				CL	coars mottle estim	e sand, trace ed light brown ated water le	e subangular fi n & gray, mois evel at 4 ft.	ne gravel.		
	na		100			coars	), poorly sort e-grained, su to little grave	ed, fine- to ibanguler to si il, light brown,	ubround, saturated		
XX	na		100		sw						No groundwater sam collected; geology boring only
8				2727	GL	sands	stone pebble,	medium plast light to green - 16.0 feet (Be	ish gray,		
		20 20									

Pro	oject Na Amerer	me/No CIPS -	Huts	onvill	e Pla	int 249	9.03	Boring No GP-9	D.	Start Date 8/26/98	Page 1
	ller AEC, Ir	ndianap	olis, I			Logged Stev	by: e Mueller/ST			End Date 8/26/98	Depth to Water 7 Feet
Во	ring De 21.0 Fe	pth	Во	ring l	Diam nches		Surface El 453.4 F		Drill Metho Geoprol		Northing 4306.991
We	ll Depti na	_	We		met		TOC Elev. na		Sample Me 4-ft Mac	thod	Easting 4990.027
						· · · ·	<u>.</u>				
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desc	ription		Well Completion	
~~~		ļ	[	_	ML	<u> </u>	vegetated wil	h grass brow			Comments
	na		50		SP	(Tops SANI medi fragm	soil) D, well sorted/ um-grained, qu nents at top, tr n, moist	rounded, fine-	- to bal		Geoprobe boring, n well installed
	na		56.2		Эг		), poorly sorte				
	na		100			COALS	se-grained, sul to little gravel	panguler to su	bround, saturated		Groundwater sampl collected from 8-12 bgs.
	na	  15	100		sw						
	na		100								. ·
×	na		100			END	OF BORING	21.0 feet (Be	drock)		

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FIG	oject Na Ameren	me/No CIPS -	Huts	onvil	e Pla	int 249	9.03	Boring N GP-10	<b>0.</b>	Start Date 8/26/98	Page 1
Dri						Logged				End Date	Depth to Wat
_	AEC, In		<u> </u>				e Mueller/STN			8/26/98	6 Feet
	ring Dej 14.25 F			-	Diam nches		Surface El 453.8 Fe		Drill Metho Geopro		Northing 4778.861
	II Depth				mete		TOC Elev.		Sample M	ethod	Easting
	na .		l	na			na		4-ft Mad	cro-Core	4700.947
9	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification			ription		Well Completion	· · ·
Sample	Blows	Sampl	Recov	Graph	Classi		·		lamo	Well C	Comments
$\bigotimes$	na		100		Coal	(Fill) Sani	L, sand/gravel	ounded, fine	-grained.		Geoprobe boring, well installed
	na		75		SP	hsun l	z, some silt 2. ated below 6 fi	5-3.5 ft. liaht	brown,		
	na	 - 10 	50		sw	coars trace medi	D, poorly sorte e-grained, sub to little gravel, um to coarse s n, saturated	orade to we	ubround, Il sorted 3 ft, light		Groundwater sam collected from 8-1: bgs.
8	na	  15	100			END	of Boring -	14.25 leet (E	Bedrock)	-	
		20						-			
		 25									

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Pro	oject Na Ameren	me/No	Huts	onvill	le Pia	nt 249	0.03	Boring N GP-11	0.	Start Date 8/26/98	Page 1
	ller					Logged				End Date	Depth to Water
_	AEC, In						e Mueller/ST			8/26/98	5 Feet
	ring De	•	1	-	Diam		Surface E		Drill Metho		Northing
_	13.0 Fe				nches		452.5 F		Geopro		4534.018
	ll Dept	ָר			amete	er .	TOC Elev. na		Sample Mo 4-ft Mac		Easting 4398.796
	na	Т		na 			110				4550.150
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desc	ription		Well Completion	Comments
$\bigotimes$					<b>C a a i</b>		, sand/grave	size, black, o	lamp		
$\bigotimes$	na		87.5	P. 9 9 P	Coal SM	SILL	z, trace coars	to medium-g e-grained, ligi	nt brown,	-	Geoprobe boring, n well installed
	na	 5 	68.8	¢	SP	satura SANE coars	um-grained, q ated below 5 f ), poorly sorte e-grained, su	rounded, fine uartz, light bro t. d, fine- to banguler to so , light brown,	own,		
	na		100		sw						Groundwater sampl collected from 6-10 bgs.
X	na		100			END	of Boring -	- 13.0 feet (Be	edrock)		
		20									
		25									

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Pro	oje <mark>ct N</mark> a Amerer	me/No	Huts	onvil	le Pla	nt 249	9.03	Boring No GP-12	D.	Start Date 8/27/98	Page 1
Dri	ller					Logged	by:			End Date	Depth to Wate
	AEC, In	dianap	olis, I	N	•	Stev	e Mueller/STI	MI		8/27/98	4 Feet
Bo	ring De	pth	Bo	ring	Diam	eter	Surface El	evation	Drill Metho	d	Northing
	9.5 Fee	t		2.2 li	nches	;	450.8 F	eet	Geoprot		4324.544
We	II Depti	n	We	ll Dia	amete	er	TOC Elev.		Sample Me	I	Easting
	na			na			na	<u> </u>	4-ft Mac	ro-Core	4346.394
	Sa	h (ft)			E		Desci	ription		tion	
Sample	Blows/6 Inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification					Weil Completion	
<i>"</i>			-		Ŭ						Comments
	na		62.5		Coal	- pile n	L, silty texture, unoff sediment D, well sorted/r edium-grained se-grained belo ated and pale	) ounded qua	rtz tine-		Geoprobe boring, n well installed
$\bigotimes$	па		50		SP						Groundwater sampl collected from 5-9 f bgs.
×	na	 10 	100			END	OF BORING -	9.5 feet (Bec	frock)		
		15   			•						
		20   									
		25        									

Pro	oject Na Amerer	me/No CIPS -	Huts	onvill	le Pla	nt 249	9.03	Boring N GP-13	0.	Start Date 8/27/98	Page
Dri	ller					Logged	-	•••		End Date	Depth to Wate
	AEC, In	dianap	_				e Mueller/S	TMI		8/27/98	4 Feet
Bo	ring De	pth	Bo	ring	Diam	eter	Surface	Elevation	Drill Metho	ođ	Northing
	10.0 Fe	et			nches		447.0		Geopro		2693.143
We	II Depti	า	We	ll Dia	amete	er '	TOC Elev. Sample Me			1	Easting
	na			na			na		4-ft Mac	ro-Core	3353.985
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Des	scription		Well Completion	Comments
xx				htti			sandy, clay	rey, trace to littl	e gravel,		
	na		50		ML	(Tõp	soil)		n, moist		Geoprobe boring, r well installed
X		5-	1			SAN	D, poorly so	ted, fine- to subanguler to s	ubround	1	
$\bigotimes$	ла		62.5		SP	trace	to little grav	subanguler to sizel, light brown,	saturated		
$\bigotimes$											
*						CLAY	EY SILT, VE	ery stiff to hard, root/stem fragm		-	Groundwater samp
8	na	L _	100		ML	trace	annular to s	ubangular coa	rse sand		collected from 5-9
\$X		10	1	Ш		to fin	e gravel, gre	enish to olive g	gray,		bgs.
			{			END	OF BORING	5 - 10.0 feet (Be	edrock)		
										1	
			1								
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Pro	j <b>ect Na</b> Ameren	me/No CIPS -	Huts	onvill	e Pla	int 249	).03 ·	Boring No GP-14		Start Date 8/27/98	Page 1
Dril						Logged				End Date	Depth to Water
_	AEC, In			_			e Mueller/STI		Drill Metho	8/27/98	Est. 10 Feet
	ing Dej 40.0 Fe			-	Diam nches		Surface El 439.9 F		Geoprot		• Northing 1104.830
_	I Depth		L		amete		TOC Elev.		Sample Me		Easting
	na			па			na		4-ft Mac		5752.447
	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desci	ription		Well Completion	Comments
XX				TTT		CLAY	EY SILT, incr	easing day c	ontent		
×	na .	 	87.5			medi	lepth from trac um plasticity, s , brown, satur	tiff above 10	ft to soft		Geoprobe boring, n well installed
	na		87.5								
XXX	na	 	100		ML						
	na		100								
	na	 	100								
				•		increa -25 f	e sampler poin ased resistanc t and ~30 ft, bu 2-ft discrete s	e to penetrati .t no soil reco	ion at		
X	па	 25 	0								
8		 30 									Partial groundwate sample (-50% volur collected from 28-32 bgs.

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	o <mark>ject Na</mark> Ameren	CIPS -	Huts	onvil	le Pla	nt 249	9.03	Boring No. GP-15		Start Date 8/27/98	Page 1
	iller					Logged				End Date	Depth to Wate
	AEC, In		_				e Mueller/STN			8/27/98	Est. 4 Feet
Bo	ring Dep		1	-	Diam		Surface El	•	Drill Metho		Northing
	18.0 Fe	_		_	nches		449.8 Fe	eet	Geoprol		2790.223
vve	II Depth	1			amete	er	TOC Elev.		Sample Me		Easting
	na	,		na			na	·	4-ft Mac	ro-Core	3212.610
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Descr	iption		Well Completion	Comments
	na				ML/ SM		7SILT material	s similar to G	P-13;		Geoprobe boring, n well installed. Groundwater sampi collected from 8-12 bgs.
	••	15 			ML/ CL	penet	OF BORING -				
		25   30 30  									

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	Ameren	me/No CIPS -	Huts	onvil	i le Pla	nt 249	9.03	Boring No GP-16	<b>D.</b>	Start Date 8/27/98	Page
Dri	ller					Logged				End Date	Depth to Water
	AEC, In	dianapo					e Mueller/STI			8/27/98	Est. 4 Feet
Bo	ring De	pth	Bo	ring	Diam	eter	Surface El		Drill Metho		Northing
	28.0 Fe			_	nches		453.7 F	eet	Geoprot		2886.789
We	II Depth	t	We	ll Dia	amete	er	TOC Elev.		Sample Me		Easting
	na			na			na		4-ft Mac	ro-Core	3064.602
										х. Э. Э.	
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desci	ription		Well Completion	Comments
				°			SOIL/SAND/SI	T materials	similar to		
	na		ฑร	ាលកិត្តសំណើង នៃ និងសំណើងកំពុងតែអនាមនាំស្ថាស្ថា សំពីសំណាមនាំ សំពេងទី សំពីសំណើង សំពេងកំពង់ និងសំណើង នៅ សំពីសំពីស សំពីសំពីសំពីសំពីសំពីសំពីសំពីសំពីសំពីសំពី	ML/ SM						Geoprobe boring, n well installed. Groundwater samp collected from 8-12 bgs.
					ML/ CL	base pene	VSILT materia d on increased tration.	I resistance to		· · ·	• •

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Project N Amere	lame/No enCIPS -	Huts	onvill	e Plar	nt 249	9.03	Boring N GP-17	0.	Start Date 8/27/98	Page 1
Driller					Logged	by:			End Date	Depth to Water
AEC,	Indianap	olis, l	N		Steve	e Mueller/ST	ГМІ		8/27/98	Est. 4 Feet
Boring D				Diame	eter	Surface E	levation	Drill Metho	d	Northing
12.0 F	eet		2.2 lr	nches		445.6	Feet	Geoprot	be	2582.997
Well Dep	th	We	II Dia	mete	r	TOC Elev		Sample Me	thod	Easting
na .			na			na		4-ft Mac	ro-Core	3541.335
Sample Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification			cription		Well Completion	Comments
		ns		ML/ SM	GP-1	3. //SILT mater d on increase tration.	Tals similar to ed resistance f - 12.0 feet (B	GP-13; lo		Geoprobe boring, ne well installed. Groundwater sampl collected from 4-8 ft bgs.

Project M Amere	lame/No enCIPS -	Huts	onvil	le Pla	nt 249.	03	Boring N GP-18	<b>lo.</b> 3	Start Date 8/27/98	Page 1
Driller		alia I		_	Logged b	y: Mueller/STN	A1		End Date 8/27/98	Depth to Water Est. 4 Feet
	ndianap	_				Surface El		Drill Metho	1	
Boring D 23.75			ring 2.2 li		1	446.0 Fe		Geoprot	be	Northing 2488.262
Well Dep	th	We	ll Dia	amete	er	TOC Elev.		Sample Me		Easting
na			na	T	l	na		4-ft Mac	ro-Core	3677.480
Sample Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Descr	iption		Well Completion	Comments
			е. 		TOPSO	DIL/SAND/SI	T materials	similar to		
na		ns		ML/ SM CL	based penetra	SILT material on increased ation.	resistance	10		Geoprobe boring, n well installed. Groundwater sampl collected from 8-12 bgs.

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Pro	oject Na Ameren	me/No CIPS -	Huts	onvill	e Pla	nt 249	9.03	Boring N GP-19	0.	Start Date 8/27/98	Page 1
Dri	ller					Logged	by:	-		End Date	Depth to Water
	AEC, Inc	dianap	olis, l	N		Stev	e Mueller/ST	MI		8/27/98	Est. 10 Feet
Во	ring Dep	oth	Bo	ring	Diam	eter	Surface E	levation	Drill Metho	d	Northing
	40.0 Fee	et		2.2 la	nches	6	Feet		Geoprol	be	
We	II Depth		We	ll Dia	amete	ər	TOC Elev.	,	Sample Me	thod	Easting
	na			na			na		not sam	pled	
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification			ription	20-14	Well Completion	Comments
	na		ns		ML/ CL	Incre ~18 f collec yield.	t. Attempted tion at 20-24	ce to penetral groundwater ft and 28-32	tion at sample ft., but no		Geoprobe boring, no well installed. No groundwater samples insuffient yield.
						END	OFBORING	- 32.0 feet		-	

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Pro	oject Na Amerer	me/No CIPS -	Huts	onvil	le Pla	nt 249	9.03	Boring N GP-20	0.	Start Date 8/28/98	
Dri	ller					Logged	by:	· · · · · ·		End Date	Depth to Wate
	AEC, Ir	ndianap	olis, I	N		Stev	e Mueller/STI	MI		8/28/98	3 Feet
	ring De 21.0 Fe	•		-	Diam nches		Surface El 450.7 F		Drill Metho Geoprol		Northing 3805.064
	ll Depti				amete		TOC Elev.		Sample Me	thod	Easting
	na			na			na		4-ft Mac	ro-Core	5099.419
sampie	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desc	ription		Well Completion	Comments
$\propto$	<u>-</u>					ASH,	silty texture, s	oft, dark gray	y, ~3/4-ft		
$\bigotimes$	na		100			layer belov	of cinder grav v 3 ft (Fill)	el at 9 ft, sati	urated .		Geoprobe boring, r well installed
X											ļ
×		- 5-	400								
X	na		100								
$\otimes$											
$\bigotimes$					Coal						
$\bigotimes$	na	10	100		Ash						
X											]
떴											
$\otimes$										-	
X	na		50								
8		-15-									]
X											Groundwater samp
X	na		100								collected from 17-21
X		L _		7777		SILT	Y CLAY, trace	coarse sand	trace		bgs.
X	na		100		CL	fine s	ubanular to su um plasticity, r	ibround grave	el. stiff.		
XX	114		100			🔨 🐁 🔪	nt gray, moist			•	
		<u> </u> –				END	OF BORING -	21.0 1001 (De			
- 1											}
		-23									
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		30									
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Pro	ject Na Ameren	me/No	Huts	onvil	le Pla	nt 249	0.03	Boring No GP-21	<b>).</b>	Start Date 8/28/98	Page 1
Dril	ler					Logged	by:			End Date	Depth to Water
	AEC, In	dianap	olis, l	N		Steve	e Mueller/ST	MI		8/28/98	3 Feet
	ring De		1	-	Diam		Surface E		Drill Metho		Northing
	36.5 Fe		_	_	nches		450.7 F		Geoprot		3593.599
	ii Depti	3			amete	er	TOC Elev.		Sample Me		Easting
	na	·		na	·		na		4-ft Mac	ro-Core	5239.017
sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification			ription		Weil Completion	Comments
$\boxtimes$						ASH,	silly lexture, saturated belo	soft, dark			
$\bowtie$	na		100			9.07,					Geoprobe boring, n
$\bowtie$		L -									well installed
X		L _		1. 1 1							•
$\otimes$		5		:							
$\bigotimes$	na		50								
$\bowtie$				113 112							
X				· .					1		
$\bigotimes$			0	· ·	•						
×	na		0	1. 	Coal						
X				•	Ash						
8				2							
$\otimes$	na		0								
X											
憥				•. •.							
83			0	÷							Groundwater samp collected from 18-22
$\otimes$	na	<u> </u>	U								bgs.
$\bigotimes$				1							
$\otimes$		L _		$\{ i_{i_1},$							
83	na		50								
$\otimes$				1///		SILT	CLAY, stift,	medium plast	icity,		
綴				V///		brown	n, moist				
$\otimes$		25		V//	CL						
$\bigotimes$	na		50								
$\otimes$				V///							
××				V///		- SILT	CLAY (estin ance to penel	nated based of tration)	n		
				V//		100101	2.100 to point				
						END	OF BORING	- 36.5 feet (Be	edrock)		
				V///	CL						
					1						
		1		x///	4						

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Рго	oject Na Ameren	me/No CIPS -	Huts	onvil	ie Pla	nt 249	9.03	Boring No GP-22	0.	Start Date 8/28/98	Page 1	
Dril						Logged		•		End Date	Depth to Wate	
	AEC, In						e Mueller/ST			8/28/98	>11.5 Feet	
	ring De 11.5 Fe			-	Diam nches		Surface E 458.7 F		Drill Metho Geoprol		Northing 4373.353	
	II Dept				amete		TOC Elev.		Sample Me		Easting	
	na		ſ	na			na		4-ft Mac		5285.420	
Sample	Blows/6 Inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification			ription		Well Completion	Comments	
$\otimes$			_		ML	Grass	DY SILT, fine , brown, mois	sand, vegetati t (Topsoil)	ed with			
$\otimes$	na		81.2			Ū			viure		Geoprobe boring, n well installed	
$\bigotimes$						ft, dai	fine cinder gr rk gray, moist	ne-grained te avel, coarsen with wet inter				
$\bigotimes$		5-			Coal Ash	(Fill)						
$\otimes$	na		100		7.911							
$\otimes$												
$\bigotimes$					Coal	ASH, some	coarse sand silt, several	to fine gravel 1/4-5/8" pyrite	size, pebbles		No groundwater sam	
$\bigotimes$	na	10	100		Ash					collected; no wa sampler.		
X						END	OF BORING	- 11.5 feel (Be	edrock)			
		20										
		25										
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		30										

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	ject Na Ameren			onvill	e Pla	nt 249	9.03	Boring N GP-23		Start Date 8/28/98	Page
Dri	ler					Logged	by:			End Date	Depth to Water
	ÀEC, In	dianap	olis, I	N		Steve	e Mueller/S'I	М		8/28/98	7 Feet
Boi	ring De	pth	Bo	ring l	Diam	eter	Surface E	levation	Drill Metho	d	Northing
	34.0 Fe			2.2 la	nches		460.7 1		Geoprot		4203.035
We	II Depth	ו	We	II Dia	mete	<b>r</b> · · ·	TOC Elev.	• . •	Sample Me		Easting
	na	T	ļ	na	······		na		4-ft Mac	ro-Core	5272.661
oainpie	Blows/6 Inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desc	cription		Well Completion	
3	ā	Sa	Re	G	ö		•			Ň	Comments
88				9	SM	SILT	SAND, fine	grained, quar	tz, trace		
	na		93.8			grass ASH, trace	, yellow oran silty to very f	and, vegetated ge, moist (Fill) ine-grained te l up to 1/2", cc gray, wet bel	exture,		Geoprobe boring, n well installed
	na		100		Coal Ash						
	na		100								
	na	  15	100	:	Coal	ASH, some		to fine gravel	size,		
	na		100		Ash						Groundwater sampl collected from 18-22 bgs.
XXXXXXX	па	20  	100			ASH	green, moist same as 13.	medium plast 5-19.8 ft). Inc tration at 31 ft	reased		
		25    30			Coat Ash						Jammed liner in Mac Core sampler; used 1 I.D. by 2-ft, piston-ti discrete sampler to collect soil sample ne bedrock surface.
XX	na		100		SP	fine-g browr olive bottor	rained, quart n, saturated. green, indica n.	softed/founde z, yellow oran Top 2-3" were ting proximity - 34.0 teet (Be	ge to light e light of ash		

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Pro	oject Na Ameren	me/No CIPS -	Huts	onvill	le Pla	nt 249	0.03	Boring N LP-1	<b>o.</b>	Start Date 8/28/98	Page 1
Dri	ller STMI					Logged Steve	by: e Mueller/ST	MI		End Date 8/28/98	Depth to Water 0.25 Feet
	ring De	oth	Во	ring	Diam		Surface E		Drill Metho		Northing
	7.3 Fee				Inche		465.9 F	eet	Hand-dr	iven	4405.098
<u> </u>	II Depth				amete		TOC Elev.		Sample Me	thod	Easting
	na ·			na			na		not sam		3961.179
sampie	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desc	ription		Weil Completion	Comments
			-	• •		ASH,	silty to very f	ne-grained te	exture, wet		· · · · · · · · · · · · · · · · · · ·
	na		na		Coal Ash		o.25 ft (Fiíi) of Boring	- 7.3 feet			Temporary well-poin with filter sock installe leachate sample collected from 3.3-7.3
		 	-								
		20-            									Removed well point 8/28/98

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Project Ame	Name/No renCIPS -	Huts	onvil	le Pla	int 249	9.03	Boring N LP-2	10.	Start Date 8/28/98	Page 1
Driller					Logged			· _	End Date	Depth to Water
STM						e Mueller/ST			8/28/98	0.25 Feet
Boring				Diam		Surface E		Drill Metho		Northing
8.0 F				Inche		466.24		Hand-d		4502.022
Well De	pth	We	ell Dia	amete	er	TOC Elev.		Sample Me		Easting
na			na			na		not sam	pled	3815.305
sample Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		·	ription		Well Completion	Comments
					ASH,	silty to very fi 0.25 ft (Fill)	ne-grained to	exture, wet		
na		na		Coal Ash		of Boring -				Temporary well-poin with filter sock installe leachate sample collected from 4.0-8.0 Removed well point 8/28/98.

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Pro	oject Na Ameren	me/No CIPS -	Huts	onvil	le	249	)-3	Boring No MW-30			rt Date 10/6/98	Page 1
Dri	ller	_				Logged	by:			En	d Date	Depth to Water
_	AEC, In		<u> </u>				e Mueller/STI				10/6/98	~6 Feet
	ring Dep			ring		eter	Surface El		Drill Met			Northing
	25.5 Fe			8* In II Dia			453.7 F	eet	Sample N	ir-rotar		3860.230 Easting
	25.1 Fe		1	2-in		er	455.28	Feet		olit-spo		3952.034
			1-	<u></u>			100.20		2 10. 0			
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desci	ription			Well Completion	Comments
$\boxtimes$	1, 2, 3,		75	hm		SAN	or SILT, little i	ine-grained g	ravel, ff_dark			5-ft by 4-in square sto stick-up casing to ~1
$\bigotimes$	6		13		ML	brown	, moist (topso	il)	n, dan	5 - 13 - 13 - 13 - 13 - 13 - 13 - 13 - 1	•	ft; concrete seal 0-3
$\bigotimes$	4, 4, 6. 4		88			SANE	, well sorted/r	ounded, fine-	grained, lium	-	-	
$\bigotimes$					SP	browr	, saturated be	elow 6 ft				•
$\otimes$	1, 2, 3, 5	5	75		SP							
X	2, 2, 2,											
$\otimes$	10		63	0.0°	sw-	SILTY	SAND & GR	AVEL, poorly	sorted, ed			
$\boxtimes$	2, 2, 3, 5		50		GW	medium-grained sand, fine-grained subangular to subround gravel, loose, light gray, saturated						Bentonite/cement gro 3-16 ft; 1/4-in benton
$\bigotimes$	5	10				ngrit g	idy, saluialeu					chips 16-17 ft.
ł				•••••		SANL	STONE, fine-	grained, quar	12			
		15								,		Sch. 40 PVC casing
					•					2042	0000	flush-threaded to 0.01 factory-slotted PVC
- 1					Ss							screen 20.1-25.1 ft; 1
Í												fine silica sand 17-18 #5 silica sand pack 1
		20										25.5 ft.
		 25										* 4-in diam. boreho
				·····		END	of Boring -	25.5 feet			<u> </u>	drilled 16-25.5 ft usin air-hammer.
												an-nannner.
		30								}		

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Pro	ject Na Ameren	me/No CIPS -	Huts	onvil	le <sup>:</sup>	249	<del>.</del>	Boring No MW-7			Date )/5/98	Page 1
Dri	ler					Logged	by:			End	Date	Depth to Water
	AEC, In	dianap	olis, I	N		Steve	e Mueller/STI	<u>vi</u>		1(	0/5/98	~10 Feet
	ing Dep		1	-	Diam	eter	Surface El 437.5 F		Drill Metho HSA	bc		Northing 3175.915
_	45.0 Fee			8 Inc	amete		TOC Elev.		Sample M	thad	_	Easting
	ll Depth 44.3 Fee			2-in		er	438.45	Foot	it-spoon		5676.110	
	+4.3 Fee			2-41			. 400.401		2-11. Spi			0070.110
Sample	Blows/6 inches	Sample Depth (ft)					Desci	ription		Well Completion		Comments
$\neg \uparrow$				hm		CLAY	EY SILT, med fibers, soft, m	ium plasticity	, trace		<b>.</b>	
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1, 1, 2, 3 1, 1, 1, 1, 2		75		ML	satura	ated below 10	fl.				5-ft by 4-in square st stick-up casing to ~1 ft; concrete seal 0-3
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1, 1, 2, 3		100					····· · · · · · ·				
$\overline{\mathbf{X}}$	0, 0, 1,											
~~~~	0, 0, 1, 2	20  	100		SP	fine-a	Y SAND, well s rained, quartz bove, loose, m ated	. arades from	1 clavev			Bentonito/comont or
X	3, 3, 4,		75	0-2-0-		- SILTY	SAND & GR	AVEL. well se	orted			Bentonite/cement gro 3-35 ft.
×	J					mediu coars subar	um-grained qu e sand, fine-g ngular gravel, i n, saturated	artz sand, tra rained angula	ace ar to			0.00 m
2	5, 8, 6,			0.0 9.9								
8	5,8,6, 8	30 	75					÷.,				•
				80 80 80	SP- GP							

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Pro	ject Na Ameren	me/No. CIPS -	Huts	onvill	е	249	9-3	Boring No MW-70	ь. Э	Start Date 10/5/98	Page 2
Dri	ller AEC, Ind	lianan	olis I	N		Logged Steve	by: e Mueller/STN	Al		End Date 10/5/98	Depth to Water ~10 Feet
Boi	ring Dep 45.0 Fee	oth	Во		Diam		Surface Ele 437.5 Fe	evation	Drill Metho HSA	d	Northing 3175.915
	I Depth				imete		TOC Elev.		Sample Me	thod	Easting
	44.3 Fee			2-in l		- ·	438.45	eet	2-ft. spli		5676.110
	14.0100										
Sample	Blows/6 Inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Descr	iption		Well Completion	Comments
	sand heave sand heave 16, 25, 7, 11	40	0		ML	CLAY	'EY SIL1, med	ium plasticity	/, trace		Sch. 40 PVC casing flush-threaded to 0.01 factory-slotted PVC screen 39.3-44.3 ft; f fine silica sand 35-38 #5 silica sand pack 3 45 ft.
XX						END	stiff, brown, n OF BORING -	45 feet			

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Pro	ject Na Ameren	me/No CIPS -	Huts	onvill	e	249	9-3	Boring N MW-10	o. )	Start Date 10/7/98	Page 1	
Dril	ler			_		Logged	by:			End Date	Depth to Water	
	AEC, In	dianap	olis. I	N			e Mueller/ST	MI		10/7/98	~2.5 Feet	
_	ing Dep				Diam	eter	Surface El	evation	Drill Metho	od	Northing	
	11 Feet			8 Inc			452.9 F	eet	HSA		4730:478	
	I Depth		·		mete	er	TOC Elev.		Sample Me	ethod	Easting	
	10.7 Fee			2-in 1			454.23			it-spoon	2559.807	
	S	(ft)					Desc	ription		lon		
aiduise	1.2.2. 50 ML				Classification					Well Completion	Comments	
4			· ·			CLAY	EY SILT, veg	etated with d	rass soft		5-ft by 4-in square ste	
$\bigotimes$	1, 2, 2, 2		50	ЩЦ		dark l	Frown to black	, moist (tops)	Dil)		stick-up casing to ~1	
X						fine-a	rained, quartz	. loose, vello	wish		ft.	
$\bigotimes$	1, 2, 2, 6		50		SP	orang	e with dark or ated below ~2	ange lamina .5 ft	(2-3 mm),			
$\bigotimes$	1, 2, 6,										Bentonite/cement gro	
$\mathbb{X}$	25	5	100			en 73	SAND well	sorted/munde			0-3 ft; 1/4-in bentoni chips 3-4 ft.	
X	5, 20,		~		SP	fine-a	rained, quartz	, laminated, o	lense,			
X	5, 20, 25, 50 63					light of the second s	gray to rust co gray below 7.5	ft, saturated	ninantiy		Sch. 40 PVC casing	
مم				\ (weat	hered bedroc	k)			flush-threaded to 0.0			
					Ss						factory-slotted PVC screen 5.7-10.7 ft; #	
											silica sand pack 4-11	
						END	of Boring -	rieet				
		15										
		20										
		25										
		30										

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Project Na Amerer			onvil	le .	249	9-3	Boring No MW-10		Start Dat 10/7/9	
Driller			_		Logged	by:			End Date	Depth to Water
AEC, In	dianap	olis, I	N		Steve	e Mueller/STN	<u> </u>		10/7/9	
Boring De	pth .	Во	ring	Diame	eter	Surface Ele	evation	Drill Metho	d .	Northing
21.5 Fe	et		8 Inc	hes		452.9 Fe	et	HSA		4729.427
Well Dept	ו	We	ll Dia	amete	r	TOC Elev.		Sample Me	ethod	Easting
21.3 Fe	et		2-in	I.D.		454.65 F	eet	see MW	/-10 log	2564.715
Sample Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Descr	iption		Well Completion	Comments
			ίπ	ML	CLAY	'EY SILT", veg	etated with c	irass.		5-ft by 4-in square ste
		see MW- 10		SP	soft, o SILT fine-g orang	dark brown to t Y SAND", well rained, quartz, je with dark or ated below ~2.	olack, moist ( sorted/round loose, yello ange lamina	topsoil) ed, wish		stick-up casing to -2 ft. Bentonite/cement gro 0-13 ft; 1/4-in benton
				SP	fine-g	rained, quartz, gray to rust col	laminated, o	dense,		chips 13-14 ft.
50 (1")		drill cuts		Ss	SANE SANE becor clasts (very	fraý below 7.5 hered bedrock DSTONE, fine- mes medium-g , increasingly difficult to aug	) grained, trace well cemente er) below 20	gravel d/hard		Sch. 40 PVC casing flush-threaded to 0.01 factory-slotted PVC screen 16.3-21.3 ft; # silica sand 14-15 ft; # silica sand pack 15-2 ft. * based on MW-10 boring log

Pro	ject Na Ameren	me/No CIPS -	Huts	onvill	e	249	)-3	Boring No MW-11	р. і	Start Date 10/6/98	Page 1
Dri	ller					Logged	by:			End Date	Depth to Water
	AEC, In	dianap	olis, l	N		Steve	e Mueller/STI	III III		10/7/98	~6 Feet
Bo	ring Dep	oth	Bo	ring	Diam	eter	Surface El	evation	Drill Metho	d	Northing
	15.0 Fee	et		8 Inc	hes		443.8 F	eet	HSA		3371.329
We	II Depth		We	II Dia	mete	er	TOC Elev.		Sample Me	ethod	Easting
	14.5 Fee	et		2-in l	.D.		445.45	Feet	2-ft. spli	t-spoon	4451.486
Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification			ription		Well Completion	Comments
$\bigotimes$	1, 2, 3,		63		ML	SANI trace	DY SILT, little coal fragment	fine-grained g s, medium st	iff.	••	5-tt by 4-in square ste stick-up casing to ~2
$\bigotimes$	4					medi	coal fragment um brown, mo 7 SAND, medi	ist (topsoil)	arainod		ft.
$\otimes$	1, 2, 6,		63		SM		z, loose, light	brown, moist	-grameu,		
X	8			0. 	SW- GW	SILT	SAND & GR e, light brown,	AVEL, poorly saturated	sorted,	8275 87 <b>8</b>	Bentonite/cement gro
$\otimes$	3, 5, 25, 50	5	75	•0. ••0							0-3 ft; 1/4-in bentoni
$\propto$	50			20. 20		SAN	DSTONE				chips 3-4 ft.
	I										Sch. 40 PVC casing flush-threaded to 0.01
		10			Ss						factory-slotted PVC
											screen 4.5-14.5 ft; # silica sand pack 4-15
	1										
								WE 6 3 7 7			
						END	of Boring -	15 1661			
		20									
		25									

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Pro	ject Nar Ameren(	ne/No. CIPS -	Huts	onvill	e	249	-3	Boring No MW-12		Start Date 10/8/98	Page 1
Dril	ler					Logged				End Date	Depth to Water
_	AEC, Inc						Mueller/STI			10/8/98	~12 Feet
	ing Dep 17 Feet	oth	[	ring 8 Inc	Diam hes	eter	Surface El 455.5 F		Drill Metho HSA		Northing 4053.583
Wel	I Depth		∙We	II Dia	amete	er	TOC Elev.		Sample M		Easting
-1	16.9 Fee	et		2-in	.D.		456.74	Feet	2-ft. spl	it-spoon	4637.976
Sallipie	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification		Desc	ription		Well Completion	Comments
X	1, 1, 1,		63	ŢΠĮ	ML	SAN	Y SILT, little ( (topsoil)	clay, soft, dar	k brown,		5-ft by 4-in square ste stick-up casing to ~1.
$\bigotimes$	1				Coal Ash	ASH,	silty texture, s	soft, olive gray	y, moist		ft.
	2, 3, 10, 8		100		GM	SILTY	SAND & GR	AVEL, poorly	sorted,		
×	1, 1, 2,				Givi	medii SANI	m dense, ligh	t brown, mois	st (fill) -grained,		
	3 - 5 - 63 quartz, ic					quart	, loose, light	brown, moist			
X	2, 2, 4, 75 SP										-
×		3 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8					poorly sorte	d, fine- to			Bentonite/cement gro
$\bigotimes$	1, 2, 3, 2		50			coars quart	e-grained, sub trace fine or	pangular to su ravel, loose, li	abround, ight		0-3.5 ft; 1/4-in benton chips 3.5-5 ft.
X	1, 1, 1,	10	75			brown	, saturated be	elow ~12 ft			
X	2		10		sw						
$\bigotimes$	1, 2, 2,		75								Sch. 40 PVC casing flush-threaded to 0.01
×	2, 3, 3,		100								factory-slotted PVC screen 6.9-16.9 fl; #
$\bigotimes$	4	15	100								fine silica sand 5-6 ft;
$\bigotimes$	10, 10, 35, 50		50	ш	ML	SILT,	stiff, light brow	wn, moist	rock		silica sand pack 6-17
×	33, 30					ENU		TT IEEL (DEDI			
		20									
	F										
	ŀ										
	ŀ										
	F	25									
	-										
	ŀ	_30_									
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	oject Na Amerer			sonvil	le	249	9-3	Boring N MW-1		Start Da 10/6/		1
	iller	·				Logged	+	· <u> </u>		End Dat		
	AEC, Ir		_	_			e Mueller/STM	ЛI		10/6/	98 ~7 F	eet
	ring De 16.5 Fe	-	Во	oring 8 Inc	Diam :hes	eter	Surface Ele 456.4 Fe		Drill Metho HSA	ođ	Northing 3961.75	9
We	ll Depti	h	We	ell Dia	amet	ег	TOC Elev.		Sample M	ethod	Easting	
	16.0 Fe	et		2-in	I.D.		458.03 F	eet	2-ft. spl	lit-spoon	4241.20	<b>0</b> :
sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification	•	Descr	iption		Well Completion		
$\overline{\nabla}$				8::12:1	-		SAND, with g		dark	 	Comments	
$\otimes$	1, 2, 3, 5		25		ѕм	browr	a, moist (topsoi	il)	Udik		5-tt by 4-in sq stick-up casir ft; concrete	uare sol ng to ~2
$\propto$	5	<u>⊢</u> –		° .		SAN	, well sorted/	rounded fine	- 10	- C - C	ft; concrete	
						mediu satura	im-grained, qu ated below ~9 (	artz, light bro ft.	own,			
		- 5-				• base	ed on drill cutti	ngs and geol	ogic log			
1					SP	tor ge	oprobe GP-4				Bentonite/cen 3-6.3 ft; 1/4-in	nent gro
					56					1113 11	3-0.3 ft, 1/4-in chips 6.3	
					[							
							. •					
1		-10-			ľ							
$\mathbf{X}$	1, 2, 2,		50		sw-	CLAY	EY SAND & G	RAVEL, poo	rly and			
$\bigotimes$	2				GW	fine-a	rained subang	ular gravel, k	oose,		Sch. 40 PVC	
		[]				light b	rown, saturate	a			flush-threaded	
		_15_		***		SAND	STONE	<del>.</del>			screen 9-14 f	t; #7 fin
			ļ		Ss						silica sand 7	
						TEND (	of Boring -	16.5 fēet 👕		<u> </u>	ft.	
										ł		
		20	1		- 1							
				[	1							
					ļ							
										ļ		
		25									Unslott casing/sedim	
					1					}	14-16	
			,									
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		- 7									]	

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**Appendix A-6** 

NRT 2001 Boring Logs

Natural Resource Technology, Inc. Standard Soil Boring Log

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#### SOIL BORING LOG INFORMATION

Form - General Use Rev. 8-2000

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	l Ener	gy Ger	eraling	) - Hutsonville Powei			License				·		NH-11			•		
oring i oart L andy i	ongye		irm nam	e and name of crew	chief)		Date D: 10/03/0		Started		Date I 10/03,	Dr <b>illing</b> /01	Compi	eted	Dr. HS	<b>liing</b> Me 5A	ethod	
ecility		lo.	Unic	we Well No.	Common Well Nam	me.	Final S Feet I		Water L	evel <sub>.</sub>		ce Elev 20 Fea		÷		xehole 25 inch		ler
oring	Locall	on	<b>-</b>	3217.083	Feet N		Lat			•••	Local	Grid Li			appl	icable)		
late f				4654.729	Feet E		Long	•		•							] <i>E</i> ]#	
ounty rawlo					•				Civil To Hutson		Hy/ or	Vijlage	:	-				
Sam	ske				• •						- ·		S	oil Pro	per	lies		
	Length Att & Recovered (In)	Blow Counts	Depth in Feet	And G	lock Description cologic Origin For ich Major Unit			uscs	Graphic Log .	Well	-Ulagram P10/F10	Compressive	Moisture	Content Llquid	Llmit	Plasticity Index	P 200	ROD/
w-11R 0-2	18	23 <sup>°</sup> 46	-2	O'-5' EILL gray y sand with clay, dr grades to sand w		, coarse	2 .	FILL			i							
W-11R 5-4.5	18	34 <sub>.</sub> 66	4							50163	<b>6</b>							
11R 7	·20	34 45	6	5'-8' <u>SAND</u> , oran	ge, poorly graded,	coarse		SP		ALANA ALANA	10000000							
w-11R 5-9.5	14	23	8		<u>GRAVEL</u> , brown, po tine gravel/coarse			SP	0.0 0.0									
IW-11R 10-12	18	22	Ē	10"-11"6" <u>SAND</u> , p Coarse	oorly graded, mediu	um to ·	•	SP										
		23			th GRAVEL, brown, , tine gravel/coarse				0.0	がたまた水								
MW-11R 2.5-14.1		33			• • •			SP						· .				
4W-11R 15-17	3	50/3	[16 	EOB 🖗 16'Auger	Refusal	<del>.</del>				<u>· 197</u>	<u>9999</u>							
			18		•									·				
						•												
			E 22		•													
		ertify t	hat the	e information on this	form is true and	correc			l of my	kno	wiedge.						- <u>-</u>	
ำล	ture	Î		hallen_			Firi	<sup>m</sup> N	latural	Reso	urce Te	chnok	ogy, Ir	KC.				
			/															

· Natural Resource Technology, Inc.

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Standard Soil Boring Log

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### SOIL BORING LOG INFORMATION

Form - General Use Rev. 8-2000

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AMER	EN En		eneral	ing - Hutsonville Powe			Licens	se/Per	nit/Honit	orin	g Numbe	și.	Borin NN−1	-	iber	r	•	Page	<b>-</b>
Boart	) Drille Longy Radk	rear	Firm n	ame and name of crew	r chief)		Date 10/03		Started		Date D 10/03/		Compi	eted		rwing I 'SA	lethod		
Facilit	y Well	No.	U	nique Well No.	Common Well Na	ane	Final Feet	Static MSL	Water Le	vel	Surtac 440.9.					orehol .25 inc		eter	•
	Loca	tion		2811.508	Feet N		Lat				Local								<b>-</b>
State	Plane			5325.781	Feet E		Long					•		1			Πε		
Count	y				······································	T			Chill Tau	- 10				; 			<b>N</b>		
Srawf	-		•			1		·	Civil Tow Hutsonvi	lle	aty/ of	vnage		•				-	
Sar	ple				· ·	4		Ţ			Ţ	1	S		ner	tion			_
r De	Att. 6 red (in)	Counts	In Feet		lock Description eologic Origin For							ssive b		T					
Number and Type	Length Att. Recovered	Blox C	Depth in	Ea	ch Major Unit		•	uscs	Graphic Log	Vell Diaccam	PID/FID	Compressive Strength	Moisture	Liquid	Imit	Plasticity Index	P 200	R0D/	Comment
			E	0°-7°6" <u>SILT</u> brow	in (10YR 4/3), mois	st,	_		11				1	+-	_				_
			E-2																
W-14		23	Ē				-						·					[	
5-4.5	18	23	Ė₄					ML				·							
			È.									.							
W-14 5-7	18	11 22	6							and the second									i
W-14 5-0.5	18.	12 12	8	7'6''-12'6'' <u>SILT wi</u> low plasticity, mois	th SAND, brown (10	0YR 4/:	3),			and the second	2								
W-14		11	E 10	yellowish brown () to medium	0YR 5/4), increase	e plastic	city .	ML		a marine and the									
0-12	24	-11			•					and the second			1.						
W-14 5-14.5	18	11		12'6"-18'6" LEAN ( 10-15% grey/orang	LAY, brown (7.5Y) je mottling, medium	R 4/2), plasici	 tv			يغرب بمخند									
			- 14 -				-,					1				.			
W-14 5-17	22	11 <sup>°</sup> 11	- 18					.a		V Xian								.	
			- 18																
W-14 5-19.5	18 .	11	Ē	18'6"-28' SAND M	th SILT, wet, non-	plastic	• •		¥///									}	
	· ·		- 20																
w-14 )-22	18	11 11						SM											
N-14	: 20	22	22 	23'6"-24" <u>SAND</u> s	eam, medium									·					
5-24 bere	<b>,</b> , , , , , , , , , , , , , , , , , ,	₹3, tify th	 	information an Ahlar				SP		0.5									
ignat	ure		ar the	information on this f	OT IN IS LINE BUG C	orrect	to the Firm												_
-		blur		Xa Mar	_		]	Nat	ural Reso	ourc	e Techr	nology	, Inc.						

	ple									Soil	Proper	ties		
Num,, and Type	Length Att. & Recovered (in)	Blow Counts	Oepth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	uscs	Graphic Log	welt Diagram	P10/F10	Compressive Strength	Moisture Content	Liquid Limit	Plas ticity Index	P 200	ROD/
MW-14	_ <u>20</u>	12	26	24'~26' SAND with SILT, as above	SM									
25-27	9	23	Ē	26'-39' <u>SAND with GRAVEL</u> , coarse sand, platy fine gravel, poorly graded		0.0								
MW-14 7.5-29	5 18	23 34	- 28	gravel becomes rounded	SP	0 0 0 0 0	<u>arteratoratara</u> 11111111111111111111111111111111111							
NW-14 30-32	20	33 45	- 32	4" L <u>EAN CLAY with Gravel</u> seam, gray (5Y 5/1), rounded, tine, 2~7% shell tragments		0 0 0								
MW-14 2.5-34	5 <sup>.</sup> 18	33 55	- 34		SP	0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.								
			- 36			0.0. 0.0. 0.0.								Advan
			- <b>3</b> 8		SP	0.0 0.0 0								Hydroj discre water sample
)		•	- 40 	EOB @ 39"										Oriller: note: sand a
1			42	•										grave! above
			44											
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Natural Resource Technology, Inc. Standard Soil Boring Log

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### SOIL BORING LOG INFORMATION

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Form - General Use Rev. 8-2000

Facility AMERE	/Proje N Ener	ct Nam gy Gen	e eraling	) – Hutsonville Power	r Plant		License	e/Pern	hit/Monif	lorin;	g Numb	, , ,	B( T	oring i W	lunde	r 		
9oarl I	Drilled Longye Radke		 W nam	e and name of crew	chie1)		Date D 10/02/		Started	•	Date 10/02		) Co	mplet		irliing H ISA	lethod	
	y Well N	0.	Unic	ue Well No.	Common Well N	BRC	Final S Feet		Water L	evel		ice Eli 814 Fe				Boreholi B.25 inc		ter
Boring State	Locati Plane	on		3717.203 5605.471	•	Lat				Loca	i Grid	- 1	<b>N</b> ·	(If ap	plicable	Θε		
County					Feet E	<u> </u>			Civil To	wn/C	liv/.o	r Villa		<u> </u>			<u> </u>	
Crawlo									Hutson									
Sam			-											Soil	Prope	rties	r	
Number and Type	Length Att S Recovered (In)	Blow Counts	Depth in Feet	· And Ge	tock Description eologic Origin Fa Ich Major Unit			nscs	Graphic Log	¥eli 0	Ulagram P10/F10	Compressive	Strength	Moisture Content	Liauld Limit	Plasticity Index	P 200	ROD/
			-2	0'-5'8" <u>SILT with</u> 2/2), grades from throughout			IIOYR .						-					
TW 2.5-4.5	20	2 2 3 3	4		• •			ML										
тн 5-7	18	21 24	-6	5'8''-23' <u>LEAN CL</u> plasticity, noist	AY, brown (10YR	4/3), m	edium											
TW 7.5-9.5	16	11 12	8	weak red (2.5Y 5	i/3), trace orange	e motlän	9											
TW. 10-12	20	11 11	- 10			•												
T W 2.5-14.	18	- 11	- 12 	trace horizontal	Iraciure, wet						-							
		·		5-10% line sand				CL										
TW 15-17	18	11						ļ.										
T W 7.5-19	20	1/24		very dark gray white shell tragm	(2.5¥ 3/1), trace ( pents	wood a	ndi -											
TW 20-22	24	1/24	20								يدي. بريد							
TH 2:5-24		1/24		23'-25'6" SAND	, very dark gray				5P	2		1		·				
1 her Signa		rtity t	at the	information on this	form is true an	d corre	ct to th	m										
Signi	51018	lle	1 -	Shy lather				" N	latural l	leso	urce T	echno	logy	, Inc.				

San	nple														Soi	Prope	rties		
Num and Tỹpe	Length Att. 6 Recovered (in)	Blow Counts	Depth in Feet		And	il/Rock Des Geologic ( Each Majoi	Drigin Fo	, ·		NSCS	Graphic Log	<u>Well</u> Diagram	P10/F10	Compressive Strength	Moisture Content	Llquid Limit	Plasticity Index	P 200	ROD/
	10	1/24	<b>-</b>	m	edium, loose, 1	ret				SP					·				
TW	18	2 2 2 2	E 26	2 ۲	5'6"-26' <u>LEAN</u>	CLAY, as a	bove		<u></u>		ŻŻŻ								
25-27		~ ~ ~		2	6'-27'.6" <u>SANC</u> oarse sand, 11	with GRAVI	EL poorly	graded.		SP	0.0. 0.0.								
TW 7.5-29.	5 20	35 910	28	2	7'8"-31' <u>SAND</u> raded, medium ilth depth	, gray/blaci	and whi			° SP		į							
TW 30-32	20	46 99	- 32	3	1'-32'6" <u>SAND</u> oorly graded,	and GRAVE		e sand,		SP	0.0 0 0 0								
TW	. 12	. 11		3	2'6"-39'6" <u>54</u>	ND, gray, p			um ·		0.0								
2.5-34	5 " 	11	- 34		o coarse, 5-1	ox graver			-			18							
TW 35-37	24	2 2 3 4	- - 36	•						SP		NUMPER OF STREET	2003						
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7.5-39	5	6 10													.				
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Appendix A-7

NRT 2004 Boring Logs

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n R ility/P	T	Name			<u>-</u>				<u>-</u> ji	.icense/P	ermit/N	Aonitor	ing Ni	ımber	B	oring l		ber			
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and Typ	Lengin Att. & Recovered (in)	Blow C	Depth From Surface (feet)				Eac	h Major	Unit			Hand Pen (tsf)	Field Moisture Condition	usc	Graphic Log	PID/FID (ppm)	Well Diagram			ommenis/ Lab Tesi	
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Signa	inure-	, 2	2	·,	,			Richard	Firm ]	Vatural 3713 W.	Resou	псе Т	echn	ology	, Inc.		<b>~</b> ^			Tel: (262) Fax: (262)	1523.

	R T	Tec	bnol	logy			÷				Page	1	of S
Facility	Project	Nam	e		License/Permit/	Monitor	ing Nu	mber	В	oring	Numbe	r	
Δme	ren H	utsor	ville ]	Power Station Drilling		•							V-115d
Boring	Drilled	By: 1	Name of	f crew chief (first, last) and Firm	Date Drilling St	arred	•	Date	Drillin	ig Con	pleted		Drilling Method
Stev			•			/2004	•	1.	·	5/1/20	)04	•	hsa, core
Boa	rt Lon		r	Well ID No. Common Well Name	Final Static Water		. S	urface E				Bo	prehale Diameter
Unique	weii 140	•		- TW-115d	Feet M	MSL			8.4 F				8.3 inches
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San	nple		.	Soil/Rock Description		G	2	Pop		Ê	E		
	ઝ દિ	slni	ect)	And Geologic Origin F		Hand Pen (tsf)	Distu	S Symbol	Graphic Log	P1D/F1D (ppm)	Diagram		
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Number and Typ	Length Att. & Recovered (in)	Blow	Depth From Surface (fect)			Hai	Field Moisture Condition	US	le O	Q.	Well	Ι.	Comments/ Lab Test
11	24	a		0'-3.5' SANDY CLAY, very dark	erevish	· · · · · · · · · · · · · · · · · · ·			]]]]]				
ss	12		Ľ	brown (10 YR 3/2), very fine sand	i, moist								
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3	24		ŀ	3.5'-6' CLAYEY SAND mottled tan, very fine sand, moist	gicy-biown to	'					And		
3 SS	24		Ls		•		· ·	SC	V//	3	1		
	N								$\langle \rangle \rangle$		19492		
4	24		} ·	6'-22' FAT CLAY, brown (10 YR	(4/3), soft,						1. The second		
4 SS	.24	·		plastic, moist						<b>a</b> .			
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Ч · 1 t hereby certify that the information on this form is true and correct to the best of my knowledge. Firm Natural Resource Technology, Inc. on 23713 W. Paul Road, Unit D. Pewaukee, WI 53072 Tel: (262) 523-9000 Signature Fax: (262) 523-9001

Paula Richardson Template: NRT BORING LOG - Project: 1375 LOGS.GPJ

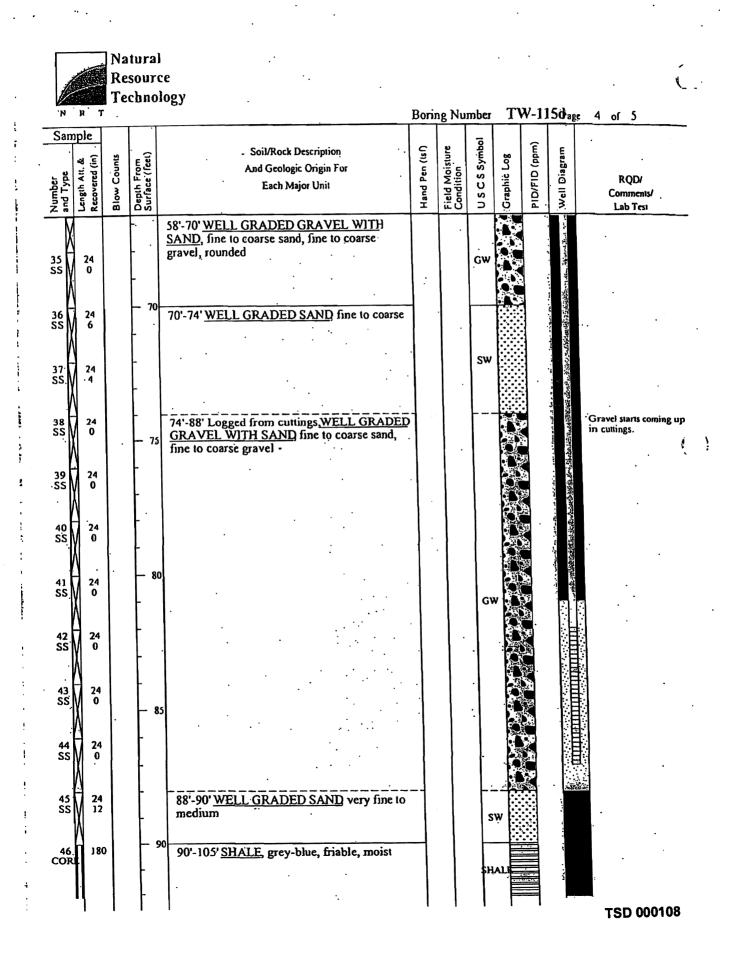
SOIL BORING LOG

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'N	й Т ————		r1	·	Bori	ing Nu	imber		<b>₩-1</b>	150 age	: 2 of	; 	
Number and Type	·Length Att. & 전 Recovered (in)	Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Møjor Unit	Hand Pen (tsf)	Field Moisture Condition	U S C S Symbol	. Graphic Log	PID/FID (ppm)	Well Diagram	RQ Comm Lab	ents/	
9 SS 10 SS	24 24 24 24 24		-	6'-22' <u>FAT CLAY</u> , brown (10 YR 4/3), soft, plastic, moist at 16' color change to olive grey (5Y 5/2)			сн			and the second secon		- ·	
11 SS	24 24	- 	  - 20  -	at 19.8' 2" sand seam, very fine sand 20'-22' trace very fine sand						an a			
12 SS 13. SS	24 24 24 24 0		- 2:	22'-22.9' <u>SANDY CLAY</u> 22.9'-32' <u>POORLY GRADED GRAVEL WIT</u> <u>SAND</u> , olive grey (SY 5/2), rounded, very fin to fine sand	ਸ •		a	0000		and the second secon	•		
]4 SS	24 8						G				•		
15 SS	· 24 7 . 24		- 3							and the substance of an	•		
16 SS	A		F						C V	ALL CONTRACT	·· -		
17 SS	· 24 5			32'-33' <u>WELL GRADED SAND</u> fine to coar trace rounded gravel 33'-36' WELL GRADED SAND WITH	se,		. s	W	1	and the second second			
18 SS	· 24		- - -	<u>GRAVEL</u> , very fine to coarse sand, fine to medium gravel, rounded			s	¥		and the second of the second o	¢.	•	-
19 55	24			36'-39' <u>POORLY GRADED SAND</u> very fin to medium, trace gravel, rounded	₹.			SP		And States a			
20 SS	24 14	-	ŀ	39'-40' WELL GRADED SAND WITH				sw .	U N	1	-		-
21 SS	24 11			10 GRAVEL, fine to coarse gravel and sand	-1			sw 🐑		1			



N	RT			Jog J	Bori	ng Nu	mber <b>T</b>	W-1	15drage	3 of 5
Number and Type	Length Att. & dd Recovered (in)	Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (Isf)	Field Moisture Condition	U S C S Symbol Graphic Log	PID/FID (ppm)	well Diagram	RQD/ Comments/ Lab Test
22 SS	24 . 12		-	40-42' WELL GRADED GRAVEL WITH SAND, fine to coarse sand, fine to coarse gravel, rounded 42'-58' WELL GRADED SAND fine to coarse sand, trace gravel, rounded			GW		in a start for the start of the s	
23 SS	24 12		- 45	2" gravelly sand seam, fine to coarse gravel at 44'		. :			in	
24 SS	24 13		-						is there is a little of	
25 SS	24 ]4								and the second second	
	24 13		- 50		•		SW		and the fact with	• .
27 SS	24 16		-						and the second second	
28 SS	24 15		- 55	5					nime alerta he	
29 SS	24. 9		-						ander and an and a subserver and an and a subserver and a	
30 .SS	24		-	58'-70' <u>WELL GRADED GRAVEL WITH</u> <u>SAND</u> , fine to coarse sand, fine to coarse gravel, rounded					a la	
31 SS	24 7		6						and the state of the	
32 SS	24 24						GW 2		statu ziktokieli	
در 22	24 -12		- 0	is					A DEPARTMENT	
34 SS	Z 24		-							TSD 000107

TSD 000107



Sample     Soil/Rock Description     Graph       Image: Stample     Image: Stample     Soil/Rock Description     Graph       Image: Stample     Image: Stample     And Geologic Origin For     Soil/Perecent       Image: Stample     Image: Stample     Image: Stample     Image: Stample       Image: Stample     I	Field Moisture Condition	pol		5 of 5 RQD/ Comments/ Lab Test
addr free       strong of the second se				RQD/ Comments/
90'-105' <u>SHALE</u> , grey-blue, friable, moist		HALL		
- 10 END OF BORING AT 105' Well set at 87'				

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## SOIL BORING LOG

-	R T Project					License/Permit	Monito	ring Nu	mber	B	oring	Page Numbe	J	· ·	
A a -	on H	itson	ville 1	Power Station Dr	illing	Date Drilling S	aned.		Date	Drillin	12 Con	npleted	<u>. TW</u>	Drilling Met	hod
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Sam	ple	•				•		U	poq		Ê	L L			
	a (j	lts	<u>و</u> او		Soil/Rock Description		Hand Pen (Isf)	Field Moisture Condition	S Symbo	Graphic Log	PID/FID (ppm)	Diagram			
- 8	Att.		E (le		And Geologic Origin	rof	Per	Mo	S	hic	<u><u> </u></u>	Ö	·	RQD/	
and Typ	Length Alt. & Recovered (in)	Blow Counts	Depth From Surface (feet)		Each Major Unit	•	Hand	Cond	U S C	da D	P10/	Well		Commenis/ Lab Tesi	
_	ב ב 24	₫.	δΩ	0' 3 5' SII T V	ery dark greyish br	rown (10 YR	$\frac{1}{1}$	1		hΠ	1				
is∥	24	•		3/2, rootlets to	o 6", firm, slightly	moist			· · ·						
· W			Γ						ML			100			
, H	24		<b>-</b> .											•	;
2 55.	32		L .									22.5	·		•
M				2 5' A 8'SU T	Y CLAY, very dar	k grevish	-	1.							
3 t	24		ŀ	brown, firm, 9	lightly moist	6.9.5			CLW			100	ŀ	•	
3 SS	24		L 5		CLAY, dark yellow	vish brown	1				Í,				
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8 SS	24			at 14' very n	noist					Ø		ų,	1		
	IX -		F	15						V			Abire.		
	Ц.		┝			•								-	
] he	reby co	rtify 1	hai the	information on this	form is true and correc	t to the best of m	knowl	edge.				·			
					Firm	Natural Res	ource	Techn	ology	, Inc.	V1 670	172		Tel: (262 Fax: (262	2) 523-9 2) 523-9
	Yan	n 1/1	han	in the second	Paula Richardson	23713 W. Paul	Koad, I		TCWA	ACC, V	Temp	anc: NRT	BORING	LOG · Project: 1	3751.00



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א	¥ 7	•			Bon	ng Nu	mber T	<b>W-1</b>	16 Page	2 of 4
	Length Att. & d Recovered (in)	Blaw Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (tsj)	Field Moisture Condition	U S C S Symbol Graphic Log	PID/FID (ppm)	.weil Diagram	RQD/ Commenis/ Lab Tesi
9 SS	24 24		-	16'-20.5' <u>SANDY LEAN CLAY</u> , olive brown (2.5 Y 4/3), very fine sand, soft, wet		·	CL.		a served a server and a server	
10 SS	24 24		- 20 - -	color change to dark grey (2.5 Y 4/1) 20.5'-26.5' <u>CLAYEY SAND</u> dark grey, very fine sand, wet					a and a same	· · ·
ss	24 24 <sup>.</sup>		- 25	26.5'-30' <u>CLAYEY GRAVEL</u> , fine gravel, few shell fragments, wet			SC			· ·
12 SS	24 18		- 30 -				GC			
13 SS	24 12		- 35		•		SW			
14 SS	24 0		- - 41 -	D						

TSD 000111



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N	ד א	ſ			Bori	ng Nu	mber	T	<b>N-1</b>	16 Page	3 of 4
Number and Type	Length An. & d	Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (tsf)	Field Moisture Condition	U S C S Symbol	Graphic Log	PID/FID (ppm)	Well Diagram	RQD/ Comments/ Lab Test
J5 SS			- - - - - - - - - - - 50	30'-60' <u>WELL GRADED SAND</u> olive brown (2.5 Y 4/4), fine to coarse, subangular to rounded, wet							
16 SS J7 SS	12 24 6		- 55				SW				· · · · · · · · · · · · · · · · · · ·
18 SS	24 2			60'-79' <u>SHALE</u> , grey-blue, slightly moist, friable						المعالمة ومعالم ومسار المرامعات المالية والمعاد المراجعة	***
19 COR	380		- 6:				SHA			- - - - - - - - - - - - - - - - - - -	TSD 000112



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N R T			Bori	ng Nu	mber	ָ T\	<b>W-1</b> ]	l 6 Pag	e 4 of 4
Number and Type Length Alt. & Recovered (in) Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (tsf)	Field Moisture Condition	U S C S Symbol	Graphic Log	PID/FID (ppm)	well Diagram	RQD/ Comments/ Lab Test
	- 70	60'-79' <u>SHALE</u> , grey-blue, slightly moist, friable coal seam at 79', bit plugged-no water <u>circulation for coring</u> <u>END OF BORING AT 79.2</u> ; Well set at 30' -			SHAL				TSD 000113

Natural Resource Technology

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### SOIL BORING LOG

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Facility	Project	Nam	e					License/J	Permit/J	Aoni10	ring Nu	mber	B	oring	Number	 	117	
A -mer	en Hi	11500	ville	Power Stati	ion Dril	ling							D_11:-		pleted	1 W	-]]7 Drilling Metho	
Boring I	Drilled	By: 1	Name o	crew chief (	first, last)	and Firm		Date Dri	lling Sta	inted .	•	Dale	זוווחע	ig Con	ipicicu	•	1 -	
Sieve	:							\ ·	4000					/29/2	004		hollow ste	:m
Boar	Lon	gyear	r					Final Stat	4/28/			Inface l	Elevatio		004	Bor	auger chole Diameter	
Inique V	Vell No.			Well ID No.		Common We					ľ		35.0 F		121		8.3 inches	
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Facility	Ņ			Coun	• 1					Huts	onvill	e			·			
Sam	nle					•				·		10		~			•	•
<u> </u>						Soil/Rock I	Description	·		( s)	Field Moisture Condition	U S C S Symbol	60	hID/FID (ppm)	E			
	લ ઉ	unts	Egg			And Geologi				L) L	n oist	Sy	٤		Well Diagram			
r S	ered 1	õ	L U			Each Ma				β	Σÿ	ΰ	phic	/FH			RQD/ Comments/	
Numbe and Typ	Length Att. & Recovered (in)	Blow Counts	Depth From Surface (feet)							Hand Pen (Isf)	die i	n s	Graphic Log	. dia	N N		Lab Test	·
	3 æ 24	8	۵ů	OL CIEAD		AN CLA	V dark	nlive bro	חשר							•		
ss	12		· ·	$(2.5 \times 3)$	(3), ver	fine sand	d, slightl	y moist			1					••		
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			4		•				•									:
2 SS	24 24										·		<i>\///</i>					
33 1	27		$\mathbf{F}$									CL			100			
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3	24		F				•							8				
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Ā	24	1	ŀ	6785	ATCI	<u>AY</u> , dark	olive bro	wn. hig	h	1					12.1			
4 SS	24			toughne	ess and	plasticity,	moist	,6				CH						
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Ľ				20125	POOP	LY GRAI		ND darl		-					Store .			
5 SS	24 10			vellowi	<u>FOOR</u>	vn (10 YR	( 4/4), ve	ry fine,	wet	·					at at		•	
22			F													•		
	N															•	·	
6	24			0													•	
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7 SS	X 24											'				到		
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		rtify t	hai the	information	on this io	ann 15 true ai	Firm	Natural	Deer		Techn		· Inc				Tel: (262)	523-90
Sig	inature		2.	h. h.		Paula Rict		Natural 23713 W	r reso '. Paul I	usce load, l	Jnit D.	Pewai	ikee, W	/1 530	72		Fax: (262)	523-90
	in	h	ja.									•		Temp	ate: NRT I	BORINO	5 LOG - Project: 13	IS LOGS.



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N	р Т	110	chno	logy	Bori	ng Nu	mber	T١	v-1:	17 Page	2 of 4
Sam	ple						-				
	s (i	S	-3	Soil/Rock Description	Č <sup>s</sup>	Field Moisture Condition	U S C S Symbol	ы	PID/FID (ppm)	E	
	й. 1. 8	Blow Counts	Ę j	And Geologic Origin For	Hand Pen (tsf)	oist Di	s Sy	Graphic Log	6	Diagram	
	Length Att. Recovered (	U R	ace P	Each Major Unit	4 p	Σig	Ű	phic	μĘ/		RQD/ Comments/
Number and Type	Length Att. & Recovered (in)	Blo	Depilh From Surface (feel)		Har	U iii	n S	Gra	DIG	Well	Lab Tesi
M				7.8'-25' POORLY GRADED SAND dark						日	
W				yellowish brown (10 YR 4/4), very fine, wet							
٦				yellowish brown (10 YR 4/4), very fine, wet trace shell fragments at 16"		·					•
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			-	•			1			日日	
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8 SS	24 0					ŀ	SP				
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	24 8			25'-26' WELL GRADED SAND fine to		· .	sw			668	
		ł	┢	medium, coarsens downward 26'-35' <u>WELL GRADED GRAVEL</u> , trace sand	1			-		608	
ľ	V			and shell fragments, rounded	•						
	-		ſ								
			$\mathbf{F}$				·				
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			- 30	· · · ·	ŀ	.	·		4 I		
10 SS	24	J		•			GV				
	(		F .						4	666	ð.
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	1			grey clay in shoe of split spoon				8	<b>5</b> 75	50°	
			$\mathbf{F}$						N.		
	.]						1.				
			F	· · ·					2		
			- 3	5				-			
11 SS	24 6			35'-60' WELL GRADED SAND fine to coars	:						
	XI .		ŀ								
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			$\mathbf{F}$				s	w 🖾			ži
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12 [	1 30		- 4	o · · · · ·	·	·	1				
12 SS	24			· .							
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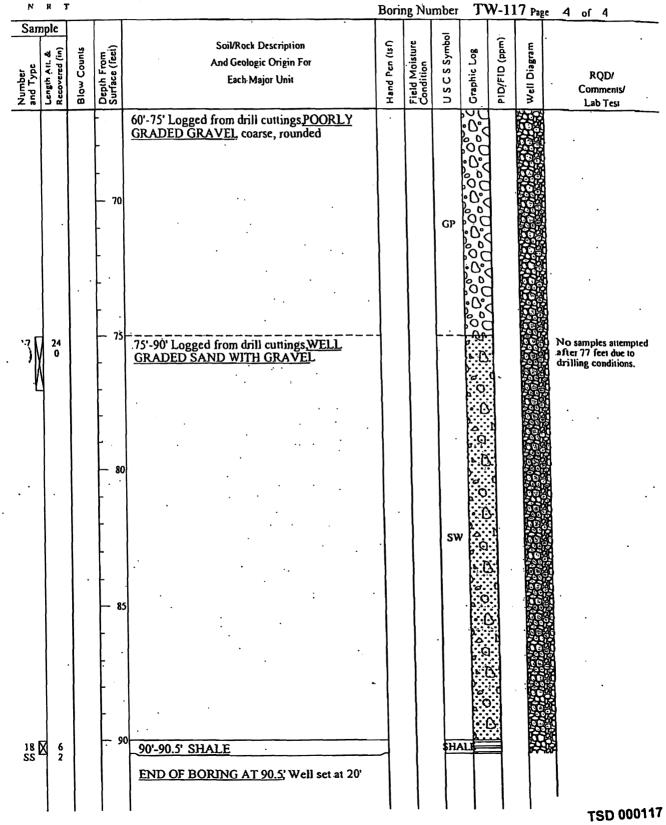
Natural Resource Technology

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N	R 1		cbb0		Bon	ng Nu	mber	T	<b>V-1</b>	17 Page	3 of 4
and Type	Length Alt. & Ö Recovered (in)	Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (Isf)	Field Moisture Condition	U S C S Symbol	Graphic Log	PID/FID (ppm)	Well Diagram	RQD/ Comments/ Lab Test
X			-	35'-60' WELL GRADED SAND fine to coarse							
			-								
s. S	24 ]4		- 45 -								
Ľ											
			-								
ŝ	24 17		- 50 -				. sw				·
L!			-  -  -								• •
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s s./	24 0		-								
· L			- F		ł						
4 ۲	24	.	- . : - 6					-21			Went to become as
6 S	Ō			60'-75' Logged from drill cuttings <u>POORLY</u> <u>GRADED GRAVEL</u> , coarse, rounded							Went to larger samp interval due to drillin conditions.
-							G	0.1	d d		
			- 6	5				PO	24		
			F	• •					Na		TSD 000



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# SOIL BORING LOG $\backslash$

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Facility					· · · · · · · · · · · · · · · · · · ·	License/PermiV	Monito	ring Nu	mber	I	Boring	Number		
Ame	ren H	utsoi	nville	Power Station Dril	ling	<u> </u>			1				<u>TW-118</u>	
Boring	Dnilled	By: 1	Name o	f crew chief (first, last)	and Firm	Date Drilling St	arted	·	Date	: Drih	ng Cor	npleted	Drilling Me	
Stev Boar	rt Lon	gyea	r	•			2004				5/4/2	004	hollow : auger	•
Unique	Well No	•		Well ID No.	Common Well Name	Final Static Water		Su		Elevatio		(C)	Borehole Diameter	
					TW-J18	Feet )	N2L			37.0 J			8.3 inche	S
Local		າຮານ	••	N,	ESICIN	Lai	• •	<u>.</u>	_"	••		N 🛛		Ε
<u></u>	]/4	of	1/	4 of Section , County	<u>TR</u>	Long	Civil T	own/Cit					177978.73 Feei	<u>w</u>
Facilit	U V			County		orbie		onville	-					
San	nple				·	•			ō		•	·		
	a ĉ	ls si	<u>و</u> ب	•	Soil/Rock Description		Hand Pen (tsf)	Field Moisture Condition	S Symbol	ы.	(mdd) (lphm)	Diagram		
r g	Att.	20L	Fror (fe	, , , , , , , , , , , , , , , , , , ,	and Geologic Origin F	01	Pen	Vois ion	SS	<u>ب</u> ا	ğ	Diag	RQD/	
Number and Type	Length Att. & Recovered (in)	Blow Counts	Deplh From Surface (feet)		Each Major Unit	·	and	ord	sc	Graphic Log	D/F	Well [	Comments/	
		18	õõ				I	ΞŬ	2		ā		Lab Test	
ss	24 24		· ·	0'-3' <u>SILT</u> , brow	n (7.5 YR 472)	. ·					.		:	
۱.			-				1							
	24		ŀ									anger a		
ss SS	24								ML			and the		
M.			Γ	3'-5' dark reddis	h grey (5 YR 4/2)	, trace sand				1111		in the second		
. F	24		╞	wet at 4'								1. C.		
3 SS	24		_ s	WCI al 4						1111		a deta	• •	
1	۱ <u>.</u>		Γ,		ADED SAND lig				sw		3	1. S.		
٩Ĥ	24		ŀ		3), medium to fin own (7.5 YR 4/2)		1		•	hii	4			
ss	24		L		· · · · · · · · · · · · · · · · · · ·		1		ML.			a data		
	V			2 (1 10100001	V CRADED CA		-		<u></u>	+++	· ·	and.	-	
Ś	24		F	SILT	Y GRADED SAL	<u>• • • • • • • • • • • • • •</u>	ł							
5 SS	38		Ļ		•				SP-S	мЦ		an fraith		•
V	N													
6	24		+ "	10'-26' POORL	Y GRADED SAM	ND brown (7.5	-1			1		er e		
SS	24			YR 5/2), mediu	m grained	<u> </u>						1		••••
	N				·	•						ie.		
7	24		F			· .	·					in the second	·	
SS	24		L		•		·		SP	,		100	•	
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8	24		F		•									
8 SS,	M 16			s										
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	elm cer		t at the in	nformation on this form	n is true and correct to	the best of mv k	nowled				-1		]	<u> </u>
Sign	•	y ui				Natural Resou			Ogv.	lnc.			 Tel: (262)	523-9000
	Par	<u>c.</u> [	Rick	hist 1		23713 W. Paul Ro				kee, WI			Fax: (262	523-9001
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Number and Type	Length Att. & du Recovered (in)	Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (Isf)	Field Moisture Condition	U S C S Symbol	Graphic Log	PID/FID (ppm)	Well Diagram	RQD/ Comments/ Lab Test
9 \$\$	· 24 12		- 20	10'-26' <u>POORLY GRADED SAND</u> brown (7.5 YR 5/2), medium grained			SP		-	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
10 SS )	24 12		- 25	@ 22' coarse sand with few gravel END OF BORING AT 26' Well set at 25'							
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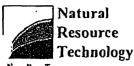
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acility/	Projec	Nam	e		·	License/Permit/	Monito	ring N	ninper	E	oring	Number		110	
Ame	ren H	utsor	ville	Power Station Dr	illing	Date Drilling St	arted		Date	Drilli	ne Cor	npleted	TW-	Drilling Me	ibod
		Ву: Г	vame o	f crew chief (first, last	) and r mm	Date Drunng St	anco					ipicico			
Steve Boar	e 1 Lon	evea	r	•	•	5/1/2	2004				5/3/20	<b>)0</b> 4 ·		hsa, cor	2
	Well No			Well JD No.	Common Well Name	Final Static Water		5		Elevatio			Bore	hole Diameter	
				·	TW-119	Feet M	<u>ASL</u>			35,4 J .ocal C				8.3 inche	s
ocal G tate P		igin	🛛 (esi	innated: () or Bo N,	E S/C/N	Lat	o 	•	ľ			N 🛛		N	)E
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acility				County		State			-	Village	1	•			
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Sam	ple					•			Io		ĉ				
	a î	. slu	E i	•	Soil/Rock Descriptio		(tsf	sture	C S Symbol	80 0	udd)	La L			
be e	Att.	Cou	E LO		And Geologic Origin Each Major Unit	FOT	Pen	Moi	S	hicl	6	Ö		RQD/	
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth From Surface (feet)		Each Major Onn		Hand Pen (tsf)	Field Moisture Condition	ns c	Graphic Log	PID/FID (ppm)	Well Diagram		Comments/ Lab Test	
2 k	.3 æ 24		00	O' A'SILTY CL	<u>AY, very dark gre</u>	vish brown					<u> </u>		·		·
ssM	18			(10 YR 3/2), fi	m, moist			<b>)</b> .							
W			Γ	· · ·	••••										
2 H	24		┝	color change to	dark greyish brow	wn (2.5 Y 4/2)			ГГW			1			
2 SS	20		L			· · · ·		·				(41-2)			
M					•	•					8	1. S.			
3 H	24		ŀ	4'-11.7'FAT C	LAY, dark greyis)	n brown, soft,	1	.				44			
3 SS	24		- 5	moist	<b>0</b> /		1					i un f			
N	l					. •	1					and the second se			
4 SS	24		f	at 6' very mois	t -	• • •						in and			
ss	23		$\left  \right $				1					1			
- 1	V					•	:	1	СН					•	•
5 55	24	1	Γ	:	•	. • •						a de la compañía de l		•	
33	() 24		┝	at 9' wet			·					a a a a a a a a a a a a a a a a a a a		•	
	Y	ŀ			• •							1			
6 SS	24		Γ'		•				-			ないた	k.		
33 .	(  <sup>24</sup>		┝				-{`					A		•	•
ľ			[ ·	עינאיד אויד	RLY GRADED S	SAND motiled	-		$\vdash$			1.1.1.1.		•	•
7 SS	24 16			orange brown	and grey brown,	very fine, wet						tion of the second s			
	X		┢	at 12' color ch	ange to dark yello	owish brown (1	0								
. 1	N			Y.R 4/4)		·			s	P		i i i i	<b>1</b>		
	1				. •										
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l her	eby ce	tify t	at the i	information on this fo	rm is true and correct	to the best of my k	nowle	dge.							
Sign	-		5		Firm	Natural Resou	rce T	echno	ology,	lnc.	·		•	Tel: (262)	523-
	Par	'n. 4	heh	and	Paula Richardson	23713 W. Paul R	oad. U	nit D, 🛛	Pewau]	kee, W	1 5307	2		Fax: (262	523-

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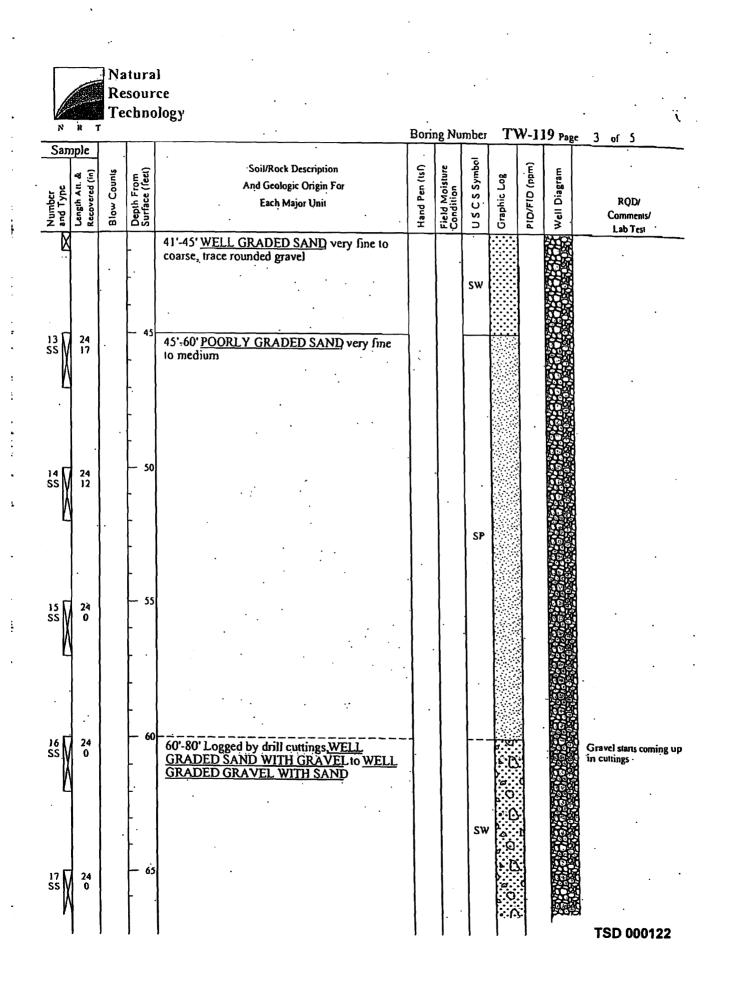
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N R	Te T	echno	logy	Bori	ing Nu	mber	Ţ	<b>W-1</b> 1	9 Page	
Numbcr and Type Length Att. & Recovered (in)	Blow Counts	Depth From Surface (fect)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (Isf)	Field Moisture Condition	U S C S Symbol	Graphic Log	(mgg) []10/F1D	Well Diagram	RQD/ Comments/ Lab Test
8 SS 24 6 24 6 24 0		- - - - - - 25	11.7'-41' <u>POORLY GRADED SAND</u> motiled orange brown and grey brown, very fine, wet			SP				
10 SS 7 11		30 - -	very fine to medium sand							
11 SS 12		- 35 - -	very fine to fine sand							
12 X 24 SS X 22		 40 -								TSD 0001

TSD 000121





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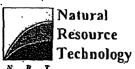
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	Number and Type	Length Att. & ald	Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (15)	Field Moisture	U S C S Symbol	Graphic Log	PID/FID (ppm)	Well Diagram	RQD/ Comments/
••••	18 SS	24 0 24 0		<u>2</u> - - - - - - - - - - - - -	60'-80' Logged by drill cuttings <u>WELL GRADED SAND WITH GRAVEL to WELL</u> GRADED GRAVEL WITH SAND	Ha	0. G	SW			######################################	Lab Tesi
(	20 COR	84 24		- - - - - 85	80'-100' <u>SHALE</u> , grey to black, laminated, poorly lithified, no circulation of drilling water						ann a bhailtean an tha  an that an that an that and a search a	, en
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and Type Length Att. &	Recovered (in)	Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (Isf)	Field Moisture Condition	U S C S Symbol	Graphic Log	PID/FID (ppm)	.Well Diagram	RQD/ Commenis/ Lab Tesi
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#### SOIL BORING LOG

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acility/Pr	n Hi	utsor	wille	Power Station	Drilling			C			5		ΤŴ	-120	
Joring Dr	illed	By: 1	Name o	f crew chief (first,	last) and Firm	Date Drilling S	larted	·	Date	Drillin	g Cor	npleted	•	Drilling Meil	hod -
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nique We	ll No.	•		Well ID No.	Common Well Name	Final Static Wat			Surface E			401	Bor		
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Number and Type Length Att	2 C	Blow Counts	Depth From Surface (feet)		Each Major Unit	•	Hand Pen (tsf)	n in	sc	Graphic Log	DVFI	Well Diagram		Comments/	
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				nformation on thi	s form is true and correct	to the best of my	knowle	dec.		L			<b>,</b>		
Signan	-	iny u			Firm					lnc	•			Tel: (262)	573_0
		-m	R	dim a	- Paula Richardson	23713 W. Paul J	load, U	nit D, ]	Pewauk	ee, W}	5307	2		Fax: (262)	

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н א Sample	т 	1		Bon	ng Nur	nper 1.	T	N-12	20 Pag	e 2 of 2
and Type Length Ait. & Recovered (in)	Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (tsf)	Field Moisture Condition	U S C S Symbol	Graphic Log	PID/FID (ppm)	Well Diagram	RQD/ Comments/ Lab Test
			14'-36' <u>POORLY GRADED SAND WITH</u> <u>GRAVEL</u> , reddish yellow, medium sand, rounded gravel, moist				•0 •0		والمجارية والمحاوية	
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			well set at 35							

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Appendix A-8

Geotechnology 2010 Boring Logs

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		FILL: brown and gr	ay, silty clay, trace gravel and sand										
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	- 5-				3-3-5	SS2		Δ	🏼	P			
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					3-4-7	SS3	· · · ·	: <b>.</b> .:			· · · · ·		
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6 REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.		Stiff to very soft, bro	own, silty CLAY - CL					••••			 		
PUF		<b>,</b>						· · ·	:::	· · · · ·			
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J 12/	- 35-												
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GTINC 0638301					0-1-1	SS10		· · · · · ·		· · · · ·	 	1	
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0638301		Very loose, brown,	fine SAND - SP										
NCO						0-2-2	SS10						
GTINC						:						· · ·	
GPJ		GROUNDWATER	ΔΤΔ	DRILLING	DATA			Drawn by			ked by: SK		by: ON
щ								Date: 6/2		Date:	1/3/11	Date:	[ 14/11
J017150.02 - HUTSONVILL	-	<u>X</u> FREE WATER N OUNTERED DURING		AUGER HO					Normality of the second	ព្រហ	TECHN	מו ומ	VZ
UTS	ENC	JUNIEKED DUKING	DITICLING	WASHBORING FR	OM _2	5_FEET			9	uLU		ULUC Rom the Gi	
- H				<u>MVU</u> DRILLER <u>E</u>	<u>BGF</u> L	.OGGER							
50.02				<u>CME 550X</u> D	RILL F	RIG							
171.				HAMMER TYP							e Power S		
	1								F	านเริงท	ville, Illino	315	
LOG OF BORING 2002 WL	RE	MARKS: Datum: IL	State Plane Coordi	nates, East Zone.	N: 89	7908.736	5' E:						
16 20	117	'6769.952'		,	-				L	OG OF	BORING	: B-3	
NIAC													
)F B(													
0 90									Pro	ject N	lo. J017	150.01	
2					****								enter contraction and contraction and the

Surface E eventor.         42.3 (0, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1	r			**************************************		otorinisianinininini		ineren en e	SHEAR STRENGTH, tsf					
Very loss, tirown, fine SAND - SP (contruled)         3.2-2         8511         4           45         Medium dames to doaled, retwin, gravely SAND - SP         7.10-9         8512         A           56         10-15-17         5513         4         A           60         Borrg terminated of 60 feet,         10-12-14         5514         A           66         Borrg terminated of 60 feet,         10-12-14         5514         A           770         Transport         Transport         Transport         Transport           770         Transport         Transport         Transport         Transport           770         Transport         Transport         Transport         Transport         Transport         Transport           770         Transport         Transport         Transport         Transport         Transport         Transport         Transport         Transport         Transport		Surfac	e Elevation: 452.3	Completion Date:	6/24/10		RQL RQL		∆ - UU/2	O - QU/2	🛛 - SV			
Very loss, tirown, fine SAND - SP (contruled)         3.2-2         8511         4           45         Medium dames to doaled, retwin, gravely SAND - SP         7.10-9         8512         A           56         10-15-17         5513         4         A           60         Borrg terminated of 60 feet,         10-12-14         5514         A           66         Borrg terminated of 60 feet,         10-12-14         5514         A           770         Transport         Transport         Transport         Transport           770         Transport         Transport         Transport         Transport           770         Transport         Transport         Transport         Transport         Transport         Transport           770         Transport         Transport         Transport         Transport         Transport         Transport         Transport         Transport         Transport						00	HT NUC	S			0 2,5			
Very loss, tirown, fine SAND - SP (contruled)         3.2-2         8511         4           45         Medium dames to doaled, retwin, gravely SAND - SP         7.10-9         8512         A           56         10-15-17         5513         4         A           60         Borrg terminated of 60 feet,         10-12-14         5514         A           66         Borrg terminated of 60 feet,         10-12-14         5514         A           770         Transport         Transport         Transport         Transport           770         Transport         Transport         Transport         Transport           770         Transport         Transport         Transport         Transport         Transport         Transport           770         Transport         Transport         Transport         Transport         Transport         Transport         Transport         Transport         Transport		C	Datum <u>msi</u>			CL			1 1					
Very loss, trown, fine SAND - SP (continued)         3.2.2         S811         A           45         Medium dames to donke, brown, gravely SAND - SP         7.10-0         SS12         A           56         10-15-17         SS13         A         A           56         10-15-17         SS13         A         A           60         Borrg terminated at 60 feet,         10-12-14         SS14         A           66         France         France         France         France         France           70         France         France         France         France         France         France           70         France         France         France         France         France         France         France           70         France						I H		AMF						
Very loss, tirown, fine SAND - SP (consuled)         3.2.2         SS11         4           45         Medium dames to donse, prown, gravely SAND - SP         7.10-0         SS12         4           56         10-15-17         SS13         4         4           56         10-12-14         SS11         4         4           60         Borrg terminated at 60 feet,         10-12-14         SS14         4           66         Borrg terminated at 60 feet,         10-12-14         SS14         4           710         SS12         X         10-12-14         SS14         X           66         Borrg terminated at 60 feet,         10-12-14         SS14         X         10-12-14           710         SS12         X         X         10-12-14         SS14         X           70         Total SS12         X         X         10-12-14         SS14         X           710         SCOUNDWATER DATA         ERILLING DATA         X         X         X         X           70         Total SS12         X         X         X         X         X           70         Total SS12         X         X         X         X         X <t< td=""><td></td><td>포됴</td><td></td><td>INTION OF SAA</td><td>77777) A I</td><td>GRA</td><td></td><td>S  </td><td>A N-VAL</td><td>UE (BLOWS PER</td><td>R FOOT)</td></t<>		포됴		INTION OF SAA	77777) A I	GRA		S	A N-VAL	UE (BLOWS PER	R FOOT)			
Very loss, tirown, fine SAND - SP (consuled)         3.2.2         SS11         4           45         Medium dames to donse, prown, gravely SAND - SP         7.10-0         SS12         4           56         10-15-17         SS13         4         4           56         10-12-14         SS11         4         4           60         Borrg terminated at 60 feet,         10-12-14         SS14         4           66         Borrg terminated at 60 feet,         10-12-14         SS14         4           710         SS12         X         10-12-14         SS14         X           66         Borrg terminated at 60 feet,         10-12-14         SS14         X         10-12-14           710         SS12         X         X         10-12-14         SS14         X           70         Total SS12         X         X         10-12-14         SS14         X           710         SCOUNDWATER DATA         ERILLING DATA         X         X         X         X           70         Total SS12         X         X         X         X         X           70         Total SS12         X         X         X         X         X <t< td=""><td></td><td></td><td>DESCR</td><td>IPTION OF IVIA</td><td>IERIAL</td><td></td><td>SP1 SP1 ORE</td><td></td><td>P  </td><td></td><td></td></t<>			DESCR	IPTION OF IVIA	IERIAL		SP1 SP1 ORE		P					
45       Medium dense to dense, brown, gravelly SAND - SP       3.2.2.       SS11       A         50       7.10-9       SS12       A         60       Boring leminates at 60 feet,       10.12.14       SS14       A         60       Boring leminates at 60 feet,       10.12.14       SS14       A         775       57       57       10.12.14       SS14       A         775       57       57       57       10.12.14       SS14       A         775       57       57       57       57       57       57       57         775       75       75       75       57							δŬ		10 2	0 30 4	) 50			
A 6     Medium dense to dense, brown, gravely SAND - SP     Medium dense to dense, brown, gravely SAND - SP     The state of the second s			Very loose, brown, t	fine SAND - SP (contin	nued)									
A 6     Medium dense to dense, brown, gravely SAND - SP     Medium dense to dense, brown, gravely SAND - SP     The state of the second s														
A 6     Medium dense to dense, brown, gravely SAND - SP     Medium dense to dense, brown, gravely SAND - SP     The state of the second s														
Medium dense in dense, brown, gravelly SAND - SP         7.10-9         SS12         A	ł						3-2-2	SS11	<b>A</b>					
50-       55-         55-       10-15-17         55-       10-15-17         600       Boring terminated at 60 feet.         10-15-17       SS13         10-15-17       SS13         4       4         600       Boring terminated at 60 feet.         600       Boring terminated at 60 feet.         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         70-       10-15-17         8000       10-15-17         8000       10-15-17         8000       10-15-17         8000       10-15-17         8000       10-15-17         8000       10-15-17		- 45-												
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/         MVU DRILLERBGF_LOGGER			Medium dense to d	ense, brown, gravelly	SAND - SP									
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/         MVU DRILLERBGF_LOGGER	- Andrews													
GROUNDWATER DATA       DRILLING DATA         Market State       Market State	n L						7-10-9	\$\$12						
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER	NEX.	- 50-					1-10-5	0012						
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER	ES OF													
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER	POS.													
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/1         MVU DRILLERBGF_LOGGER	PUR													
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/1         MVU DRILLERBGF_LOGGER							10-15-17	SS13						
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/1         MVU DRILLERBGF_LOGGER	JARI TRAT	- 55-												
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER	INNC						- -							
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/         MVU DRILLERBGF_LOGGER	∃E B( OR ⊫ B						10-12-14	SS14						
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/         MVU DRILLERBGF_LOGGER	CIMA OG F(							. 0014						
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/         MVU DRILLERBGF_LOGGER	ROX IC LO	- 60+	Boring terminated :	at 60 feet.										
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER      GEOTECHNOLOGYES         CME 550X_DRILL RIG      HUMMER TYPE _Auto	APF APH		Doning torrinitation (											
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER	ËБ													
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER	SENI													
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/         MVU DRILLERBGF_LOGGER	PRE: GRAI	65												
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER      MUTER 550X DRILL RIG         MMMER TYPE _Auto       Hutsonville Power Station         Hutsonville, Illinois	S RE													
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER	MAY													
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/1         MVU DRILLERBGF_LOGGER	NOL													
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER	ICAT ANSI													
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/1         MVU DRILLERBGF_LOGGER	ATIF TR/	- 70-												
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      AUGERHOLLOW STEM         MVU DRILLERBGF_LOGGER	STR 0 THE						- - -							
GROUNDWATER DATA       DRILLING DATA         X_FREE WATER NOT      AUGERHOLLOW STEM         ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM         WASHBORING FROM 25_FEET      Date: 1/3/1/1         MVU DRILLERBGF_LOGGER	DTE: MUC													
GROUNDWATER DATA       DRILLING DATA         Market State       App'vd. by: Market State         Market State	N( 2/13/-													
GROUNDWATER DATA       DRILLING DATA         Market State       Market State         Applyd. by: 3wz       Applyd. by: 3wz         Market State       Market State         Market State       Hutsonville Power Station         Hutsonville, Illinois       Hutsonville, Illinois		— 75—												
GROUNDWATER DATA       DRILLING DATA       Drawn by: KA       Checked by: Set       App'vd. by: Mev         X_ FREE WATER NOT ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM WASHBORING FROM 25 FEET      AUGERAUGER      AUGER      AUGER      AUGER	01.GI													
GROUNDWATER DATA       DRILLING DATA       Drawn by: KA       Checked by: Set       App'vd. by: Mev         X_ FREE WATER NOT ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM WASHBORING FROM 25 FEET      AUGERAUGER      AUGER      AUGER      AUGER	6383													
GROUNDWATER DATA       DRILLING DATA       Drawn by: KA       Checked by: See       App'vd. by: Pare         X_ FREE WATER NOT ENCOUNTERED DURING DRILLING      AUGERHOLLOW STEM WASHBORING FROM 25 FEET      AUGER      OGEFOGGER         MVU DRILLER BGF_LOGGER      OME 550X DRILL RIG      AUMON THE GROUND UP         HAMMER TYPE Auto       Hutsonville Power Station Hutsonville, Illinois	NC 0													
GROUNDWATER DATA       DRILLING DATA         AUGERHOLLOW STEM      AUGERHOLLOW STEM         MARKER NOT      AUGERHOLLOW STEM         WASHBORING FROM 25 FEET       MVU DRILLER BGF LOGGER         CME 550X DRILL RIG      AMMER TYPE Auto         Hutsonville Power Station       Hutsonville, Illinois	011													
	GPJ													
	עררב													
	SONV	ENC								<b>GEOTECHN</b>	OLOGYZ			
	HUT													
	- 02 -													
	7150									onville Power S	tation			
REMARKS: Datum: IL State Plane Coordinates, East Zone. N: 897908.736' E: 1176769.952' CONTINUATION OF LOG OF BORING: B-3 Project No. J017150.01		1			HAMMERTY	РЕ <u>А</u>	110		F	lutsonville, Illind	bis			
REMARKS: Datum: IL State Plane Coordinates, East 2016. N. 097900.730 E.       CONTINUATION OF         1176769.952'       LOG OF BORING: B-3         00       Project No. J017150.01	i2 WL			Ctoto Diana Car	rdinator East Zana	NI- 00	7008 724	s' E.						
LOG OF BORING: B-3 Project No. J017150.01	3 200	REI 117		- State Plane Cool	rumates, East 2008.	14. 03	1900.19	J L.,						
Project No. J017150.01	RING								L	OG OF BORING	: B-3			
Project No. J017150.01	й ВС													
0	000								Pro	ject No. J017	150.01			

				$\square$	Current and a second	SHI	EAR STRENG	STH, tsf				
	Surfa	ce Elevation: <u>437</u> Completion Date: <u>9/14/10</u>		TS an		∆ - UU/2	O - QU/2	0 - TV				
		a mel	00	HI NUC	S		0 1,5	2,0 2,5				
		Datum <u>msl</u>	U L	' UNIT WEIGHT (pcf) PT BLOW COUNTS RE RECOVERY/RQD	SAMPLES			ON RESISTANCE				
			H		AMF		(ASTM D 1586					
	DEPTH IN FEET		MI DESCRIPTION OF MATERIAL DESCRIPTION OF MATERIAL									
	ШЦ ОZ	DESCRIPTION OF WATERIAL	Ŭ	DRY UI SPT E CORE I		₩/	ATER CONTE	NT, %				
				δ°ΰ		10 2	20 30	40 50				
		FILL: gray, silty clay and rock fragments										
				20-19-12	SS1	<b>.</b>		· · · · · · · · · · · ·				
		Medium stiff, gray, silty CLAY - CL			İ		· · · · · · · · · · ·					
		Medium stin, gray, sity OEAT - OE		2-3-3	SS2							
	- 5-	Soft, gray CLAY - (CH)										
					070			62				
				86	ST3			>>>>				
SES.		Very soft to soft, brown and gray, silty CLAY - CL		93	ST4							
, TYF	- 10-											
SOII ES C								· · · · · · · · · · · ·				
POS												
PUR								· · · · · · · · · · · · · ·				
NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES 12/17/10/ND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.				0-0-0	SS5			· · · · · · · · · · · · ·				
DARI TRA	- 15-					• • • • • • • • •						
SU1												
TE B OR II				95	ST6	· · · · · · · · · · · ·	· · · · · · · · · ·	· · · · · · · · · · · ·				
NMA.				90	ST7	· · · · · · · · · · ·	· · · · · · · · · ·	· · · · · · · · · · · ·				
SROX	— 20—											
APF												
GF		Very soft, gray, sandy CLAY - CL										
SENT						· · · · · · · · · ·	· · · · · · · · ·	· · · · · · · · · · ·				
PRES	25			0-0-1	SS8	<b>A</b>		· · · · · · · · · · · ·				
BE (	- 25-	Boring terminated at 25 feet.										
MAY								· · · · · · · · · · ·				
ION L						· · · · · · · · · · ·	· · · · · · · · ·	· · · · · · · · · · · ·				
CATI								· · · · · · · · · · · · · ·				
ATH-	— 30—											
STR						· · · · · · · · · · ·		· · · · · · · · · · ·				
ØND:								· · · · · · · · · · · ·				
NC 1/2/1												
	— 35—											
01.GPJ								· · · · · · · · · · · ·				
0638301			}					· · · · · · · · · · · · ·				
GTINC								: :::::::::				
.GPJ	I	GROUNDWATER DATA DRILLING				Drawn by: KA						
LÚ.						Date: 9/17/10	Date: 9/17/10 Date: 1/3/11 Date: //4/11					
HUTSONVILL				OW STEM			CENTERUN	NOLOGYZ				
HUTS	ENG	COUNTERED AT <u>16</u> FEET ♀ WASHBORING F					ULUILUII	FROM THE GROUND UP				
		<u>MB</u> DRILLER										
J017150.02		CME 55TRK				Huter	onville Power	Station				
10f		HAMMER T	PE <u>Aut</u>	0			utsonville, Illi					
2 WL												
2002	REM	MARKS:										
SING						LO	G OF BORIN	G: B-4				
.OG OF BORING 2002 WI												
GOF						Proi	ect No. J01	7150.01				
2				CONTRACTOR CONTRACTOR								

## **BORING LOG: TERMS AND SYMBOLS**

#### **GENERAL NOTES**

GENERAL NOTES		LEGEND								
1. Information on each boring log is a compilation of subsurface		Continuous Sampler								
conditions based on soil or rock classifications obtained from the	CS									
field as well as from laboratory testing of samples. The strata lines										
on the logs may be approximate or the transition between the strata may be gradual rather than distinct. Water level measurements refer	GB	Grab Sample Taken From Auger Cuttings Or								
only to those ob - served at the times and places indicated, and may		Wash Water Return								
vary with time, geologic condition or construction activity.	NX									
2. Relative composition and Unified Soil Classification designations are	1 1	NX Rock Core with Percent Recovery/R.Q.D.								
based on visual estimates and are approximate only. If laboratory	<u>100</u> 42	Given In Adjacent Column								
tests were performed to classify the soil, the unified designation is show in parenthesis.	42									
3. Value given in Unit Dry Weight/SPT Column is either a unit dry		Three lead Diameter Distan Tube Comple								
weight in pounds per cubic foot, if adjacent to a ST sample	PST	Three Inch Diameter Piston Tube Sample								
designation, or blows per 6-inch increment if adjacent to a SS										
sample designation.	SS	Split Spoon Sample (Standard Penetration Test)								
ABBREVIATIONS		Three leab Diameter Chalky Type Comple								
UU/2 Shear Strength from Unconsolidated – Undrained	ST	Three Inch Diameter Shelby Tube Sample								
Triaxial Test (ASTM D2850) QU/2 Shear Strength from Unconfined Compression	*	Sample Not Recovered								
Test (ASTM D2166)		Sample Not Recovered								
SV Shear Strength from Field Vane (ASTM D2573)										
PL Plastic Limit (ASTM D4318)	SV	Field Vane Test								
LL Liquid Limit (ASTM D4318)										
Blow Por Foot (N1 ) (alua) SPLIT – BARREL SAMPLE		/ING RECORD								
Blow Fer Foot (N-value)	Descripti	ion								
25										
50/S3"50 blows drove	e sampler 3 i	inches during initial 6 inch seating interval.								
NOTES: 1. To avoid damage to sampling tools, driving is limited to 50 blows during any 2. N-Value (Blow Count) is the standard penetration resistance based on the to										
to drive a split spoon the last two of three, 6-inch drive increments. (Example: 4)										
may be shown as 4/7/9 in Unit Dry Weight – SPT column.										
	H OF (	COHESIVE SOILS								
Trace0-10 % STRENGTH OF COHESIVE SOILS										
With/Some11-35 % Undrained	Shear	Field Test Approximate								
With/Some11-35 % Undrained	Shear Tons									
With/Some	Shear Tons Ft.	Field Test Approximate N-Value Range								
With/Some	Shear Tons Ft. 0.12	Field Test       Approximate N-Value Range          Thumb will penetrate soil more than 1" 0 - 1								
With/Some	Shear Tons Ft. 0.12 5	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1" 0 - 1 Thumb will penetrate soil about 1" 2 - 4								
With/Some	Shear Tons Ft. 0.12 5 50 00	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1" 0 - 1Thumb will penetrate soil about 1" 2 - 4Thumb will penetrate soil about 14" 5 - 8Thumb hardly indents soil								
With/Some	Shear Tons Ft. 0.12 5 50 00	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1" 0 - 1Thumb will penetrate soil about 1" 2 - 4Thumb will penetrate soil about 1/4" 5 - 8								
With/Some	Shear Fons Ft. 0.12 50 00 00	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1" 0 - 1 Thumb will penetrate soil about 1" 2 - 4 Thumb will penetrate soil about 14" 5 - 8 Thumb hardly indents soil								
With/Some	Shear Fons Ft. 0.12 50 00 00	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1" 0 - 1 Thumb will penetrate soil about 1" 2 - 4 Thumb will penetrate soil about 14" 5 - 8 Thumb hardly indents soil								
With/Some	Shear Tons Ft. 0.12 50 00 00 00 00 00	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1"0 - 1 Thumb will penetrate soil about 1"2 - 4 Thumb will penetrate soil about 14"5 - 8 Thumb hardly indents soil								
With/Some	Shear Tons Ft. 0.12 50 00	Field Test       Approximate N-Value Range								
With/Some	Shear Tons Ft. 0.12 50 00	Field Test       Approximate N-Value Range								
With/Some	Shear Tons Ft. 0.12 50 00	Field Test       Approximate N-Value Range								
With/Some	Shear           Tons           Ft.           0.12           50           50           00           00           00           00           012           00           012           00 <t< td=""><td>Field Test       Approximate N-Value Range        </td></t<>	Field Test       Approximate N-Value Range								
With/Some	Shear           Tons           Ft.           0.12           50           50           00           00           00           01           00           01           01           00           01           01           01           01           01           01           01           01           02           03           04           05           05           06           07           08           09           00           00           00           01           02           03           04           05           05           05           06           07           08           09           00           00           00           00           00           00           00	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1"0 - 1 Thumb will penetrate soil about 1"2 - 4 Thumb will penetrate soil about 14"5 - 8 Thumb hardly indents soil								
With/Some	Shear           Tons           Ft.           0.12           50           50           00           00           00           00           012           00 <tr< td=""><td>Field TestApproximate N-Value RangeThumb will penetrate soil more than 1"0 - 1 Thumb will penetrate soil about 1"2 - 4 Thumb will penetrate soil about 14"5 - 8 Thumb hardly indents soil9 - 15 Thumb will not indent soil, but readily indented with thumbnail</td></tr<>	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1"0 - 1 Thumb will penetrate soil about 1"2 - 4 Thumb will penetrate soil about 14"5 - 8 Thumb hardly indents soil9 - 15 Thumb will not indent soil, but readily indented with thumbnail								
With/Some	Shear Tons Ft. 0.12 50 00 CTURI	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1" 0 - 1 Thumb will penetrate soil about 1" 2 - 4 Thumb will penetrate soil about 1" 2 - 4 Thumb will penetrate soil about 1" 2 - 4 								
With/Some	Shear Tons Ft. 0.12 50 01 01	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1" 0 - 1 Thumb will penetrate soil about 1" 2 - 4 Thumb will penetrate soil about 1" 2 - 4 Thumb hardly indents soil								
With/Some	Shear Tons Ft. 0.12 50 01 01	Field Test       Approximate N-Value Range								
With/Some	Shear Tons Ft. 0.12 50 00 00 nan 2.00 nan 2.00 N SIZE D SIEVE 10 S/E 2.00 MILLIMETE CTURI Partin Pocke	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1"0 - 1 Thumb will penetrate soil about 1"2 - 4 Thumb will penetrate soil about 1"5 - 8 Thumb hardly indents soil								
With/Some	Shear Tons Ft. 0.12 50 00 00 nan 2.00 nan 2.00 N SIZE D SIEVE 10 S/E 2.00 MILLIMETE CTURI Partin Pocke	Field TestApproximate N-Value RangeThumb will penetrate soil more than 1"0 - 1 Thumb will penetrate soil about 1"2 - 4 Thumb will penetrate soil about 14"5 - 8 Thumb hardly indents soil								
With/Some	Shear Tons Ft. 0.12 50 00	Field Test       Approximate N-Value Range								
With/Some	Shear Tons Ft. 0.12 50 00	Field Test       Approximate N-Value Range								
With/Some	Shear Tons Ft. 0.12 50 00	Field Test       Approximate N-Value Range								
With/Some	Shear Tons Ft. 0.12 50 00	Field Test       Approximate N-Value Range								
With/Some	Shear Tons Ft. 0.12 50 00	Field Test       Approximate N-Value Range								
With/Some	Shear Tons Ft. 0.12 50 00	Field Test       Approximate N-Value Range								

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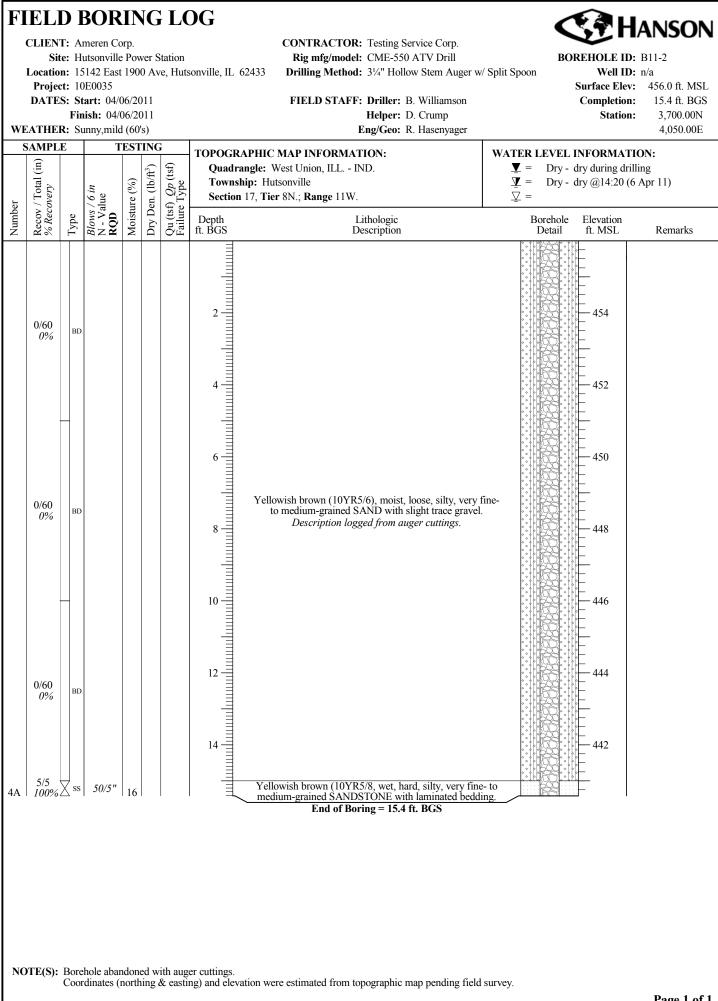
				UNIFIED SOIL CLAS	SIFICATIO	N	SYSTEM					
			SYM	DESCRIPTION			PLASTICI	TY CHART				
N	iajor di'		BOL		50			СН				
Soils arger Size)	Gravel and	Clean Gravels Little or no Fines Gravels with	GW GP GM	Well-Graded Gravel, Gravel-Sand Mixture Poorly –Graded Gravel, Gravel-Sand Mixture Silty Gravel, Gravel-Sand-Silt Mixture	(I_d) 40		CL	"A" Line				
Coarse-Grained Soils (More than 50% Larger than No 200 Sieve Size)	Gravelly Soils	Appreciable Fines	GC	Clayey-Gravel, Gravel-Sand-Clay Mixture	00 EX (b)							
barse-G ore thar n No 20	Sand and	Clean Sands Little or no Fines Sands with	SW SP SM	Well-Graded Sand, Gravelly Sand Poorly Graded Sand, Gravelly Sand Silty Sand, Sand-Silt Mixture		C	L-ML	OL M				
	Sandy Soils	Appreciable Fines	SC	Clayey Sand, Sand-Clay Mixture	bIry			& ML				
soils Smaller e Size)	Silts and Clays	Liquid Limit Less Than 50	ML CL	Silt, Clayey Silt, Silty or Clayey Very Fine Sand, Slight Plasticity Clay, Sandy Clay, Silty Clay, Low to Medium Plasticity		0	10 20 30 40 Liquid I RELATIVE P	_imit (LL)	80 90			
n 50% 5 00 Siev	Silts and	Liquid Limit	OL MH	Organic Silts, or Silty Clays of Low Plasticity Silt, Fine Sandy or Silt Soil with High Plasticity			plastic	Cannot Roll Ir				
Fine-Grained Soils (More than 50% Smaller than No 200 Sieve Size)	Clays	More Than 50	CH OH	Clay, High Plasticity Organic Clay of Medium to High Plasticity	Ν	Med	e Plasticity ium Plastic ly Plastic	Barely Roll Int Can be Rolled	l Into Ball			
₹,5	Highly	Organic Soils	PT	Peat, Humus, Swamp Soil				No Rupture by	y kneading			
				VISUAL DESCR								
	BLE 1:			R DESCRIBING ANGULARITY GRAINED PARTICLES	TABLE 8: Descrip			DESCRIBING D Criteria	RY STRENGTH			
1	<b>Descrip</b> Angular	r Pa		<b>Criteria</b> les have sharp edges and relatively	None	,	The dry s	pecimen crumb				
	Subang	-		sides with unpolished surfaces les are similar to angular description	Low			pecimen crumb e finger pressure	les into powder e			
	Subrou	bı nded Pa	it ha artic	ve rounded edges les have nearly plane sides but have	Medium	1	crumbles	s into pieces or ble finger				
F	Rounde	ed Pa	artic	ounded corners and edges les have smoothly curved sides and	High		The dry s	pressure The dry specimen cannot be broken with finger pressure. Specimen will break into				
TA	BLE 2:		FO	ges R DESCRIBING PARTICLE SHAPE	Maria		pieces be		nd a hard surface.			
	escrip lat		artic	<b>Criteria</b> les with width/thickness X3	Very High The dry specimen cannot be broken between the thumb and a hard surface TABLE 9: CRITERIA FOR DESCRIBING DILATANCY							
	longate			les with length/width X3		Description Criteria						
E F	lat and longate	P	artic	les meet criteria for both flat and ated	None	500	No visible	No visible change in the specimen Water appears slowly on the surface of the				
			A FC	DR DESCRIBING MOISTURE	Slow		specimen	during shaking r or disappears	and does not			
	escrip		haa	Criteria	Rapid		squeezing Water an	•	n the surface of the			
	Dry Ioist	to	huch	nce of moisture, dusty, dry to the o, but no visible water	- Tapia		specimen	specimen during shaking and disappears quickly upon squeezing.				
	/et	V	isibl	e free water, usually soil is below the table		TABLE 10: CRITERIA FOR DESCRIBING TOUGHNE Description Criteria						
				OR DESCRIBING REACTION WITH	Low		Only sligh thread ne					
1	<b>)escrip</b> None		o vi	Criteria sible reaction	Mediun	n	Medium p	oressure is requ	ired to roll the			
	Weak		ome owly	e reaction, with bubbles forming			and the lu	imp have medil				
	Strong		iolei pidl	nt reaction, with bubbles forming y	High	h Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high						
			IA F	OR DESCRIBING CEMENTATION			stiffness	-				
1	<b>escrip</b> /eak	C		<b>Criteria</b> bles or breaks with handling or little	TABLE 12		DENTIFICATION RAINED SOILS					
M	loderat	te C	rum	r pressure bles or breaks with considerable	Soil Symbo	ol	Dry Strength	Dilatancy	Toughness			
s	trong	V	•	r pressure hot crumble or break with finger sure	ML		None to low	Slow to rapid	Low or thread cannot be formed			
*N07	ES: 1.	'		m ASTM D2488 "Description and	CL MH		Medium to high Low to medium		Medium Low to medium			
		identification	of Sc	ils" (Visual-Manual Procedure) incorporated into other information on this plate.	СН		ligh to very high		High			

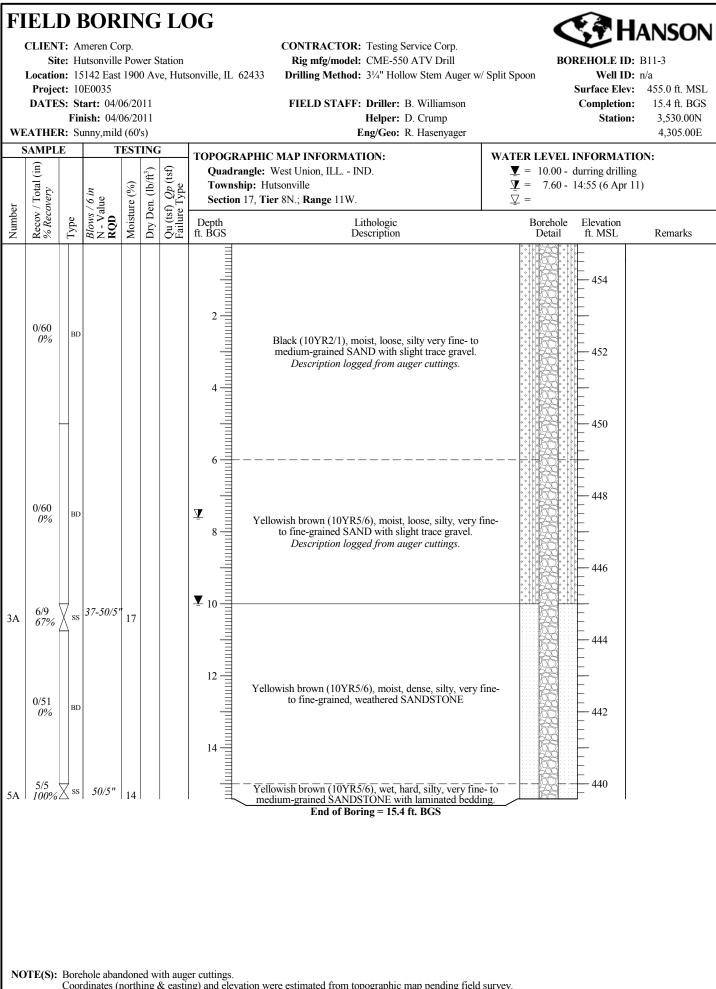


Appendix A-9

Hanson 2011 Boring Logs

F	FLI		BOR	IN	JC	1.0	C				
			meren Co		IG		CONTRACTOR: Testing Service	Com		STH.	ANSON
	Sit	e: Hu	utsonville	e Pov			Rig mfg/model: CME-550 ATV	Drill		OREHOLE ID:	
	Location Projec			: 190	0 Av	ve, Huts	ville, IL 62433 Drilling Method: 3 <sup>1</sup> / <sub>4</sub> " Hollow Ste	em Auger w/ Split Spoor	n	Well ID: Surface Elev:	n/a 450.5 ft. MSL
	DATES		art: 04/( nish: 04/				FIELD STAFF: Driller: B. Wil Helper: D. Cru			Completion: Station:	14.7 ft. BGS 4,360.00N
WE	ATHEF		unny,milc				Eng/Geo: R. Has	1		Station.	3,130.00E
5	SAMPLI	E	Т	EST	TING		OPOGRAPHIC MAP INFORMATION:			INFORMATIO	DN:
	tal (in v		ı	(%)	$(p/ft^3)$	<i>v</i> (tsf) be	Quadrangle: West Union, ILL IND. Township: Hutsonville	$\underline{\Psi} = \underline{\Psi}$		durring drilling 13:45 (6 Apr 11	.)
ber	/ / To covery		s / 6 in alue	ure ( <sup>0</sup>	Jen. (]	$\operatorname{sf}_{\operatorname{C}} Q$	Section 17, Tier 8N.; Range 11W.	<u> </u>			
Number	Recov / Total (in) % Recovery	Type	Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft <sup>3</sup> )	Qu (tsf) <i>Qp</i> (tsf) Failure Type	Depth Lithologic BGS Description	]	Borehole Detail	Elevation ft. MSL	Remarks
1A	22/24	ss	3-3 3-2	17		2.20	Very dark grayish brown (10YR3/2), mo fine- to very coarse-grained, SAND with	ist, soft, silty, trace gravel.		450	
1B	92%	A 55	N=6	17		1.30	Yellowish brown (10YR5/4), moist, soft, of				
	{						2 Yellowish brown (10YR5/4), moist, soft, overy coarse-grained SAND with trace				
	19/24	V ss	1-2							3 <del>−</del> 448	
2A	79%	A 55	2-4 N=4	19				- — — — — — —		÷.	
	{	$\rightarrow$					4 – Yellowish brown (10YR5/4), wet, loose, coarse-grained SAND with slight tra	, very fine- to			
	18/24	$\bigvee_{aa}$	1-2							446	
3A	75%	ss	4-9 N=6	16							
							6 Yellowish brown (10YR5/8), very moist, d	ense, silty, very			
	22/23	V	15-35				6 Yellowish brown (10YR5/8), very moist, d fine- to fine-grained SAND with slight trac laminations present.	e clay. Bedding		444	
4A	96%		34-50/5" N=69	11							
4B	8/8		14-50/2'	12			8 Black (10YR2/1), moist, very hard, SII Yellowish brown (10YR5/8), moist, very h	LTSTONE. ×			
5A 5B	100%	X ss		15 13		2.50	Very pale brown (10YR8/2), moist, very h	NE. /	-22-	442	
							Yellowish brown (10YR5/6), moist, very h	DNE. /			
	5/5 x 100%2	$\nabla$ ss	50/5"			2.50	10			×	
6A	100%2	$\Delta$	50/5	13		3.50			68	440	
							Gray (10YR6/1), moist, very hard, silty, fine-grained SANDSTONE	very fine- to			
	0/0	7	15 50/21			1.10	12 =Brown (10YR5/3), wet, hard, silty, vet	erv fine- to	-88-		
7A 7B	100%	X ss	15-50/3'	16 16		1.40 3.80		<u>ÓNE</u> /		438	
							Gray (10YR6/1), moist, very hard, silty,	very fine- to			
	6/8 7	$\overline{\nabla}$	45-50/2'	,,			Gray (10YR6/1), moist, very hard, silty, fine-grained SANDSTONE				
8A	75%	X ss	45 50/2	13			End of Boring = 14.7 ft. BG		60	436	
_				-	_						
NO	TE(S):	Bore Coor	hole abar dinates (1	ndon north	ed w ning d	ith aug & easti	cuttings. and elevation were estimated from topographic map pe	ending field survey.			





WE	CLIEN Sit Location Projec DATE CATHEI	F: A e: H n: 15 ft: 10 S: St Fin R: Su	0E0035 (art: 04/0 (ish: 04/0 (unny,mild	orp. 2 Pov 2 190 06/20 06/20 1 (60	ver S 0 Av 011 011 's)	tation e, Huts	DG sonville, IL	CONTRACTOR: Testing Service Corp. Rig mfg/model: CME-550 ATV Drill 52433 Drilling Method: 3¼ Hollow Stem Auger w/ S Shelby tubes FIELD STAFF: Driller: B. Williamson Helper: D. Crump Eng/Geo: R. Hasenyager	Split Sj		5	EHOLE ID: Well ID: Surface Elev: Completion: Station:	n/a
	Recov / Total (in)				Dry Den. (lb/ft <sup>3</sup> ) Z	$\begin{array}{c} \operatorname{Qu} (\text{tsf}) \ \underline{Qp} \ (\text{tsf}) \\ \text{Failure Type} \end{array}$	Quadr Towns	APHIC MAP INFORMATION: angle: West Union, ILL IND. anip: Hutsonville 17, Tier 8N.; Range 11W.	-	<b>y</b> = 16.0	0 - d	NFORMATI urring drilling 7:35 (6 Apr 1	
Number	Recov / % Reco	Type	Blows / 6 in N - Value RQD	Moisture (%)	Dry Dei	Qu (tsf) Failure	Depth ft. BGS	Lithologic Description		- Boreh Deta		Elevation ft. MSL	Remarks
1A	23/24 96%	ss	<i>1-2</i> <i>3-3</i> N=5	21		0.97 SP	2	Very dark grayish brown (10YR3/2), moist, soft, very s CLAY with trace sand. Dark brown (10YR3/3) with 10% dark yellowish brow (10YR4/4) mottles, moist, soft, very silty CLAY with tr sand.		-		440	
2A	20/24 83%	ss	1-2 2-2 N=4	36		0.73 B		Dark marick brown (10VD4/2) maint acft varweilt		-		438 	
3-1 3-2 3-3	12/24 50%	SH					4	Dark grayish brown (10YR4/2), moist, soft, very silt CLAY with trace sand.	у			436	
4A	19/24 79%	ss	3-3 3-4 N=6	32		1.36 B	8	Dark grayish brown (10YR4/2), moist, soft, silty CLA with slight trace sand.	Υ			434 	
5A	24/24 100%	ss	<i>1-2</i> <i>3-4</i> N=5	31		1.24 B	10	Dark yellowish brown (10YR4/4), moist, soft, silty CL with slight trace sand.	AY			432	
6A	22/24 92%	ss	1-2 3-4 N=5	48			hill	Dark yellowish brown (10YR4/4), wet, very soft, silt	y			430	
6B	22/24 92%	ss	4-5 4-4 N=9	31		1.65 BSh	12	Dark yellowish brown (10YR4/4), moist, soft, silty CL4 with trace sand.	AY			428	
7A		$\left( \right)$		31		1.16 BSh	=			-			
8A	20/24 83%	ss	2-3 3-3 N=6	33		1.24 BSh	⊻ ⊻ <sub>16</sub>	Dark yellowish brown (10YR4/4) with 10% gray (10YR6/1) mottles, moist, soft, silty CLAY with sligh trace sand.	ht			426	
9A	24/24 100%	ss	4-5 6-4 N=11	48				Dark yellowish brown (10YR4/4), wet, very soft, silt, CLAY with trace sand.	у			424	
9B 10-1 10-2	9/24 38%	SH		35		1.03 BSh	18	Dark yellowish brown (10YR4/4) with 10% gray (10YR6/1) mottles, moist, soft, silty CLAY with trac sand.	ce			422	
NO	TE(S):	Bore Coor	hole abar dinates (1	ndon north	ed wing a	ith high & easti	1 20	onite grout placed by tremie near borehole bottom. ation were estimated from topographic map pending field s	survey.		ot / / / /		Page 1 of 2

F	EL		BOR	I	JG	L	)G			<b>A</b>	ANSON
			meren Co utsonville	-	ver S	station		CONTRACTOR: Testing Service Corp. Rig mfg/model: CME-550 ATV Drill		BOREHOLE ID:	
	Location	<b>n:</b> 15	5142 East				onville, IL	0 0		Well ID:	n/a
	Projec DATES		DE0035 tart: 04/0	06/20	011			FIELD STAFF: Driller: B. Williamson		Surface Elev: Completion:	440.8 ft. MSL 35.4 ft. BGS
WF	ATHEF		nish: 04/0 unny,mile					Helper: D. Crump Eng/Geo: R. Hasenyager		Station:	2,975.00N 5,070.00E
	SAMPL		-		rino		TOPOGR	APHIC MAP INFORMATION:	WATER LEVI	EL INFORMATIO	-
	1 (in)				/ft³)	(tsf)	Quadr	angle: West Union, ILL IND.	<b>T</b> = 16.00	) - durring drilling	
ц.	/ Tota wery		6 in ue	re (%)	n. (lb	Qp		hip: Hutsonville 17, Tier 8N.; Range 11W.	<u>⊻</u> = 14.90 ∑ =	) - 17:35 (6 Apr 11	1)
Number	Recov / Total (in) % Recovery	Type	Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft <sup>3</sup> )	Qu (tsf) <i>Qp</i> (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Boreho Detai		Remarks
11A	24/24 100%	ss	woh-woh woh-woh			0.23 B	22 –	Yellowish brown (10YR5/4), very moist, very soft, SIL with some clay and trace sand.	Т		
12A	22/24 92%	ss	woh-wol 1-1	30		0.44 B	24	Gray (10YR5/1) with 25% yellowish brown (10YR5/6 mottles, very moist, very soft, SILT with some clay an trace sand.			
13A	17/24		1-5	44						416	
13B	17/24 71%	ss		12			26				
14A	19/24 79%	ss	11-16 18-22 N=34	10			26	Yellowish brown (10YR5/4), wet, loose, very fine- to ve coarse-grained SAND with trace gravel.	ry	414	
15A	18/24 75%	ss	10-30 24-15 N=54	8			30			412	
16A	8/24 33%	ss	4-6 8-6 N=14	28			32	Gray (10YR5/1), wet, medium dense, SILT with trace v fine-grained sand. Black (10YR2/1), moist, hard, layered, COAL and weathered SHALE.		410	
17A	17/17 100%	ss	10-33 50/5"	15				Gray (10YR5/1), wet, dense, silty, very fine- to very coarse-grained, weathered SANDSTONE.		408	
18A	17/17 100%	ss	20-42 50/5"	15		5.99 Sh	34	Gray (10YR5/1), moist, hard, SHALE.			
	L	_						End of Boring = 35.4 ft. BGS			
NO								onite grout placed by tremie near borehole bottom. ation were estimated from topographic map pending field s	urvey.		Page 2 of 2

l

			BOR		G	L(	OG			<	<b>S</b> AH	ANSON
	Sit Locatio Projec	e: Hu n: 15 t: 10	E0035	Pow 190	0 Av		sonville, IL (		Split Spoor	n	REHOLE ID: Well ID: Surface Elev:	B11-5 n/a 452.5 ft. MSL
WE		Fin	art: 04/0 iish: 04/0 inny, war	)6/20	011			FIELD STAFF: Driller: B. Williamson Helper: D. Crump Eng/Geo: R. Hasenyager			Completion: Station:	22.0 ft. BGS 3,825.00N 5,215.00E
S	AMPL	E	T	EST				APHIC MAP INFORMATION: ingle: West Union, ILL IND.	WATER		INFORMATIC during drilling	DN:
er	Recov / Total (in) % Recovery		/ 6 in ilue	Moisture (%)	Dry Den. (lb/ft <sup>3</sup> )	Qu (tsf) <i>Qp</i> (tsf) Failure Type	Townsl	nip: Hutsonville 17, Tier 8N.; Range 11W.	= ∑_ =			
Number	Recov % Rec	Type	Blows / 6 in N - Value RQD	Moisti	Dry D	Qu (ts Failur	Depth ft. BGS	Lithologic Description	]	Borehole Detail	Elevation ft. MSL	Remarks
1A	17/24 71%	ss	<i>1-2</i> <i>11-12</i> N=13				2				452	
2A	18/24 75%	ss	6-6 4-4 N=10				2 <u>2</u> 4				450	
3A	20/24 83%	ss	2-2 1-1 N=3				6				448	
4A	24/24 100%	ss	<i>l-1</i> <i>l-1</i> N=2								446	
5A	24/24 100%	ss	woh-woh 2-1				8 10 12 12	Black (10YR2/1) very moist to wet, ASH and yellow: red (5YR5/6) CINDERS. Found layered or mixed.	ish		- 444 	
6A	15/24 63%	ss	woh-woh woh-1				12	Found layered of mixed.			442	
7A	17/24 71%	ss	2-1 3-4 N=4				14				440	
8A	18/24 75%	ss	1-0 1-0 N=1				16 -				438	
9A	24/24 100%	ss	1-0 0-0 N=0				18				436	
10A	20/24 83%	ss	woh-woh 2-5	2							434	
11A	12/24 50%	ss	3-3 4-5 N=7				20	Gray (10YR5/1), moist, stiff, silty CLAY with slight to sand.	race		432	
	. L		. 1				22 =	End of Boring = 21.0 ft. BGS	V / /	. y come At 1-1 .	<u> </u>	
NO	TE(S):	Bore	hole aban	ndone	ed w	ith ben	tonite chips (	bottom 1 ft.) and auger cuttings to surface.				
	. ,	Coor	dinates (r	north	ing o	& easti	ng) and eleva	ation were estimated from topographic map pending field	survey.			Page 1 of 1

		J	BOR	IN	G	L	)G		<b>C</b> HANSON
	Site Location Projec	e: Hu n: 15 t: 10		Pow 1900	0 Av		onville, IL 62	CONTRACTOR: Testing Service Corp. Rig mfg/model: CME-550 ATV Drill Drilling Method: 3 <sup>1</sup> / <sub>4</sub> " Hollow Stem Auger w/ FIELD STAFF: Driller: B. Williamson	BOREHOLE ID: B11-6
WF		Fin	ish: 04/( mny, war	07/20	)11			Helper: D. Crump Eng/Geo: R. Hasenyager	Station: 3,700.00N 5,425.00E
	SAMPLI		-	EST		Ţ	TOPOGRA	PHIC MAP INFORMATION:	WATER LEVEL INFORMATION:
ber -	Recov / Total (in) % Recovery		Blows / 6 in N - Value <b>RQD</b>	Moisture (%)	Dry Den. (lb/ft <sup>3</sup> )	Qu (tsf) <i>Qp</i> (tsf) Failure Type	Townshi	gle: West Union, ILL IND. p: Hutsonville 7, Tier 8N.; Range 11W.	$ \underline{\Psi} = 3.50 - \text{durring drilling} $ $ \underline{\Psi} = 3.50 - 19:30 (7 \text{ Apr } 11) $ $ \underline{\nabla} = $
Number	Recov % Rec	Type	Blows N - V RQD	Moist	Dry I	Qu (ts Failur	Depth ft. BGS	Lithologic Description	Borehole Elevation Detail ft. MSL Remarks
1A	20/24 83%	ss	2-6 21-29 N=27				2		452
2A	24/24 100%	ss	12-19 17-23 N=36				2		450
3A	24/24 100%	ss	11-14 16-12 N=30				6		
4A	24/24 100%	ss	26-13 25-15 N=38						446
5A	20/24 83%	ss	3-6 8-8 N=14				8	Black (10YR2/1) very moist to wet, ASH and yellowis red (5YR5/6) CINDERS.	h
6A	24/24 100%	ss	4-6 7-8 N=13				12	Found layered or mixed.	
7A	24/24 100%	ss	8-14 10-12 N=24				14		
8A	22/24 92%	ss	7-8 8-9 N=16				16		
9A	22/24 92%	ss	7-7 8-9 N=15				18 -		
10.	22/24 92%	ss	22-9 9-7 N=18						434
10A	10/24	7	11-7				20		
11A 11B	16/24 67%	ss	3-4 N=10				22	Yellowish brown (10YR5/4) with 10% yellowish brow (10YR5/8) mottles, very moist, soft, silty CLAY with	n 432
12A	16/24 67%	ss	<i>1-2</i> <i>2-2</i> N=4					slight trace sand.	430
							24	End of Boring = 24.0 ft. BGS	
NO	OTE(S):	Piezo Coor	ometer P1 dinates (1	l 1-6 i north	insta ing d	Illed in & easti	borehole. ng) and elevat	ion were estimated from topographic map pending field s	urvey. Page 1 of 1



Appendix A-10

Illinois State Geological Survey Water Well Records

Water Well	Тор	Bottom
brown clay,very soft	0	20
gray clay very soft	20	25
crs sand & gravel w/bldr @ 40'(wtr brg)	25	54
gravel w/boulders very loose(wtr brg)	54	75
medium/fine sand very loose (wtr brg)	75	90
bedrock at	90	90
Total Depth Casing: 42" from -1' to 30' 26" from -1' to 57' Screen: 30' of 26" diameter 6 slot Water from sand & gravel at 25' to 87'. Static level 18' below casing top which is 2' above GL Pumping level 24' when pumping at 825 gpm for 3 hours		90
Remarks: see logbook for further location info Driller's Log filed Sample set # 60350 (0' - 85') Received: June 1, 1976 Owner Address: , Location source: Location from permit		

Permit Date: May 18, 1976

**Permit #:** 47367

COMPANY	owner	
FARM	C.I.P.SHutsonv	ille Unit
DATE DRIL	<b>LED</b> May 25, 1976	<b>NO.</b> <sup>3</sup>
ELEVATION	440TM	COUNTY NO. 29913
LOCATION	350'S line, 1630	'E line of SE
LATITUDE	39.129678	LONGITUDE -87.654686
COUNTY	Crawford	API 120332991300

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	· · · · · ·					

17 - 8N - 11W

Industrial Water Well	Тор	Bottom
cinders, sand & clay	0	Į
med to soft clay	5	22
soft gray clay	22	26
f-med s, gvl & bld	26	88
Total Depth Casing: 26" .375 WALL from 0' to 57' 42" .375 WALL from -22' to 30' Screen: 30' of 26" diameter .5 slot Grout: CEMENT from 5 to 30.		88
Size hole below casing: 42"		
Water from alluvial at 25' to 97'. Static level 15' below casing top which is 0' above GL Pumping level 22' when pumping at 826 gpm for 5 hours Permanent pump installed at 60' on , with a capacity of 600 gpm		
Driller's Log filed		
Owner Address: Hutsonville Power Generator St Hutsonv Location source: Location from permit	lle, IL	

Permit Date: August 26, 1983

**Permit #:** 109053

COMPANY	Ruester, Jol	hn T.		
FARM	Central Il H	Public Serv.Co	0.	
DATE DRIL	LED October 2	28, 1983	<b>NO.</b> 4	
ELEVATION	440GL	COU	<b>NTY NO.</b> 3386	7
LOCATION LATITUDE	350'S line, 39.129677	150'W line o: LONGITU	f se sw se <b>de</b> -87.65483	2
COUNTY	Crawford	API	1203333867	00 17 - 8

1				

L7 - 8N - 11W

Private Water Well	Тор	Bottom
sandy clay	0	5
sand & gravel	5	8
gray hardpan	8	15
gray sandstone	15	51
gry shale	51	64
coal	64	68
gray shale	68	90
Total Depth Casing: 5" PVC SDR 21 from -2' to 90' Grout: BENTONITE from 0 to 30. Nater from sandstone at 15' to 51'. Static level 11' below casing top which is 2' above GL		90
Pumping level 85' when pumping at gpm for 5 hours Permanent pump installed at 85' on December 24, 2007, with a capacity of 10 gpm		
Owner Address: 19470 N 1500 Hutsonville, IL Address of well: same as above Location source: Location from permit		

Permit Date: December 17, 2007

**Permit #:** 033-7-0

e. December	17, 2007 ICIMIC    - 0	33 / 0
AIIISON, UI		
LED December	20, 2007 <b>NO.</b>	
1	COUNTY NO. 37411	
NE NE SE		
39.135033	<b>LONGITUDE</b> -87.66725	
Crawford	API 120333741100	18 - 8N - 11W
	Van Gilder, Allison, Jin CLED December N NE NE SE 39.135033	Van Gilder, Richard E. Allison, Jim CLED December 20, 2007 NO. COUNTY NO. 37411 NE NE SE 39.135033 LONGITUDE -87.66725

#### ILLINOIS STATE GEOLOGICAL SURVEY Page 1

Irrigation Well		Тор	Bottom
dark clay		0	2
sand & gravel		2	47
coarse sand		47	61
Total Depth Casing: 16" PVC SCH 40 from 16" PVC SAWED SCRED Screen: 30' of 16" diameter 32 Grout: BENSEAL from 3 to 20. Grout: GRAVEL PACK from 20 to Static level 9' below casing t	EN from 31' to 61' slot 61.		61
Owner Address: 1008 N. Pleasa Location source: Location from			
Permit Date: June 7, 2002	Permit #:		
COMPANY Speth, James			
FARM DeMent, Margaret			
DATE DRILLED June 12, 2002	NO.		
ELEVATION 0	COUNTY NO. 36898		

LOCATION NE NE NW **LATITUDE** 39.127799 **LONGITUDE** -87.658791 COUNTY Crawford API 120333689800 20 - 8N - 11W

Irrigation Well	Тор	Bottom
topsoil	0	3
silty dark clay	3	20
gray clay	20	25
coarse gray sand with fine-med gravel	25	66
gray clay at	66	66
Total Depth Casing: 12" SCH 40 PVC from 0' to 32' Screen: 3' of 12" diameter .06 slot Grout: BENTONITE from 0 to 25. Water from sand & gravel at 25' to 66'. Static level 11' below casing top which is 1' above GL Pumping level 0' when pumping at 1000 gpm for 0 hours		66
Owner Address: R.R. #1 Sullivan, IN Address of well:		
Hutsonville, IL		
Add'l loc. info: FALSE		
S of CIPS Power Plant Location source: Location from permit		

Permit Date: January 15, 1997

Permit #: 033-1-9

COMPANY H	lacker, Tim					-
FARM Wa	ampler, Duane					ŀ
DATE DRILLE	<b>D</b> January 29, 199	8	<b>NO.</b> 1			
ELEVATION 0		COUNTY	NO. 36667			ŀ
LOCATION	NE NE NW					-
LATITUDE 39	9.127799 <b>L</b>	ONGITUDE	-87.658791	· · ·		
COUNTY Cr	rawford	API 120	333666700	20 ·	- 81	N


20 - 8N - 11W

Irrigation Well	Тор	Bottom
SS #66941 (0'-65')	0	
top soil	0	
fine brown sand	1	13
coarse brown sand	13	45
gravel & sand	45	64
Total Depth Casing: 16" PVC WC SCH 80 from 2' to 64' Screen: 30' of 16" diameter .12 slot Grout: BENTONITE from 0 to 0. Water from sand & gravel at 0' to 0'.		64
Sample set # 66941 (0' - 65') Received: June 2, 1989 Owner Address: R.R. #1 Box #3 Hudsonville, IL Location source: Location from permit		
Permit Date: February 10, 1989 Permit #: 139	9628	l
COMPANY Erwin, Harold E.		
FARM Dement, Margaret R.		
DATE DRILLED March 24, 1989 NO.		
ELEVATION 0 COUNTY NO. 35196		
LOCATION NW NW NW		

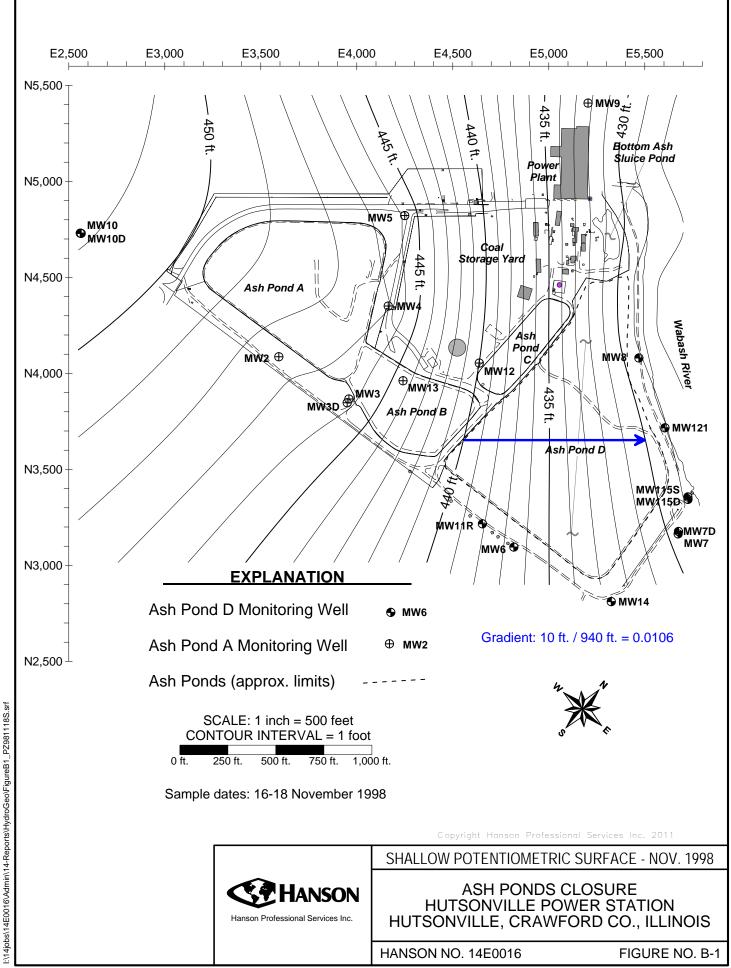
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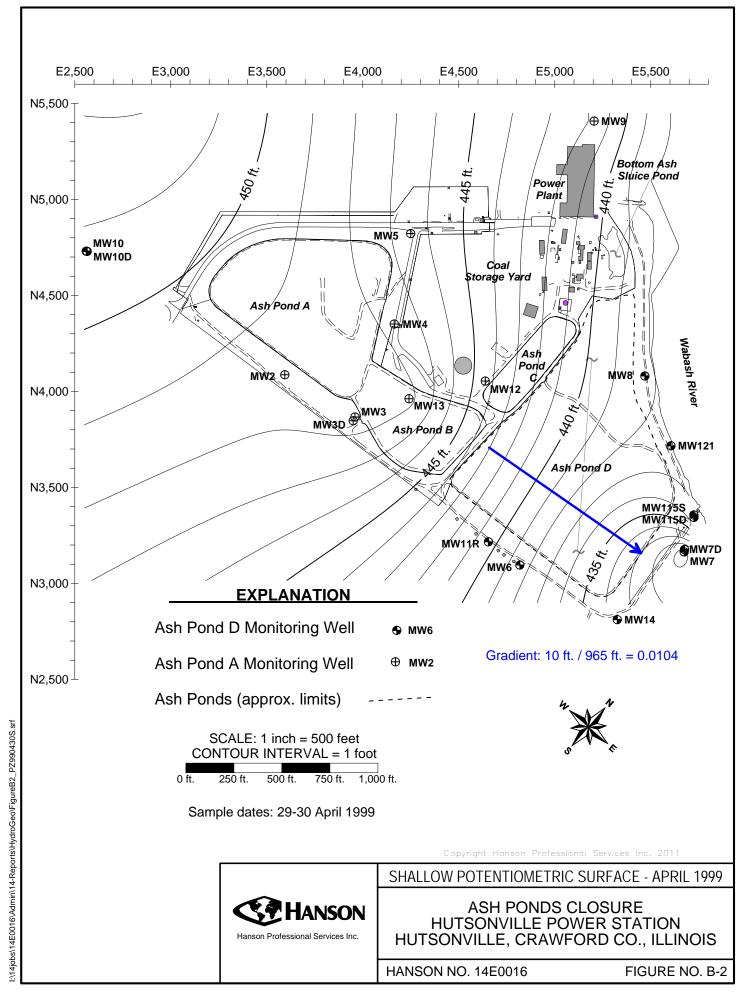


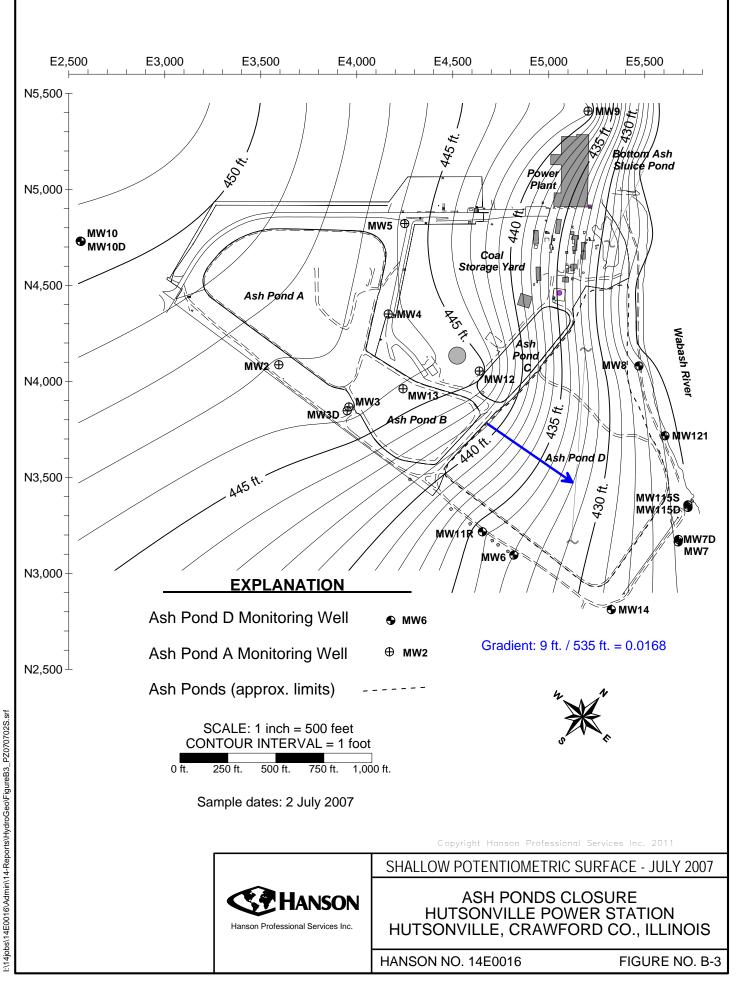
# Appendix B

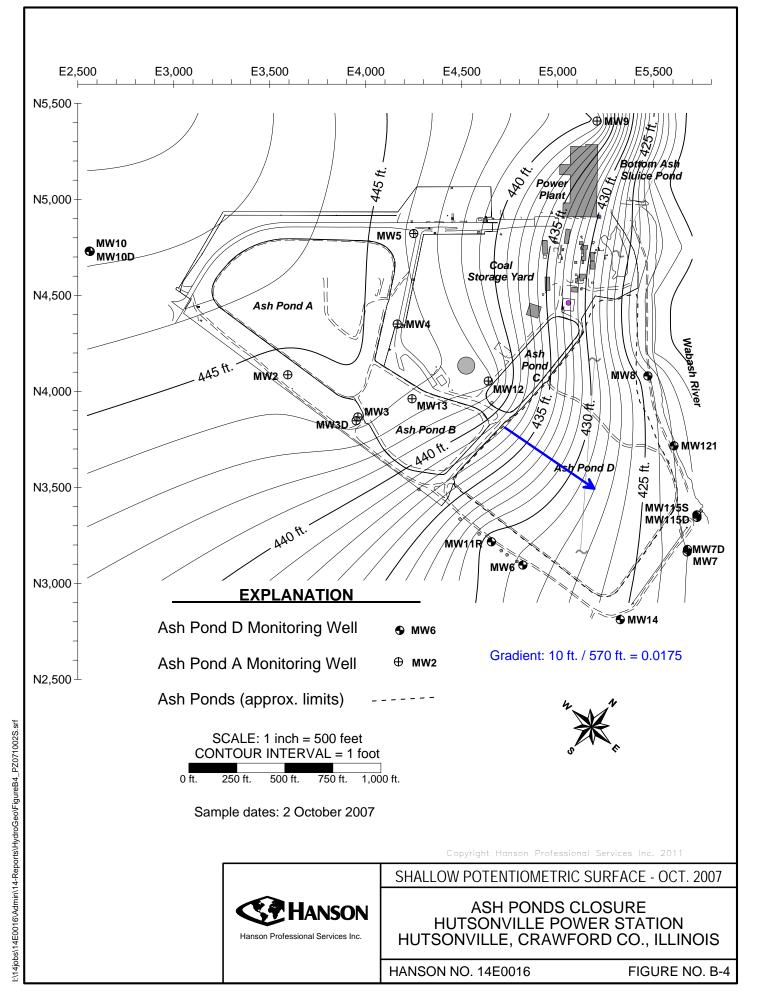
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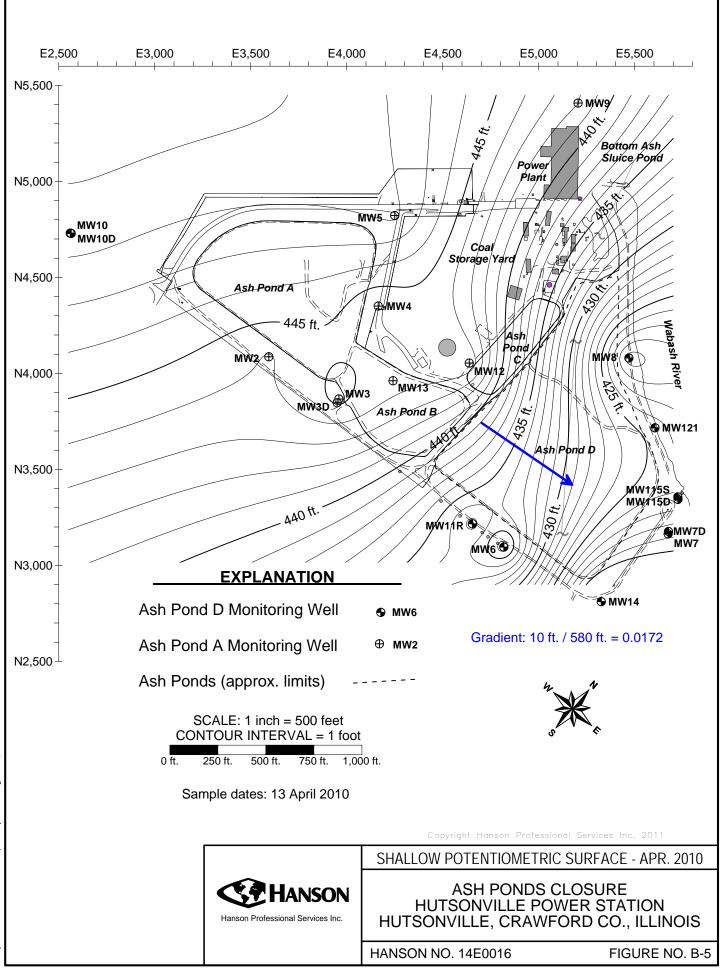


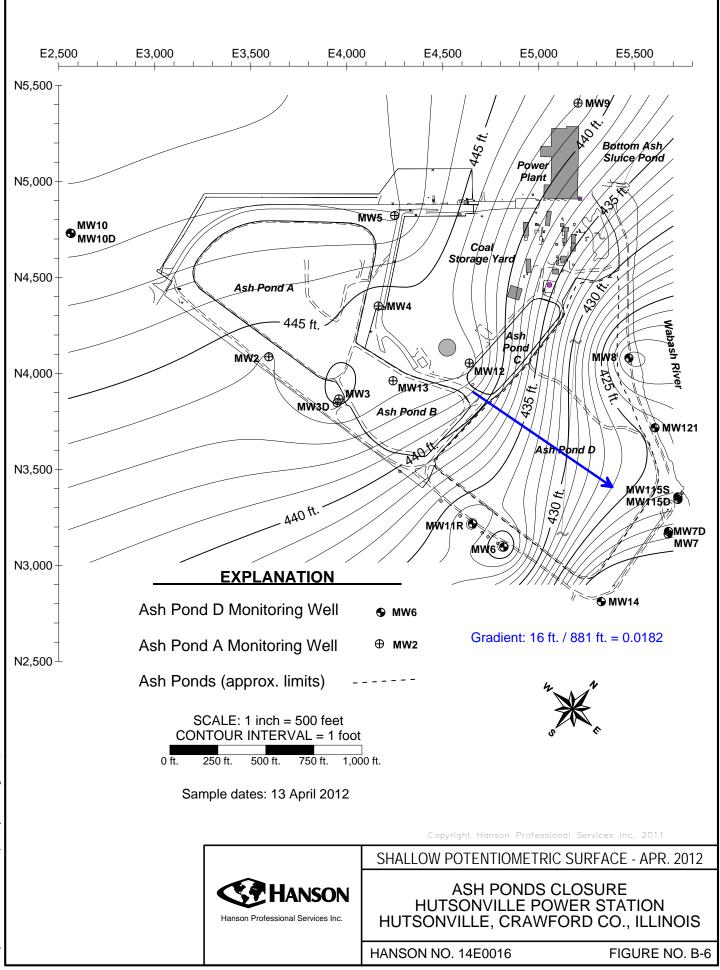


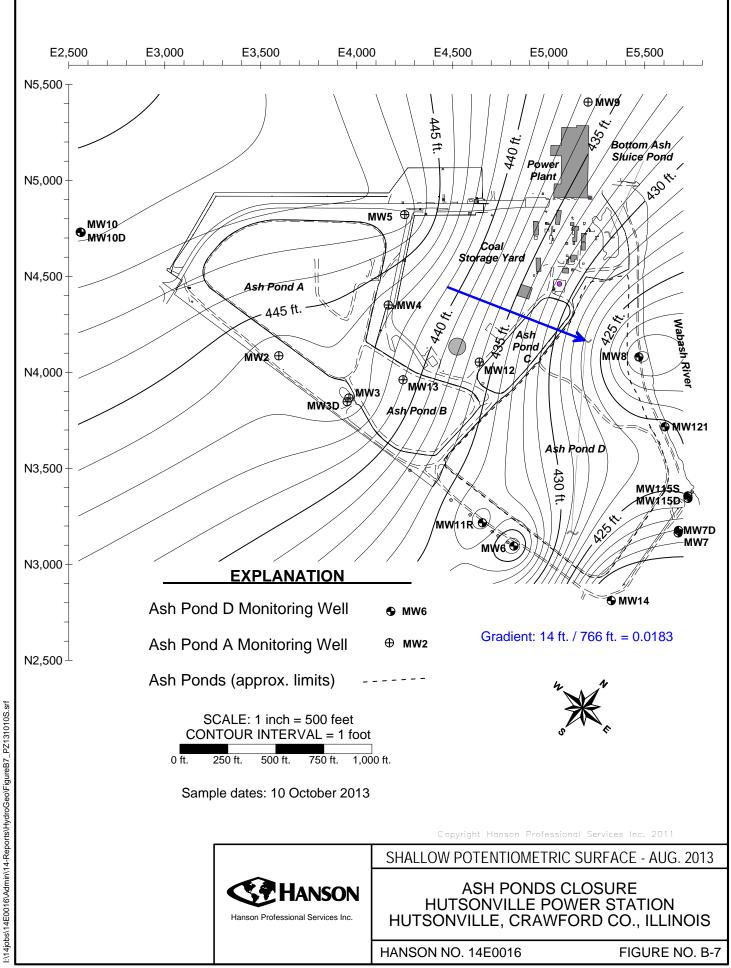


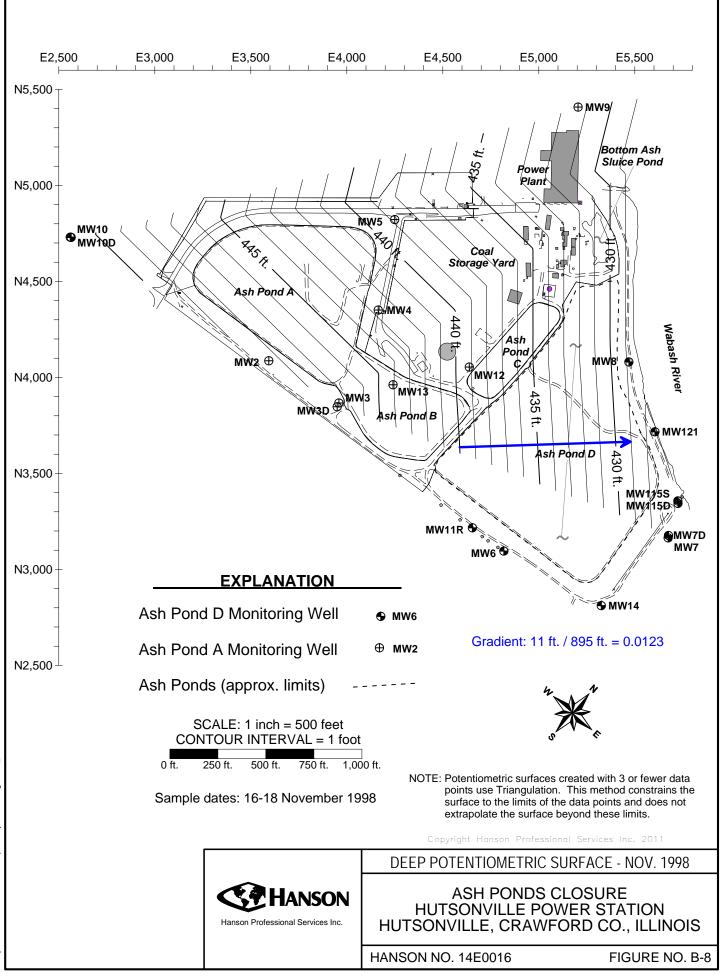


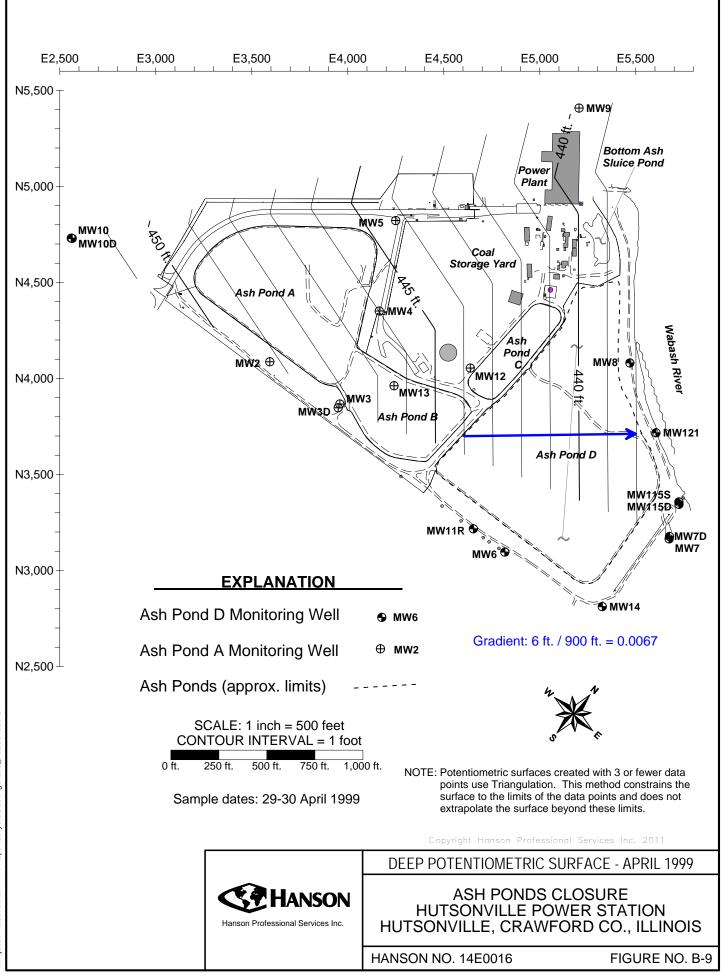




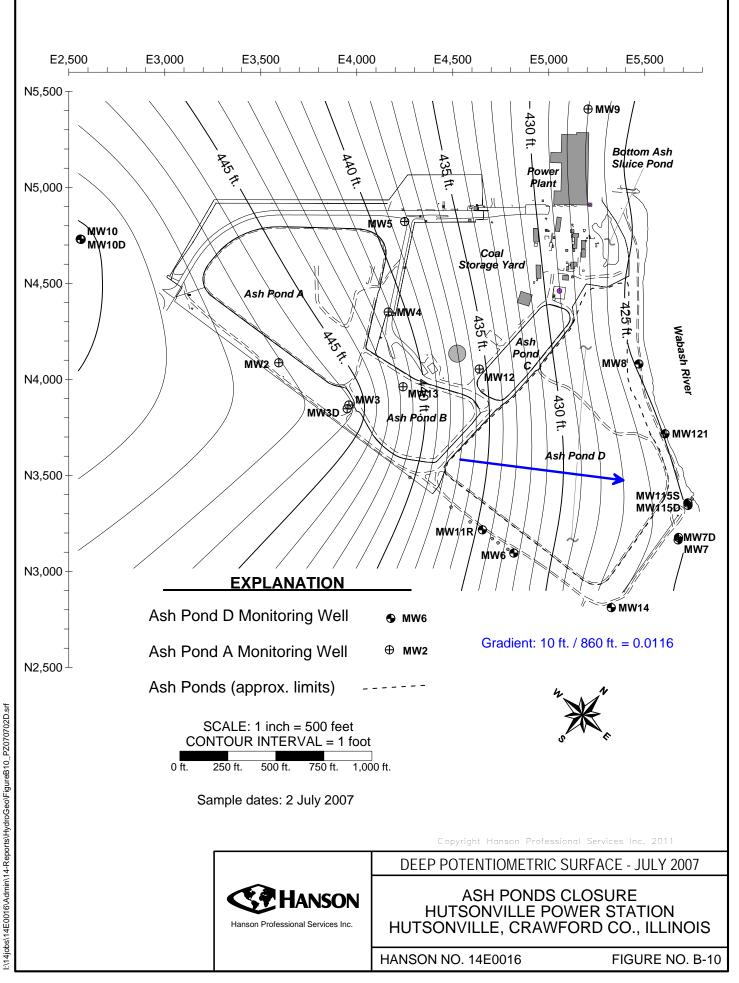




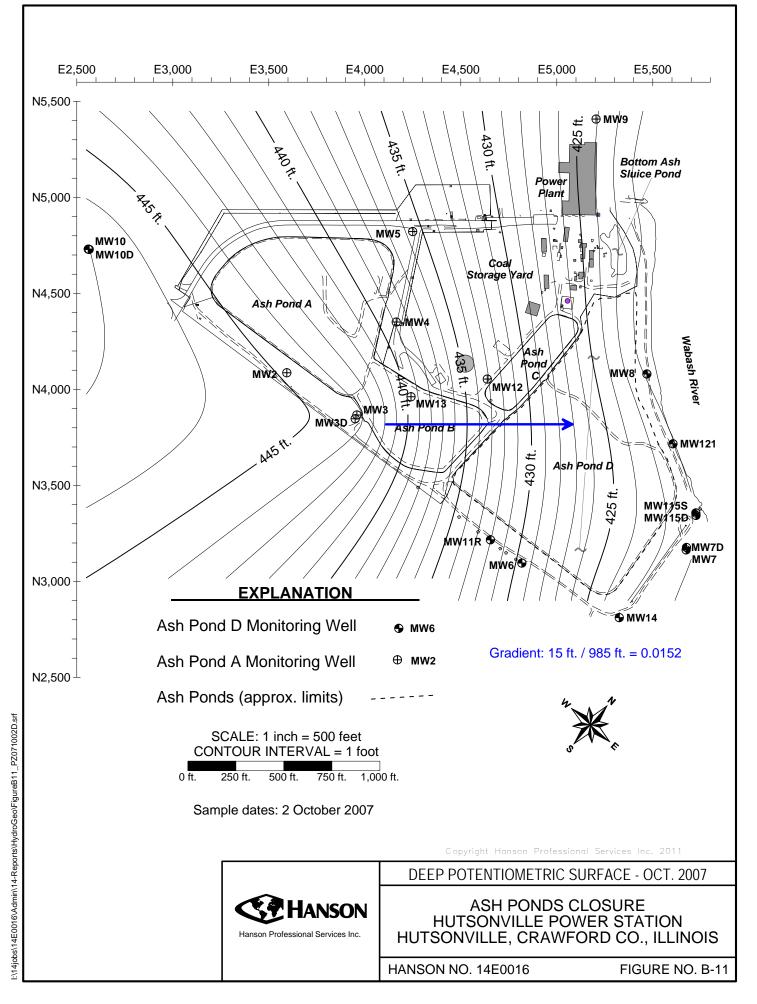


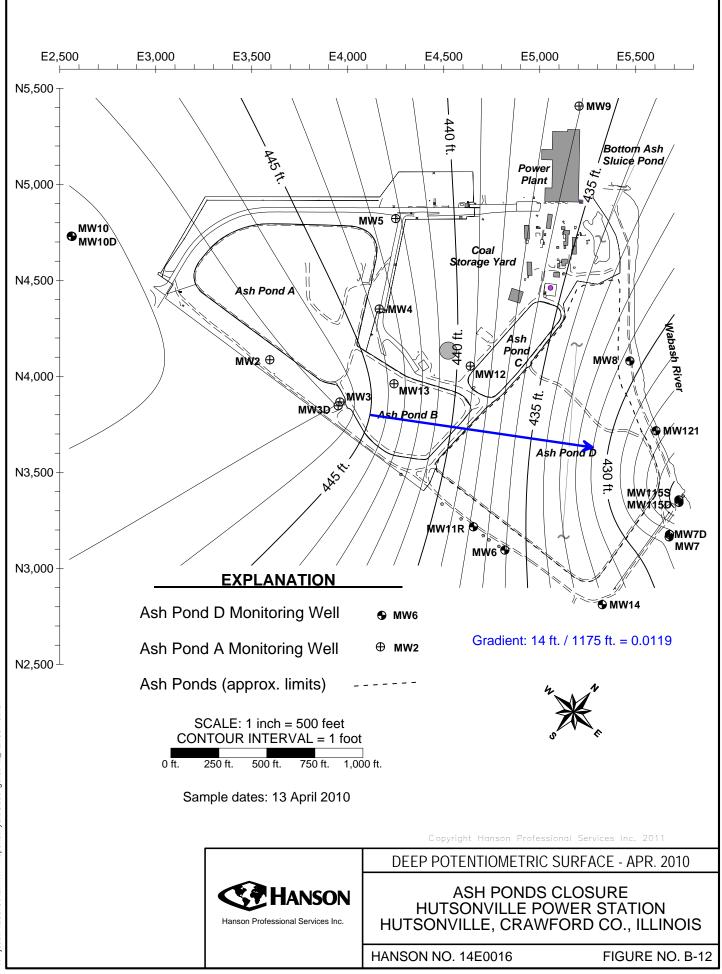


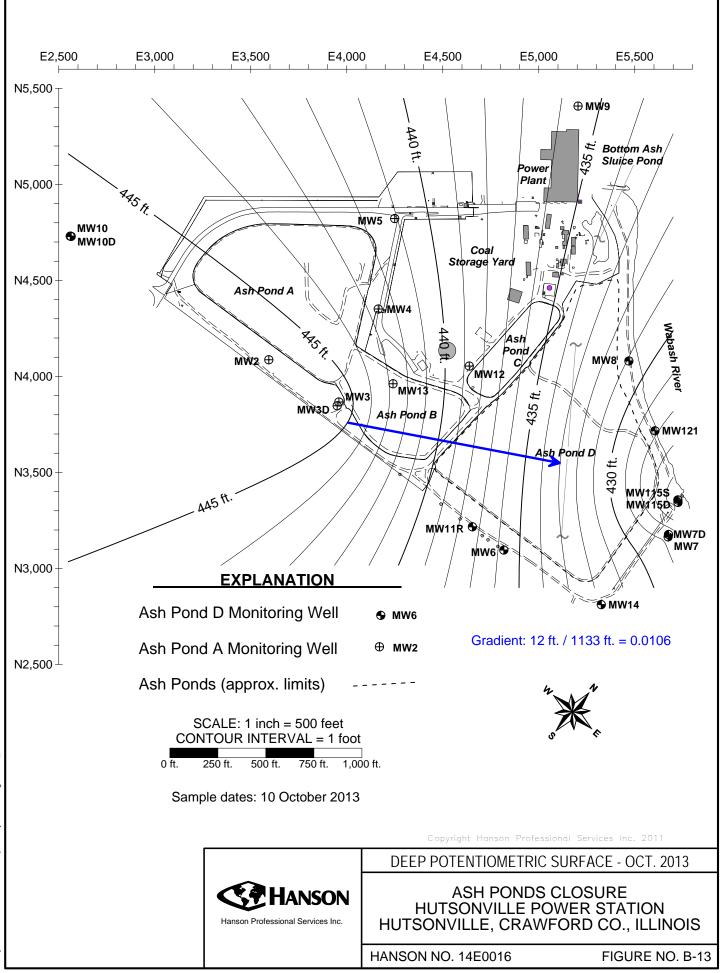
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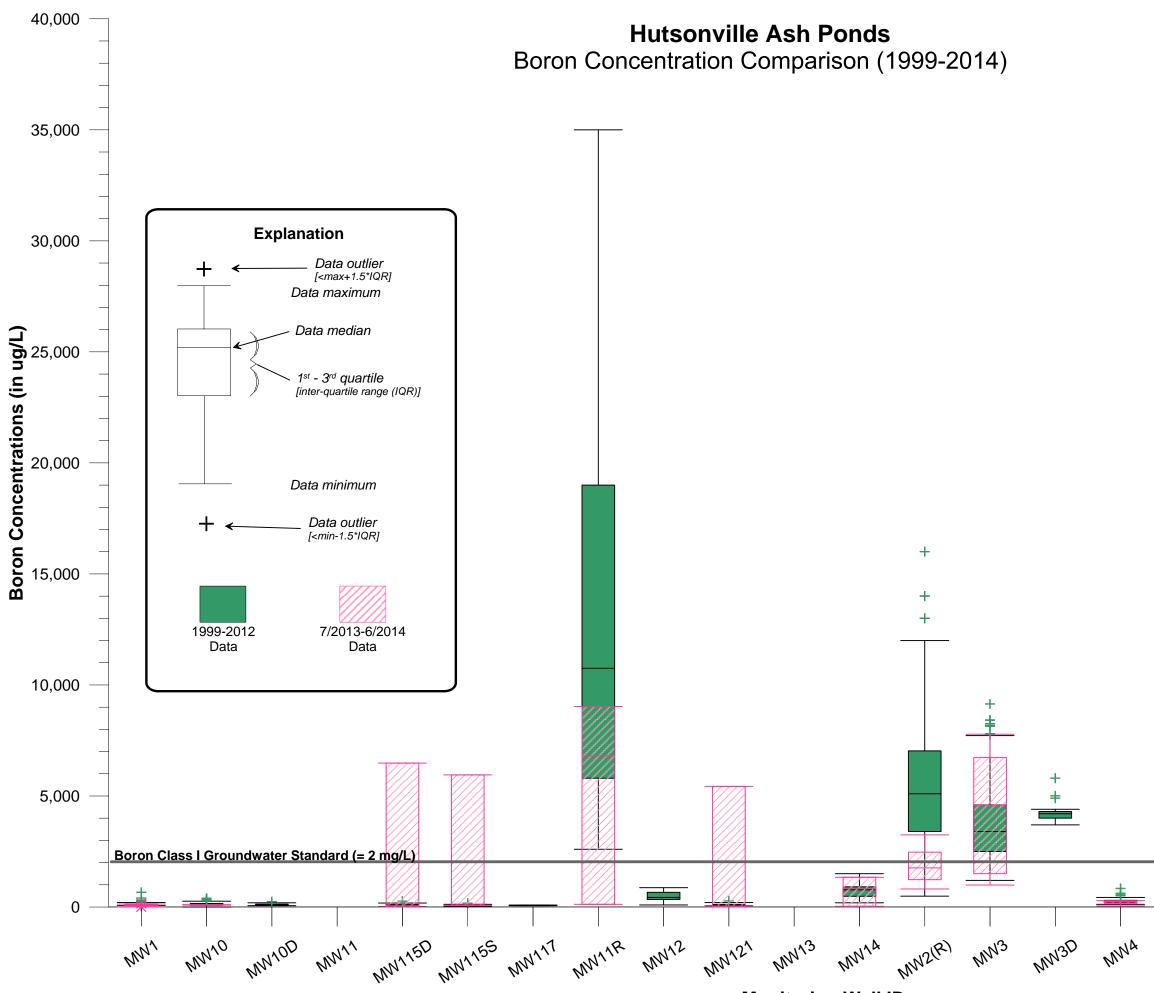




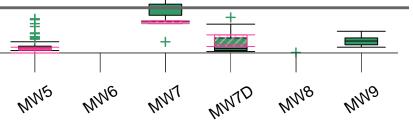
## Appendix C

**Groundwater Quality Information** 

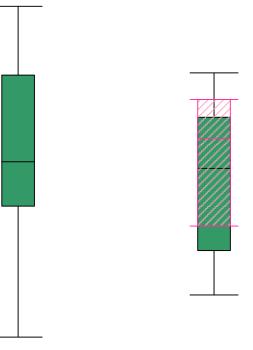


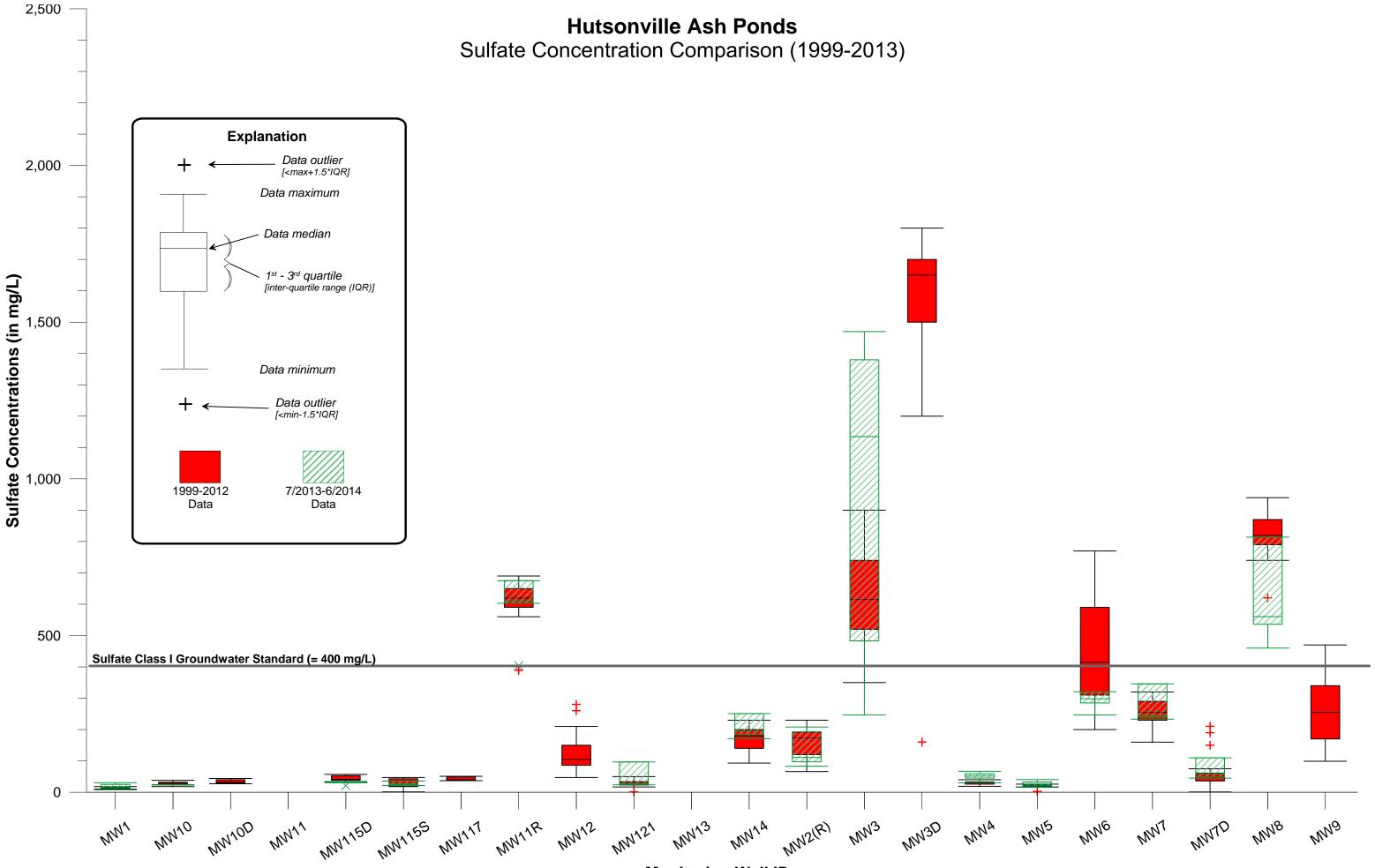


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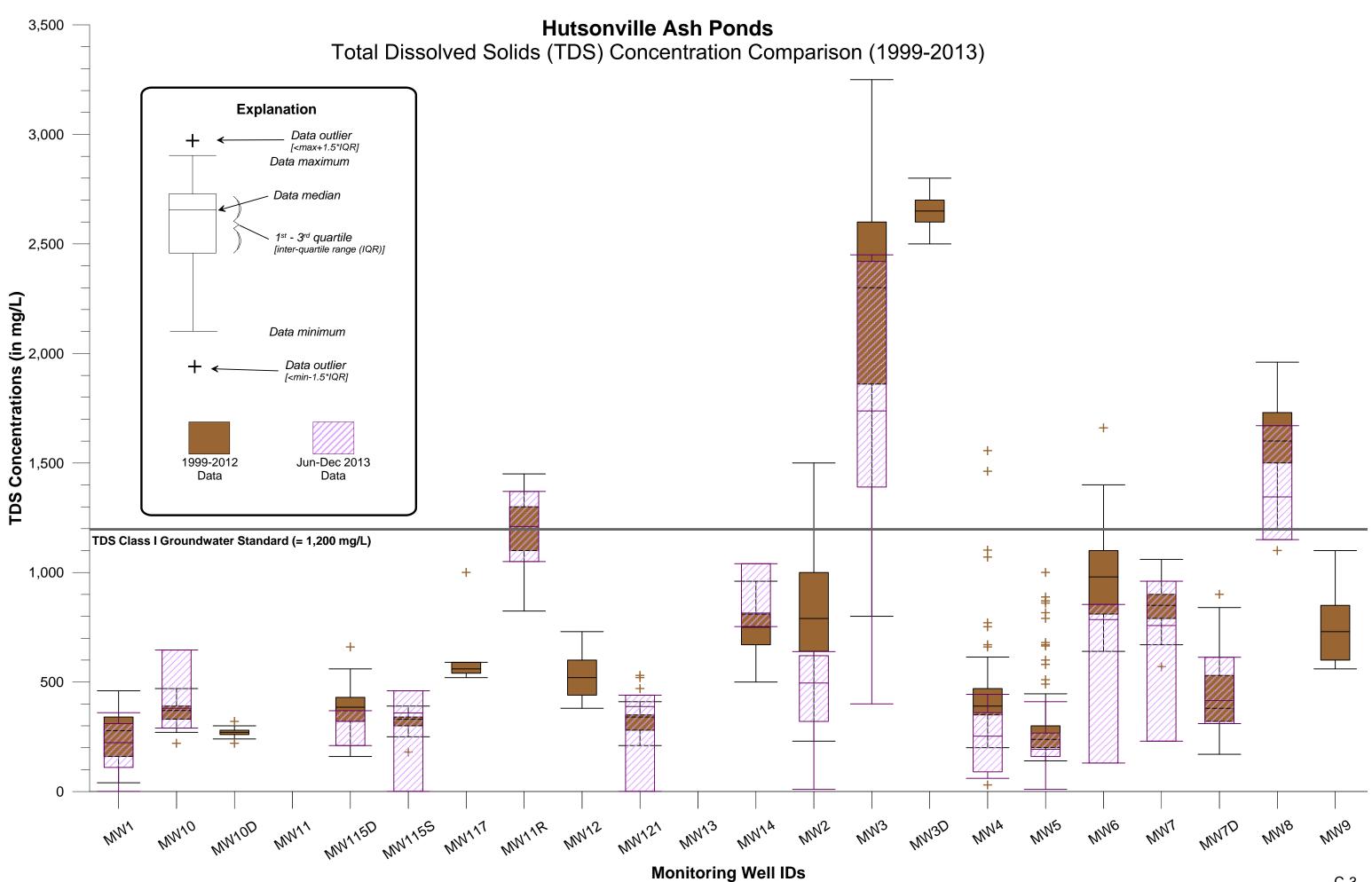






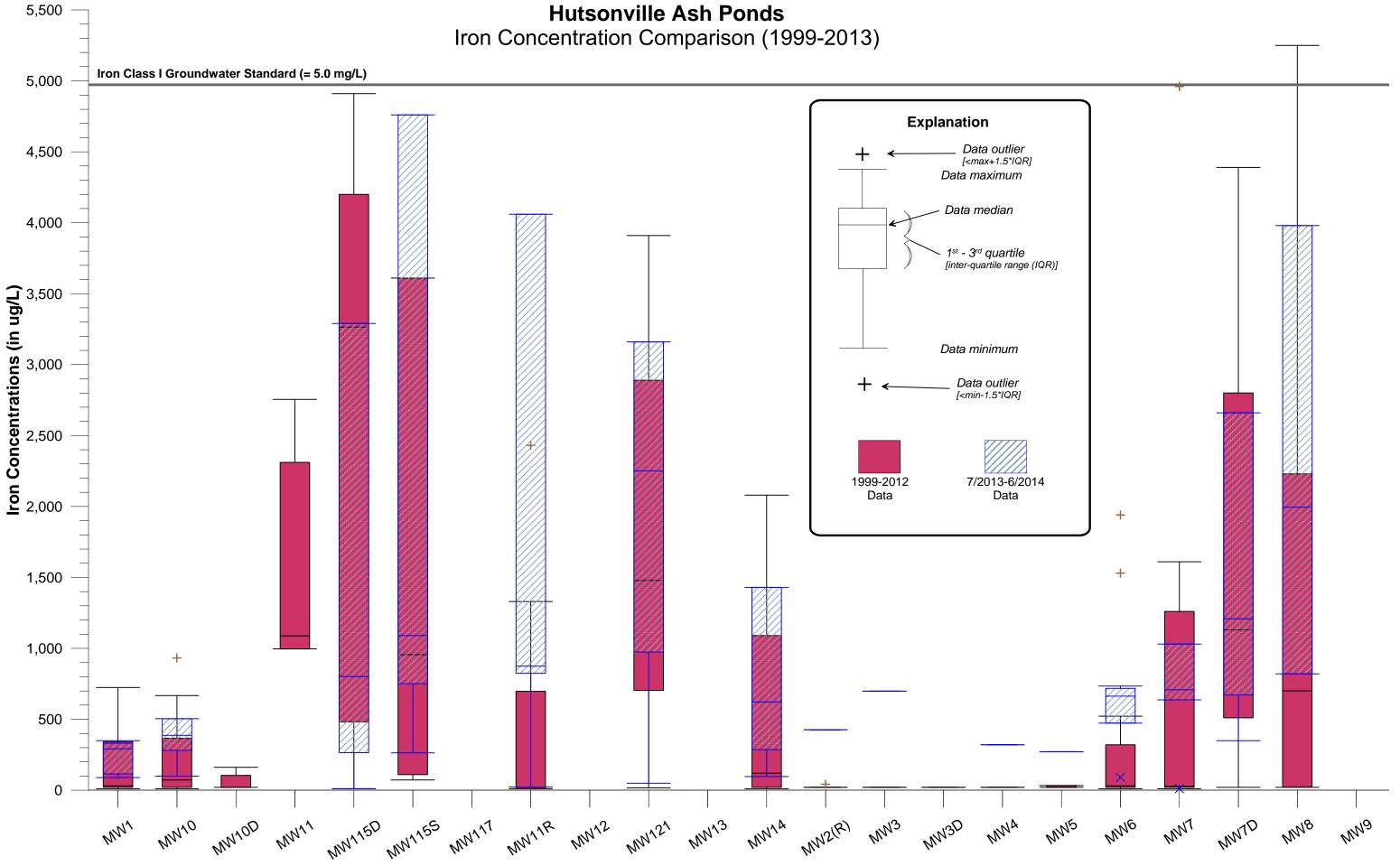


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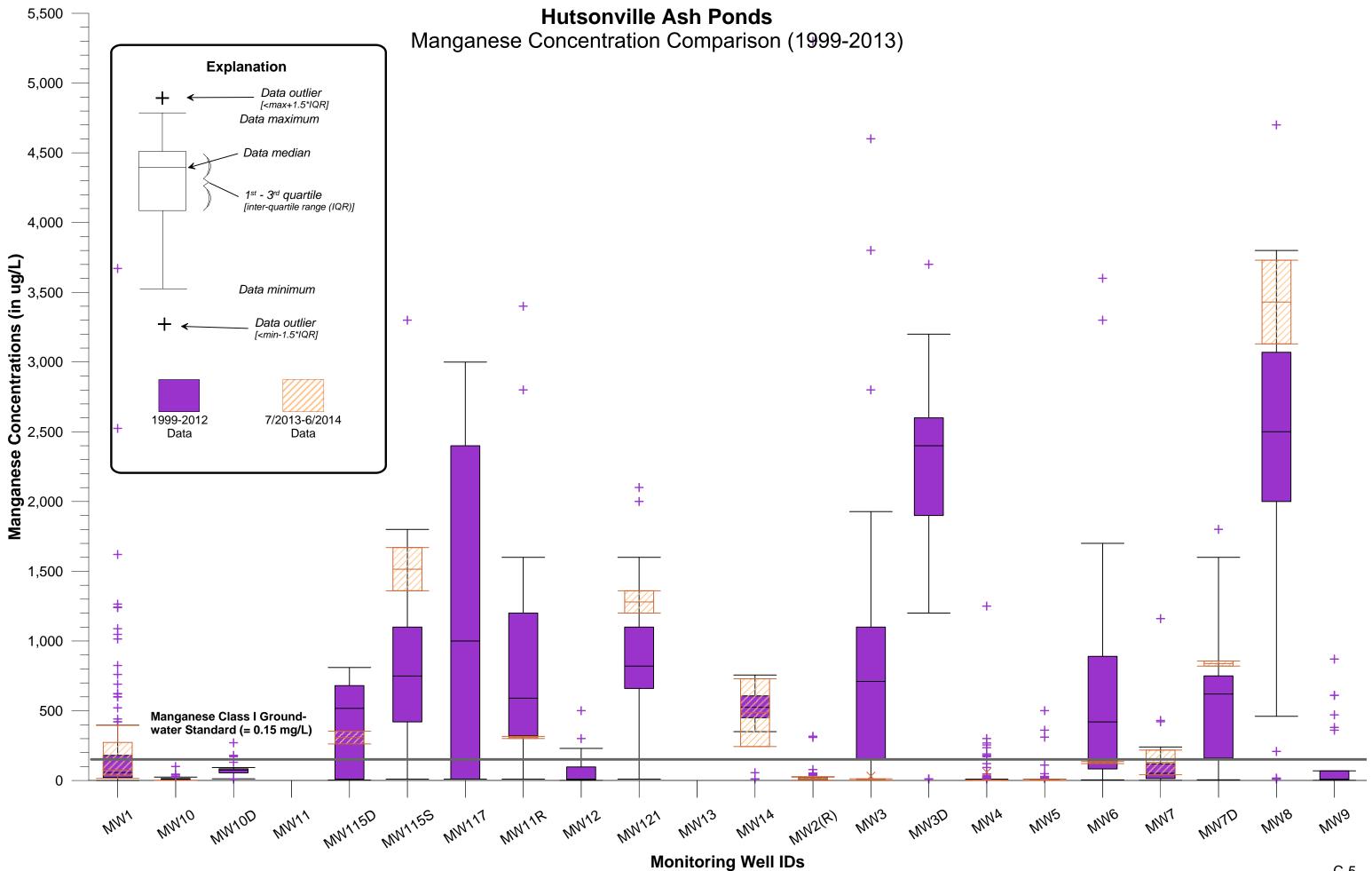
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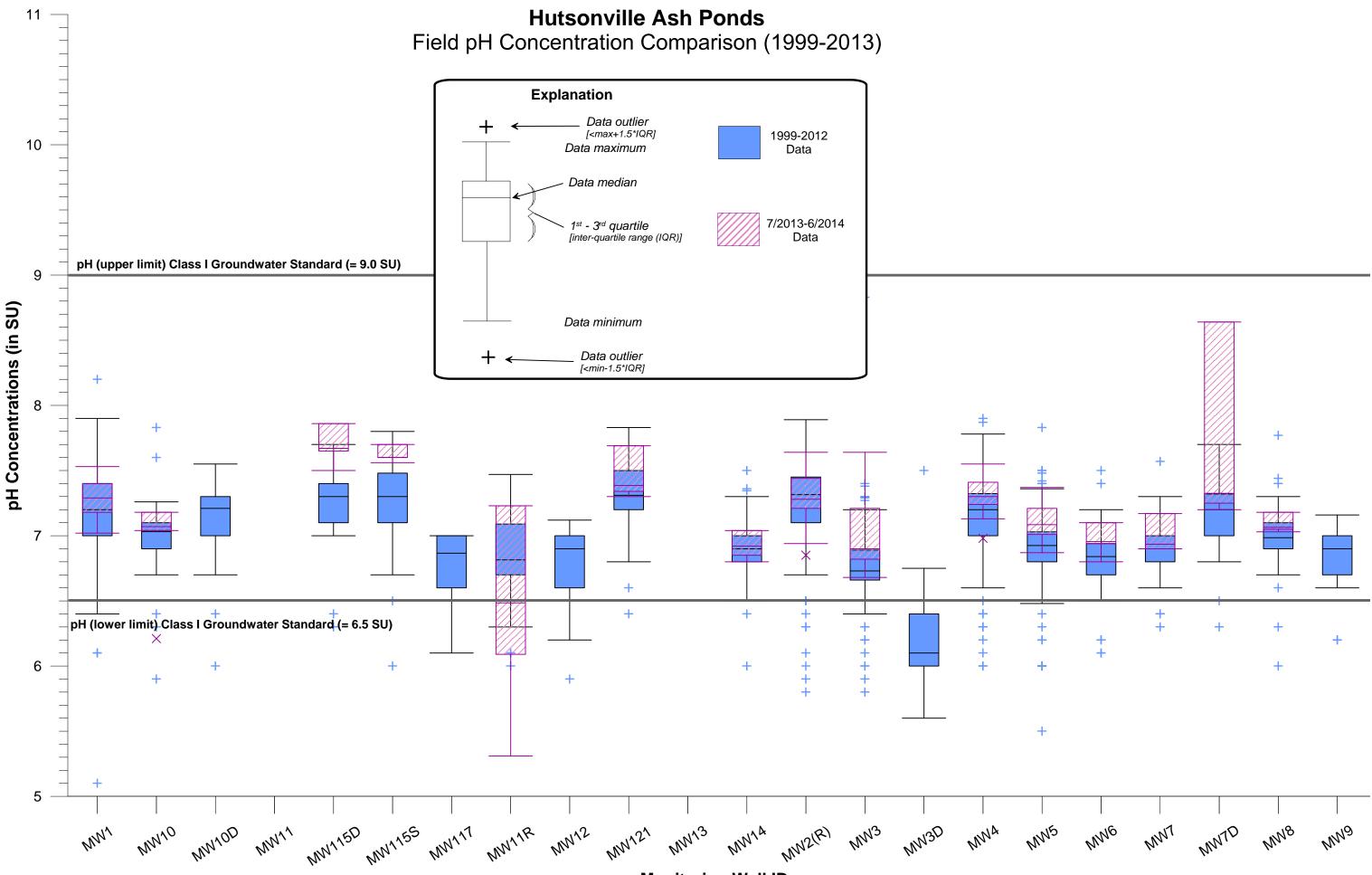
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