

Chapter 9

**Letter of Agreement for
Restriction of Shallow Water Well Drilling**



THIS LETTER OF AGREEMENT memorializes various discussions representatives from Ameren have had with you regarding groundwater contamination that extends onto your property located in Crawford County, Illinois, and near the City of Hutsonville ("Property"). AmerenEnergy Generating Company (AEG) owns and operates the Hutsonville Power Station located directly north of your property. AEG is seeking regulatory approval from state environmental officials to cap and close one of the coal ash ponds located on the plant property. Restricting the usage of shallow groundwater for certain purposes on portions of your property would facilitate such closure and the approval process.

Such restriction would be accomplished by your agreement not to install wells within the first twenty-five (25) feet of the water table underlying the Property. Please find attached Exhibit A, a site photo/diagram depicting the area within which such groundwater use restriction would apply, as well as a legal description describing the cross-hatched restricted area. Note there are no restrictions on the use of the Property (i.e., agricultural, commercial, industrial or residential) and current irrigation and farming practices are not impacted.

The parties understand that if required by either the Illinois Environmental Protection Agency or the Illinois Pollution Control Board, this Letter of Agreement may be recorded within the chain of title for the Property with the Office of the Recorder of Deeds in Crawford County, Illinois. The parties agree that under no circumstances will this Letter of Agreement be recorded until such time as Ms. DeMent, or her estate, conveys or transfers title to such Property. This Letter of Agreement shall apply and benefit each party and their respective successors, assigns, future owners and the estate of any individual owner.

If the foregoing accurately sets forth our understanding, please indicate your agreement with the terms of this Letter of Agreement by signing where indicated below.

AGREED AND ACCEPTED THIS 14 DAY OF APRIL, 2009.

By: Margaret R. DeMent
Margaret R. DeMent, Owner

By: Dennis W. Welsenborn
Dennis W. Welsenborn
Vice President

STATE OF ILLINOIS

COUNTY OF Crawford } SS

I, the undersigned, a Notary Public, in and for said County and State aforesaid, DO HEREBY CERTIFY, that MARGARET. R. DEMENT, a single person, personally known to me to be the same person whose name is subscribed to the forgoing instrument, appeared before me this day in person and acknowledged that she signed, sealed and delivered the said instrument as her free and voluntary act, for the uses and purposes therein set forth.

GIVEN under my hand and Notarial Seal this 14 day of April, 2009.

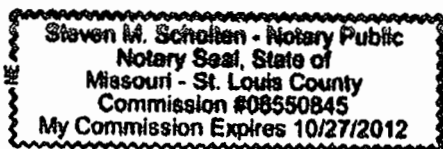


William B. Thompson
Notary Public

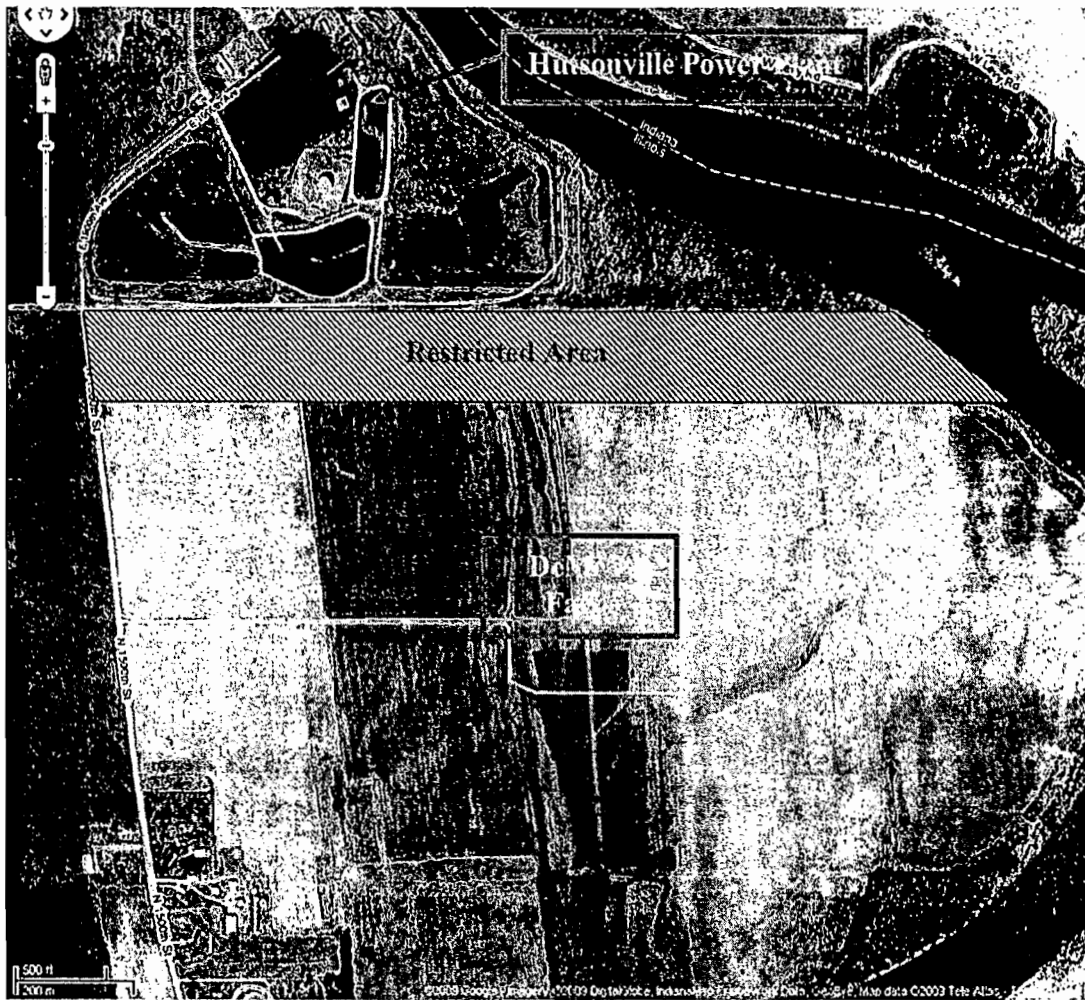
STATE OF MISSOURI }
CITY OF ST. LOUIS SS

On the 13th day of APRIL, 2009, before me appeared Dennis W. Weisenborn, to me personally known, who being by me duly sworn, did say that he is a Vice President of AmerenEnergy Generating Company, and that such instrument was signed in behalf of said corporation by authority of its Board of Directors, and said Dennis W. Weisenborn acknowledged said instrument to be the free act and deed of said corporation.

My commission expires 10-27-2012



Steven M. Scholten
Notary Public



**Exhibit A: Ariel View of DeMent
Farm showing the 56.24 Acres m/l of
Restricted Area**

The area shown on the above photo located 500 feet South of the Hutsonville Generation Plant boundary, in the North Half of Section 20, Township 8 North, Range 11 West of the Second Principle Meridian, Crawford County, Illinois, lying East of Township Road 254A which extends in a Northwesterly direction across said Section 20 AND the area shown 500 feet South of the Hutsonville Generation Plant boundary, in the North Half of Section 21, Township 8 North, Range 11 West of the Second Principle Meridian, Crawford County, Illinois, lying West of the Wabash River.



Chapter 10



TECHNICAL MEMORANDUM

www.naturalrt.com

Date: April 28, 2009

Subject: Preliminary Groundwater Monitoring Plan: Hutsonville Pond D

From: Bruce Hensel

Introduction

This technical memorandum outlines a groundwater monitoring program for the above-mentioned facility. Included are background materials, monitoring well details, and a description of a conceptual plan for monitoring groundwater at this facility. A final monitoring plan will be included in the Pond D Closure Plan. The final plan will include: procedures for groundwater sampling, sample preservation and shipment, analytical methods, quality assurance and quality control, recordkeeping, and analysis and reporting of results.

Background

Ameren Energy Generating Company (AEG) operates an impoundment system with five ponds at the Hutsonville generating station (Figure 1). Ponds A and B are lined impoundments that currently receive coal combustion by-product (CCB), Pond C is a lined impoundment that receives stormwater runoff and other flows from the plant, and Pond D is an unlined impoundment that formerly received CCB and is now removed from service. The fifth pond receives bottom ash. Ponds A, B, C, and the bottom ash pond are permitted under the IEPA Bureau of Water's Water Pollution Control program. Pond D, which was formerly permitted under the Water Pollution Control program, will be closed under the Bureau of Land's Solid Waste program.

Site Hydrogeology

The impoundments are underlain by two water-bearing units separated by materials that have low hydraulic conductivity (shale bedrock or silts and clays). The upland portion of the power plant property (the site), and the western portion of Pond D, are underlain by a thin (less than 20 feet thick) layer of sand-rich soil, which is underlain by Pennsylvanian-age sandstone and then shale (Figure 2, Cross-

Section A-A'). The lowland portion of the site and eastern portion of Pond D are underlain by 90 feet of alluvium in the Wabash River bedrock valley. The upper 20 feet of alluvium is fine-grained, primarily composed of silt and clay with thin sand lenses, while the lower 70 feet is coarse-grained, consisting of sand and gravel. Every boring drilled over the alluvium encountered the fine-grained deposits, and on-site borings that extended to the underlying sand and gravel (SB101, SB102, MW7D, MW14, MW115, and MW121) encountered 19 to 25 feet of these deposits (Figure 2, Cross-Section B-B'). Pennsylvanian-age shale underlies the alluvium.

The shallow upland sand and sandstone, and sand lenses in the fine-grained alluvium are referred to as the upper migration zone, and constitute the uppermost aquifer at this site. The coarse-grained alluvium is referred to as the deep alluvial aquifer. The shale underlying the upland sandstone and the silts and clays of the fine grained alluvium separate the upper migration zone from the deep alluvial aquifer.

Groundwater flow was mapped for four consecutive quarters in 2003-2004, and again in 2007. During the 2003-2004 period, depth to water readings for all of the upper migration zone and one of the deep alluvial aquifer maps were not collected on the same day. While this discrepancy did not appear to change map depictions of the overall direction of groundwater flow, it affected relative readings between wells. Therefore, the second set of drawings was produced using data collected after the plant initiated same-date measurements beginning in 2006. All maps show that groundwater flow in the upper migration zone and the deep alluvial aquifer is eastward toward the Wabash River (Figures 3 and 4).

Groundwater Quality

AEG has performed groundwater monitoring at this facility and found concentrations of boron and sulfate higher than Class I standards in Pond D monitoring wells screened in the upper migration zone. No concentrations in the deep alluvial aquifer exceed Class I standards. Sulfate and boron are mobile indicator parameters for coal ash leachate.

Impacted Pond D monitoring wells in the upper migration zone are MW-6, MW-7, MW-8, and MW-11R. The fine-grained alluvial deposits overlying the deep alluvial aquifer occur over an elevation range that overlaps the upland shale (Figure 2-1, Cross-Section A-A'), combining to form a confining layer that restricts vertical migration of groundwater. The efficacy of the confining layer is supported by the concentration data, because the only ash leachate impacts observed in the deep alluvial aquifer are highly localized, and at concentrations lower than Class I standards and much lower than in the upper migration zone, despite the fact that Pond D was first placed in service 40 years ago.

AEG currently has a groundwater monitoring program for Pond A. The Pond A monitoring program is designed for detection of a release from that lined pond. It consists of five monitoring wells completed in the upper migration zone, and five parameters with listed limitations, on a monthly basis (Table 1).

Pond D Monitoring Program

The Pond D groundwater monitoring program is summarized in Table 2.

Monitoring Wells

Table 3 lists monitoring well completion details; boring and well completion logs are provided in Attachment A. Monitoring wells MW-1 and MW-10 provide upgradient data for the upper migration zone. There are no suitable locations for deep alluvial aquifer background monitoring points, because the Wabash River overlays the western edge of the deep alluvial aquifer north of Pond D.

Analytical Constituents

Boron and sulfate are the primary indicators of coal ash leachate. These constituents are persistent, mobile, and typically present in elevated concentrations in coal ash leachate. Additional monitoring of pH, specific conductance, groundwater elevation, and monitoring well depth will be completed during each sample event.

In addition to the field parameters and ash indicators, inorganic constituents with Illinois Class I groundwater quality standards will be analyzed at least once each year until a demonstration is made that the constituents can be removed from the monitoring program.

Schedule

Groundwater will be sampled on a quarterly basis for the first five years after closure.

The frequency of groundwater sampling will be reduced to semi-annual sampling upon a determination of all of the following:

- Five years after closure;
- That monitoring effectiveness has not been compromised by the reduced frequency of monitoring;
- That sufficient quarterly data has been collected to characterize groundwater; and

- That concentrations of monitored constituents at the downgradient monitoring wells show no statistically significant increasing trends that are attributed to a release from Pond D.

The frequency of groundwater monitoring will be reduced to annual sampling upon determination of either of the following:

- Beginning fifteen years after closure; or
- Five years after concentrations of monitored constituents in downgradient groundwater show no statistically significant increasing trends that are attributed to Pond D.

Ash indicator constituents, field parameters, manganese, and iron will be analyzed in each sample, while the remaining constituents will initially be analyzed once each year. If any of the annual constituents are detected at a concentration higher than the Illinois Class I groundwater quality standard, then that constituent will be analyzed in each sample until it can be demonstrated that a return to annual sampling is appropriate.

Table 1
Hutsonville Pond A Monitoring Program

Wells	Position	Parameters	Frequency
MW-1	Background	pH, TDS, Boron, Manganese, Sulfate	Monthly
MW-2	Sidegradient		
MW-3	Downgradient		
MW-4	Downgradient		
MW-5	Downgradient		

Notes:

Per Permit No. 2005-EO-3689

Table 2
Hutsonville Pond D Monitoring Program Summary

a. Monitoring Wells

Upper Migration Zone	Position	Deep Alluvial Aquifer*	Position
MW-1	Upgradient	MW-7D	Downgradient
MW-10	Upgradient	MW-121	Downgradient
MW-6	Downgradient	MW-14	Downgradient
MW-7	Downgradient	MW-115D	Downgradient
MW-8	Downgradient	MW-115S	Downgradient
MW-11R	Downgradient		

Note:

* Notations in parentheses are former names of deep alluvial aquifer monitoring points,

b. Parameters

Parameter	Initial Schedule	Notes
pH	every sample	field parameter
Specific Conductance	every sample	field parameter
Groundwater Depth	every sample	field parameter
Well Depth	every sample	field parameter
Boron	every sample	CCB indicator parameter
Sulfate	every sample	CCB indicator parameter
Iron	every sample	
Manganese	every sample	
TDS	every sample	
Antimony	annual	
Arsenic	annual	
Barium	annual	
Beryllium	annual	
Cadmium	annual	
Chloride	annual	
Chromium	annual	
Cobalt	annual	
Copper	annual	Frequency will be
Cyanide	annual	increased to every sample
Fluoride	annual	if an annual concentration
Lead	annual	is higher than the Class I
Mercury	annual	standard.
Nickel	annual	
Nitrate as N	annual	
Selenium	annual	
Silver	annual	
Thallium	annual	
Zinc	annual	

c. Sample Schedule

Period	Sample Frequency
0 to 5 years after closure	quarterly
After 5 years	see monitoring plan text

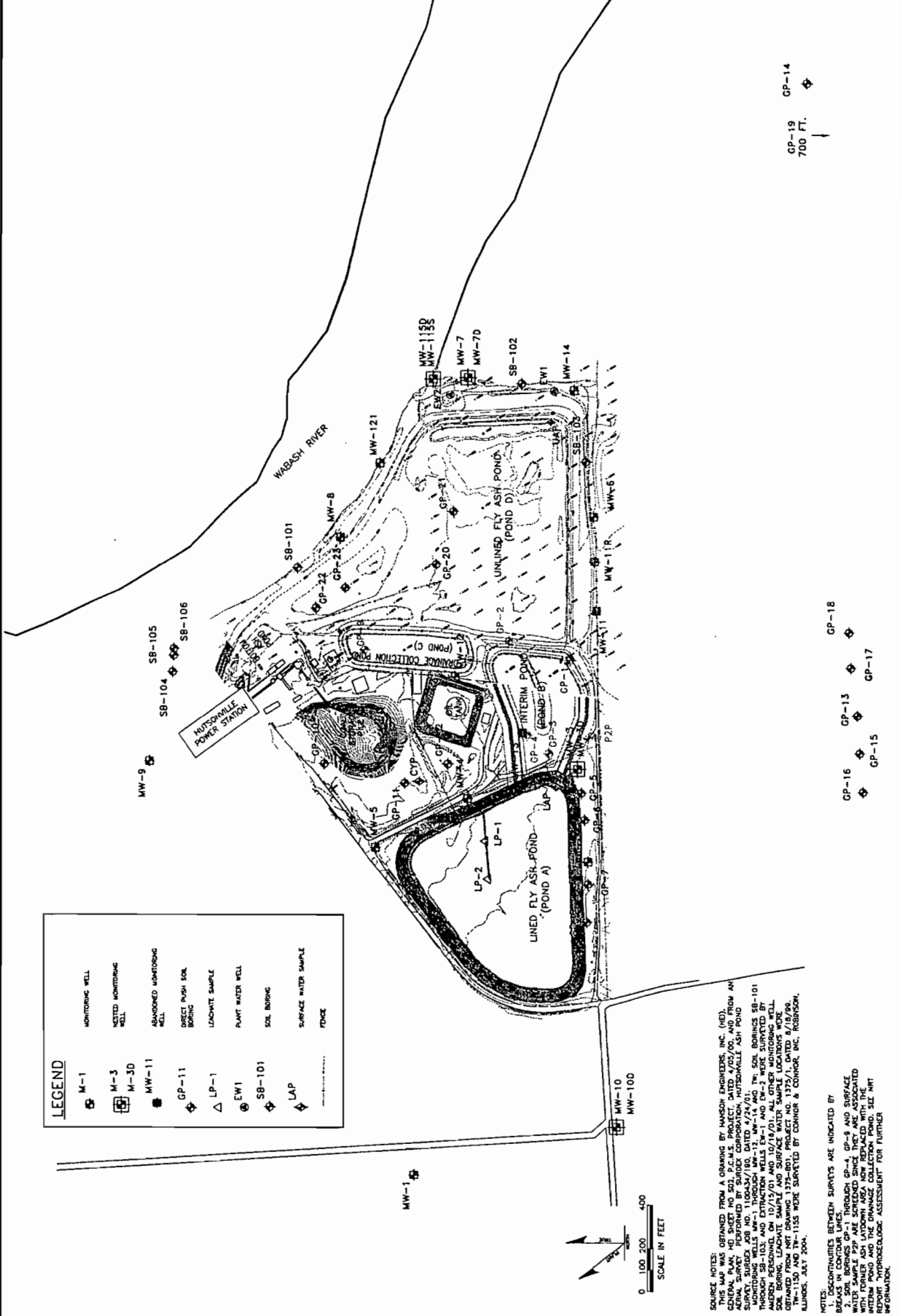
Table 3

Hutsonville Monitoring Well Elevations, Depth to Bedrock, and Screened Formation

Well	Date Drilled	Surface Elevation (ft, MSL) ¹	TOC ¹ Elevation (ft, MSL)	Boring Depth (ft, BGS) ²	Total Depth (ft, BGS)	Depth to Bedrock (ft, BGS)	Bedrock Elevation (ft, MSL)	Bedrock Penetration (ft)	Screened Formation ³	Hydraulic Conductivity (cm/s)
Pond A Monitoring Wells										
MW-1	2/14/1984	456.4	459.12	9.1	8.9	6.3	450.1	2.7	U - sand, ss	4.1E-05
MW-2	2/10/1984	453.4	456.03	21.5	18.1	>21	<431.8	0	U - s&g	n/a
MW-3	2/9/1984	453.5	455.16	9.4	10.8	10.3	443.2	0.5	U - s&g	2.7E-02
MW-4	2/13/1984	454.2	457.07	13.4	12.3	10.7	443.5	2.5	U - s&g, ss	n/a
MW-5	2/13/1984	452.2	454.89	19.2	17.9	17.7	434.5	1.4	U - s&g, ss	8.0E-03
Pond D Monitoring Wells										
MW-1	2/14/1984	456.4	459.12	9.1	8.9	6.3	450.1	2.7	U - sand, ss	4.1E-05
MW-6	2/9/1984	439.0	443.66	11.4	11.5	8.5	430.5	3.0	U - s&g, ss	3.2E-02
MW-7	2/8/1984	438.0	442.70	25.0	25.1	>25	<394	0	U - si s&g	2.6E-04
MW-7D	10/5/1998	437.5	438.45	45.0	44.3	>44	<394	0	A - si s&g	4.8E-02
MW-8	2/7/1984	440.4	444.25	21.5	22.5	>21.5	<419	0	U - si sand	-4-
MW-10	10/7/1998	452.9	454.23	11.0	10.7	7.5	445.4	3.5	U - si s&g, ss	6.2E-04
MW-11R	10/3/2001	440.9	443.55	16.0	15.5	16.0	424.9	0.0	U - s&g	-5-
MW-14	10/3/2001	440.9	443.35	39.0	33.0	>39	<401.9	0.0	A - s&g	-5-
MW-115D	5/1/2004	438.4	440.80	105.0	105.0	90.0	348.4	15.0	A - s&g	1.2E-02
MW-115S	5/1/2004	438.4	440.89	35.0	35.0	90.0	348.4	0.0	A - s&g	9.3E-02
MW-121	10/2/2001	437.8	440.59	39.5	39.0	>39.5	<398.3	0.0	A - s&g	2.4E-02

Notes:

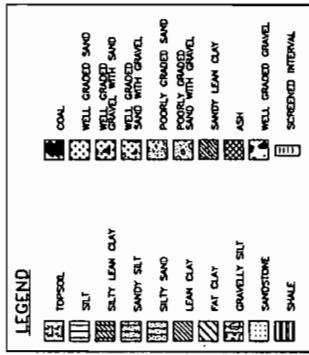
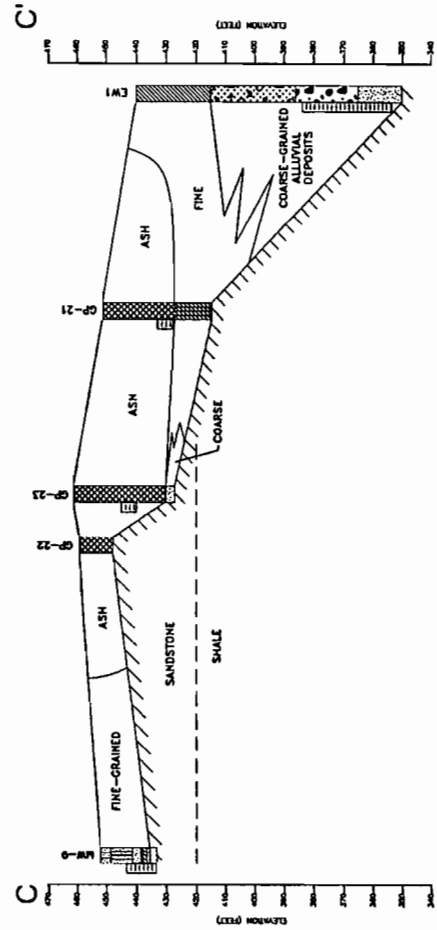
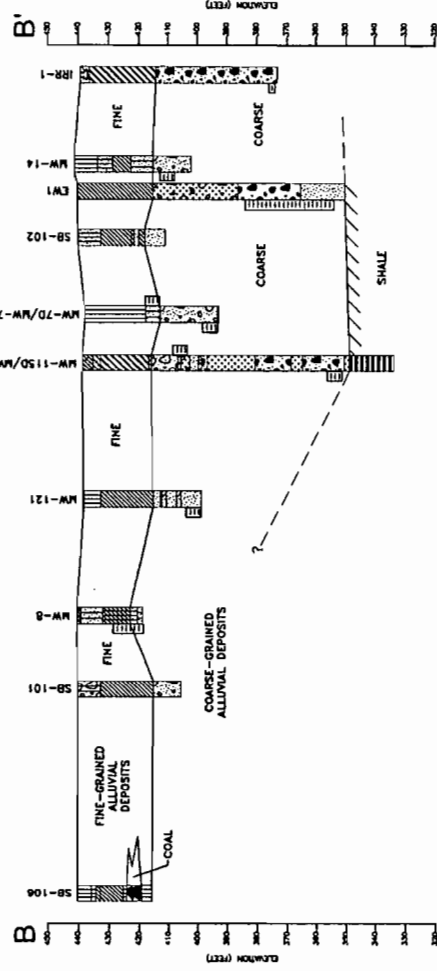
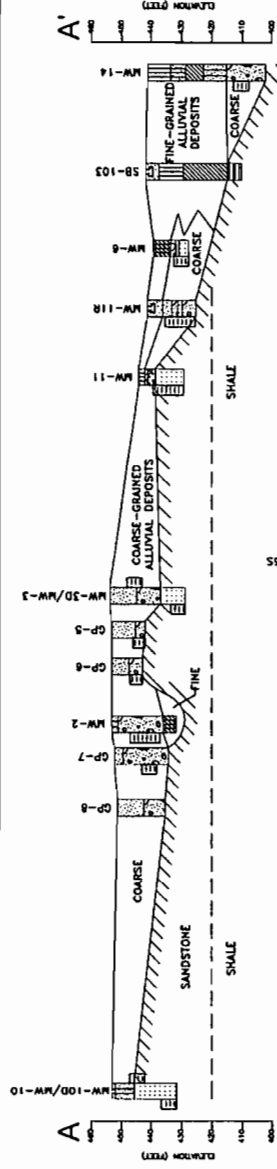
1. TOC = top of casing
2. BGS = below ground surface; MSL = mean sea level.
3. U = upper migration zone, A = deep alluvial aquifer, s&g = sand and gravel, si = silty, ss = sandstone
4. Aquifer test not performed because well was still recovering from prior sampling.
5. Aquifer test yielded recovery curve that could not be interpreted.
6. Notations in parentheses are former names of deep alluvial aquifer monitoring points.



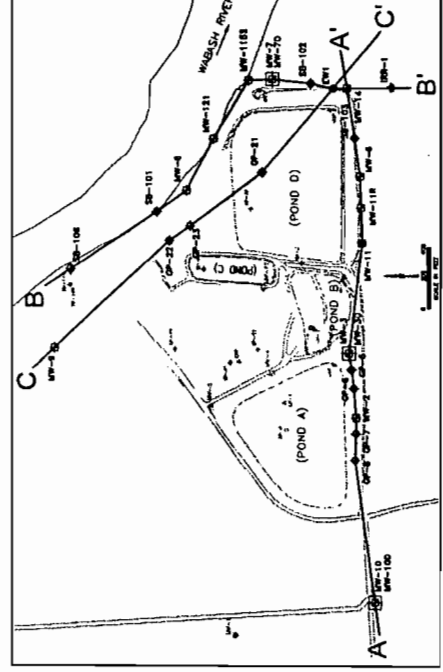
LEGEND	
M-1	MONITORING WELL
M-3	TESTED MONITORING WELL
M-3D	MONITORING WELL
MW-11	ABANDONED MONITORING WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
EW1	PLANT WATER WELL
SB-101	SOIL BORING
LAP	SURFACE WATER SAMPLE
	PODGE

SOURCE NOTES:
 THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI).
 GENERAL PLAN, HD SHEET NO. 502, P.C.M.S. PROJECT, DATED 4/02/00, AND FROM AN
 AERIAL SURVEY PERFORMED BY SURFEX CORPORATION, HUTSONVILLE ASH POND
 MONITORING WELLS MW-1 THROUGH MW-12, MW-14 AND TW. SOIL BORINGS SB-101
 THROUGH SB-103, AND EXTRACTION WELLS EW-1 AND EW-2 WERE SURVEYED BY
 HANSON ENGINEERS, INC. IN 1995. MONITORING WELLS GP-1 THROUGH GP-100
 AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM THE
 SOIL BORING LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE
 OBTAINED FROM THE DRAWING 1375-801, PROJECT NO. 1375/1, DATED 8/18/99.
 LUNDS, JULY 2004.

NOTES:
 1. DISCONTINUITIES BETWEEN SURVEYS ARE INDICATED BY
 BRK. CONTINUED
 2. SOIL BORINGS GP-1 THROUGH GP-4, GP-8 AND SURFACE
 WATER SAMPLE P2P ARE SCREENED SINCE THEY ARE ASSOCIATED
 WITH THE INTERIM POND AND THE DRAINAGE COLLECTION POND. SEE NRT
 REPORT HYDROLOGIC ASSESSMENT FOR FURTHER
 INFORMATION.



NOTES:
 1. IR-1 IS THE WAMPLER BRIGGIAN WELL (ISGS WELL #12-033-36857-00).
 2. EWT IS BASED ON ISGS WELL #12-033-36857-00.
 3. SURFACE ELEVATION FOR SB-106 WAS ESTIMATED FROM NEIGHBORING WELLS.
 4. C-C' SHALE/SANDSTONE CONTACT EXTRAPOLATED FROM A-A'.



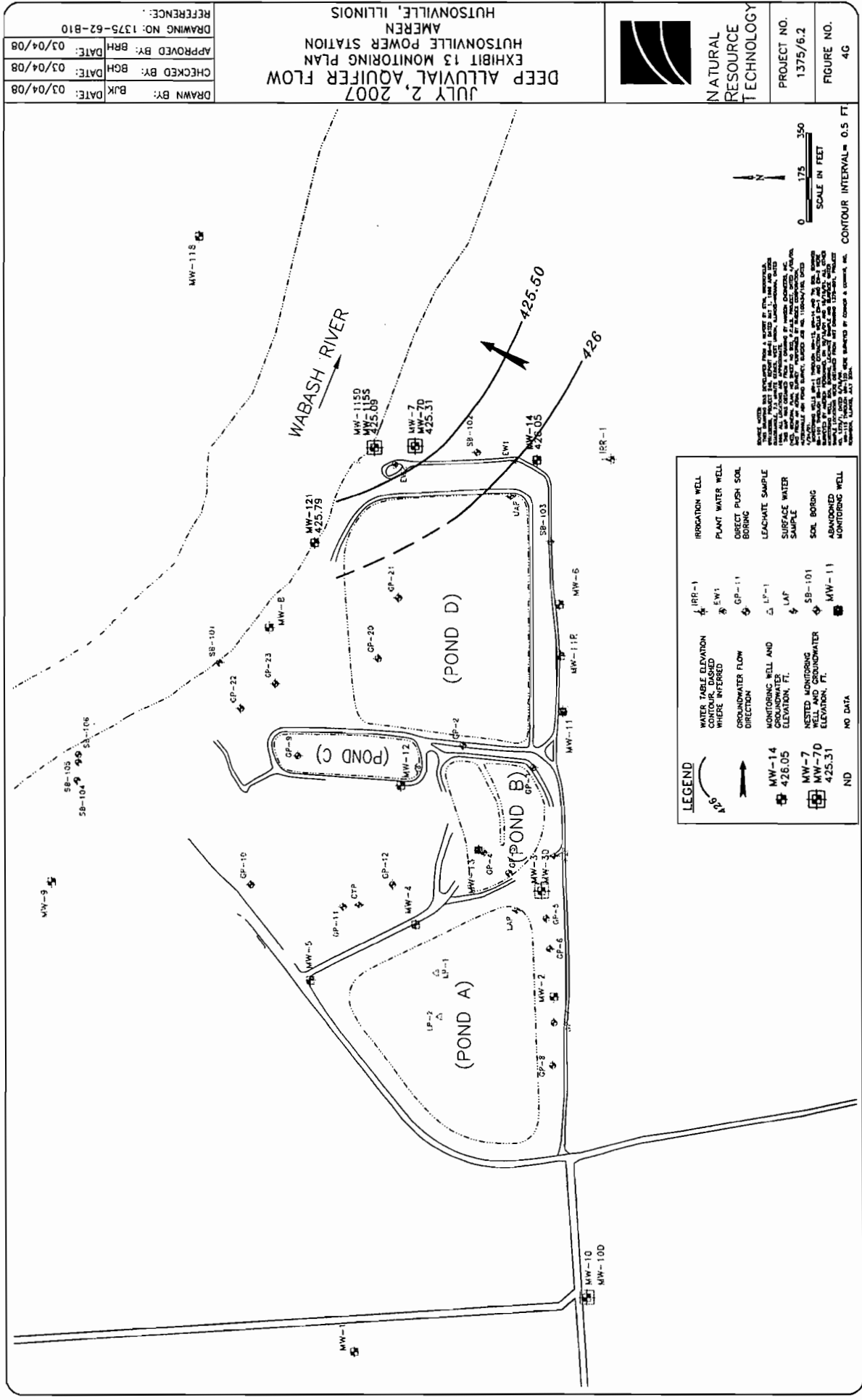
NATURAL RESOURCE TECHNOLOGY

GEOLOGIC CROSS SECTIONS

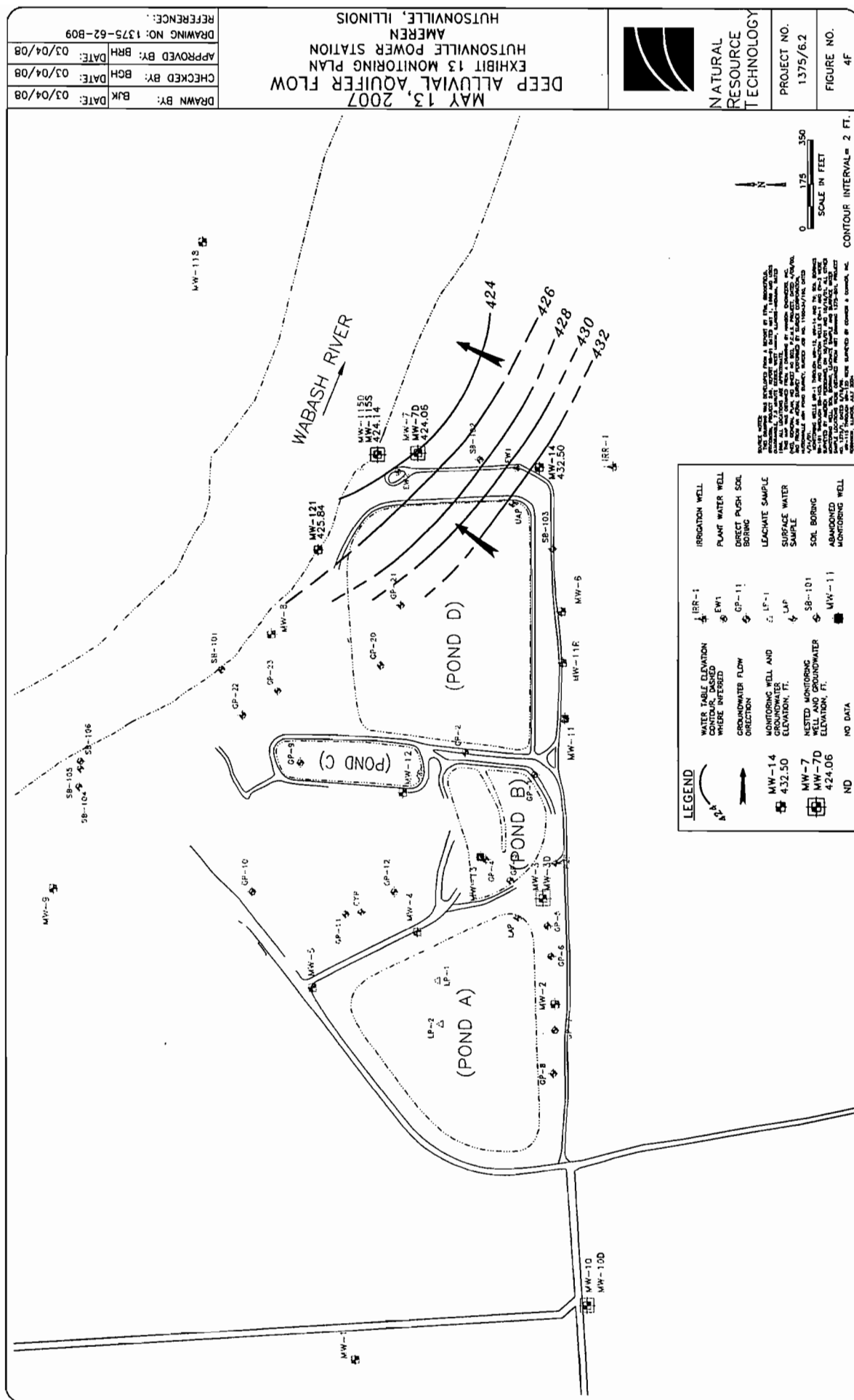
EXHIBIT 13 MONITORING PLAN
 HUTSONVILLE POWER STATION
 AMEREN
 HUTSONVILLE, ILLINOIS

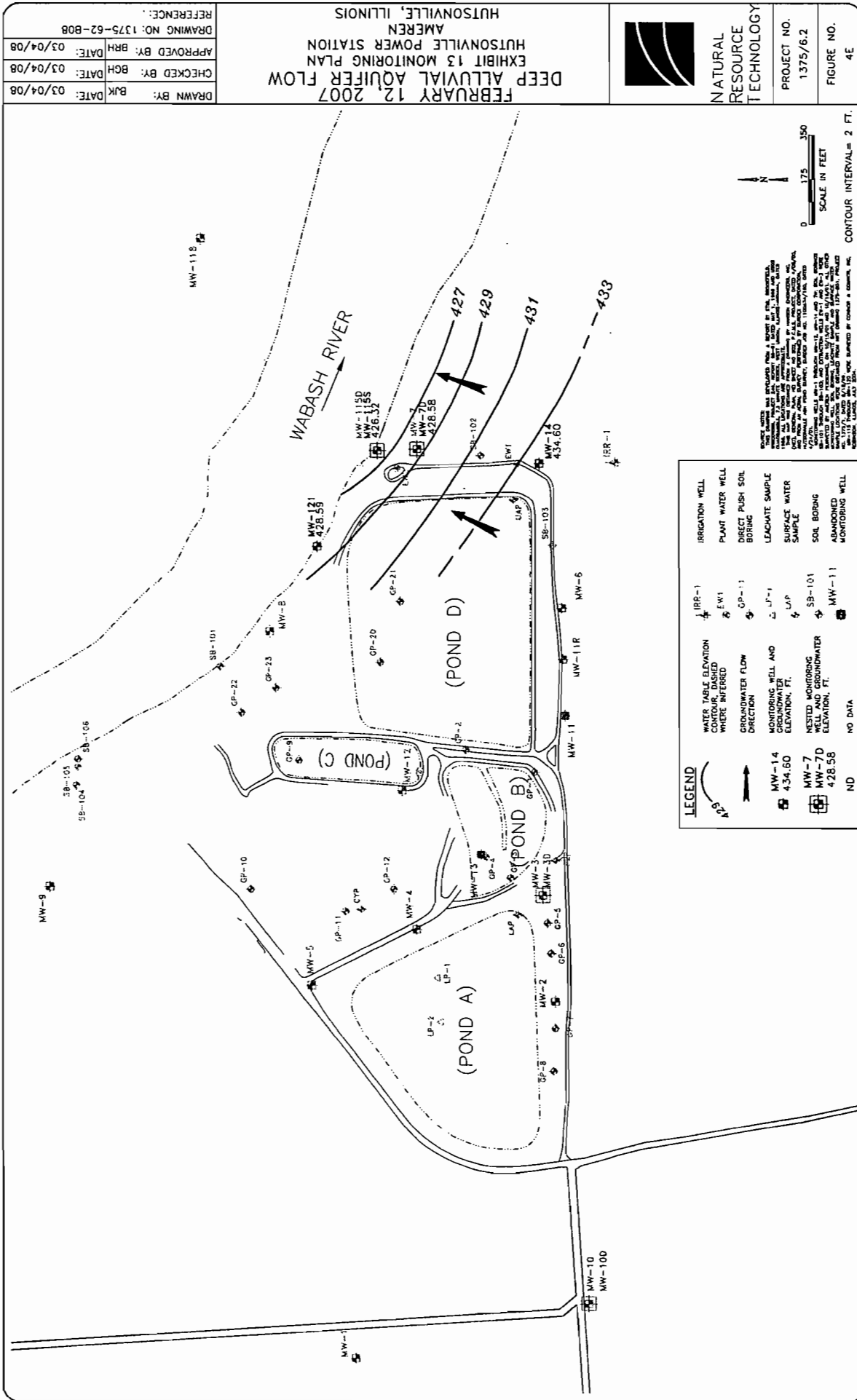
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DRAWING NO. 1375-43-803			
REFERENCE: BAC 02/27/08			

NO.	DATE	BY	APP'D BY
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B-1	02/27/08	BAC	
A-1	02/27/08	BAC	

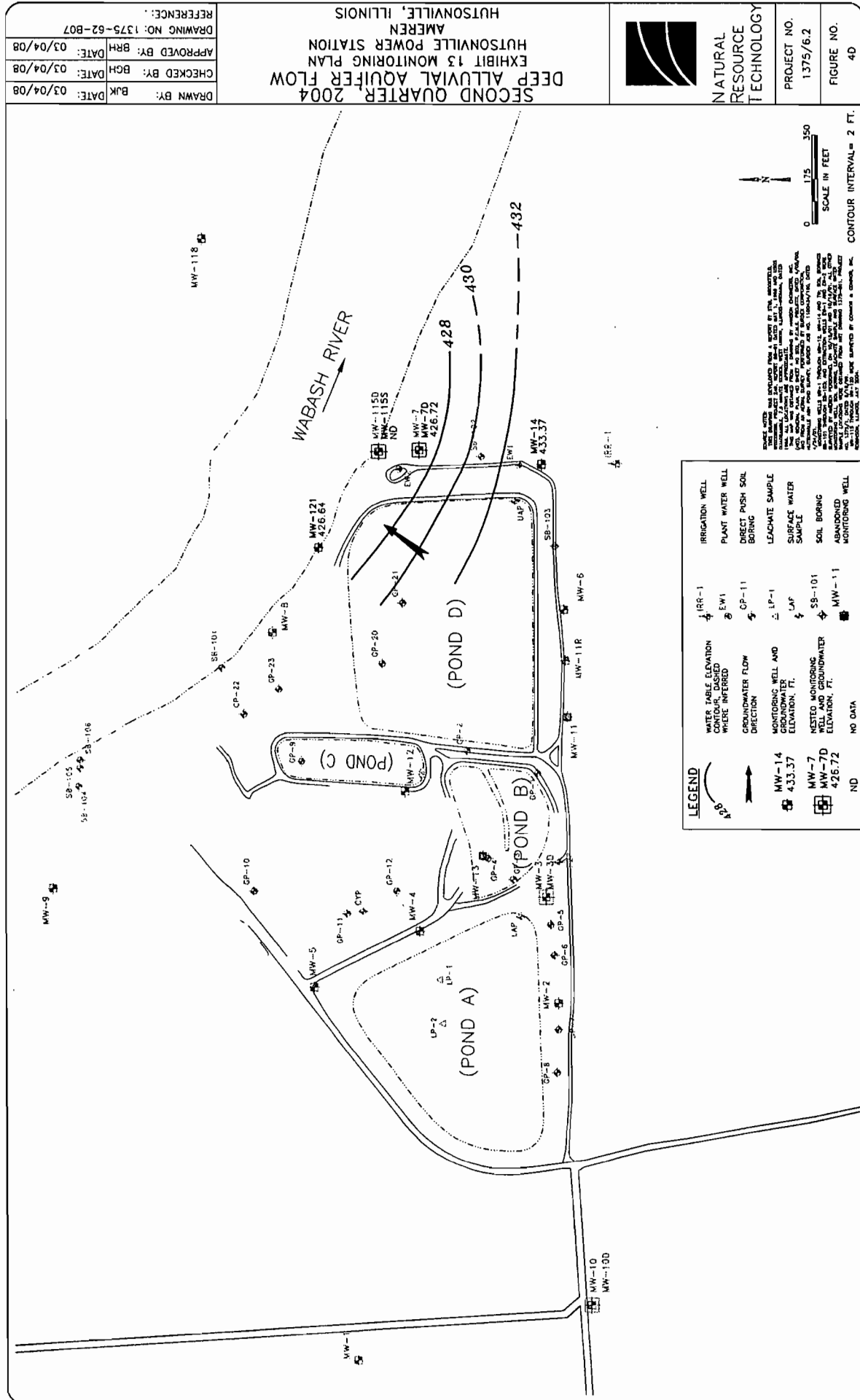


TSD 000551





TSD 000553



SECOND QUARTER 2004
DEEP ALLUVIAL AQUIFER FLOW
EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS



NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
4D

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DATE: 03/04/08

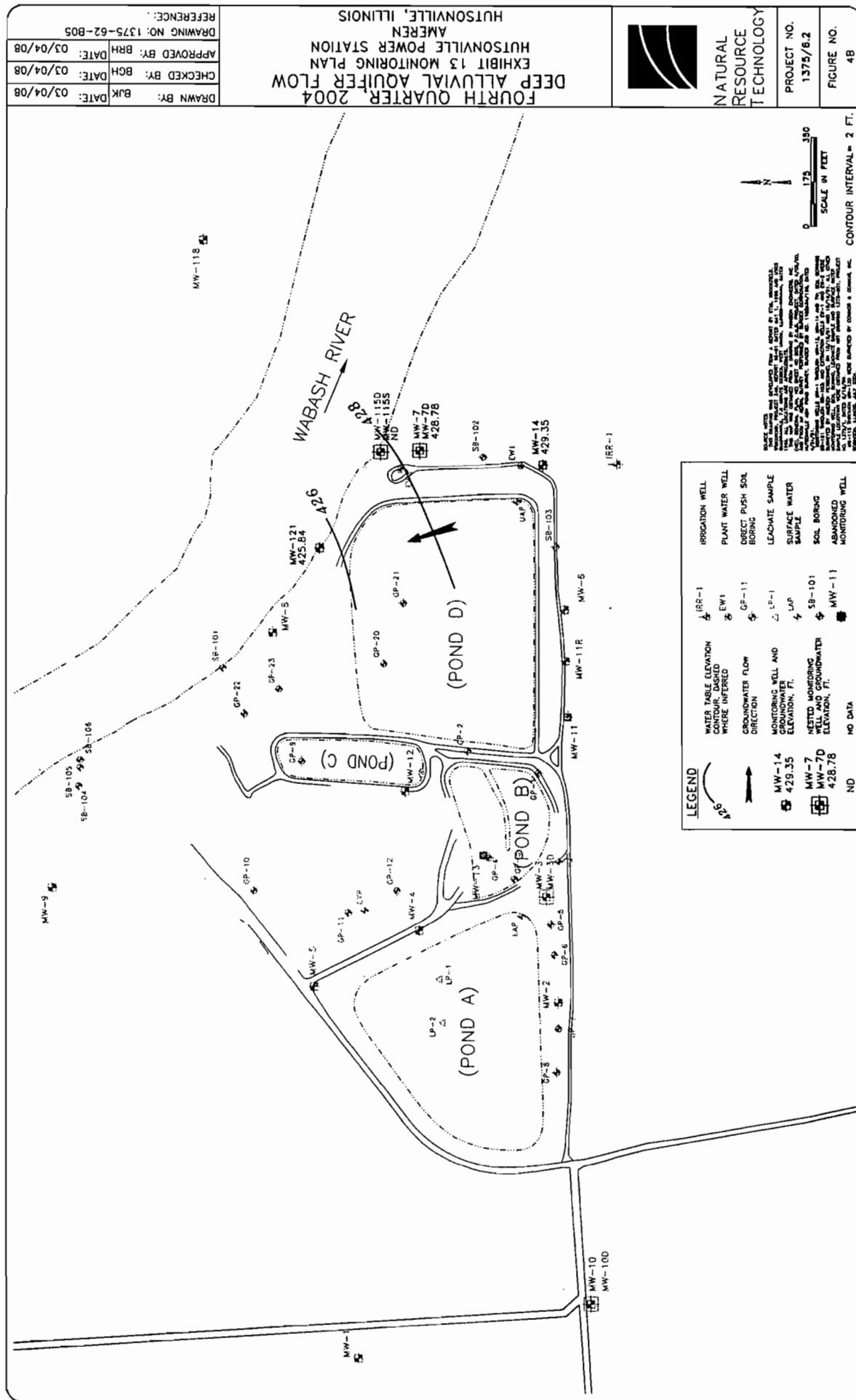
CHECKED BY: BQH
DATE: 03/04/08

APPROVED BY: BRH
DATE: 03/04/08

DRAWING NO: 1375-62-B07

REFERENCE:

TSD 000554



DRAWN BY:	BJK	DATE:	03/04/08
CHECKED BY:	BCH	DATE:	03/04/08
APPROVED BY:	BRH	DATE:	03/04/08
DRAWING NO:	1375-62-B04	REFERENCE:	

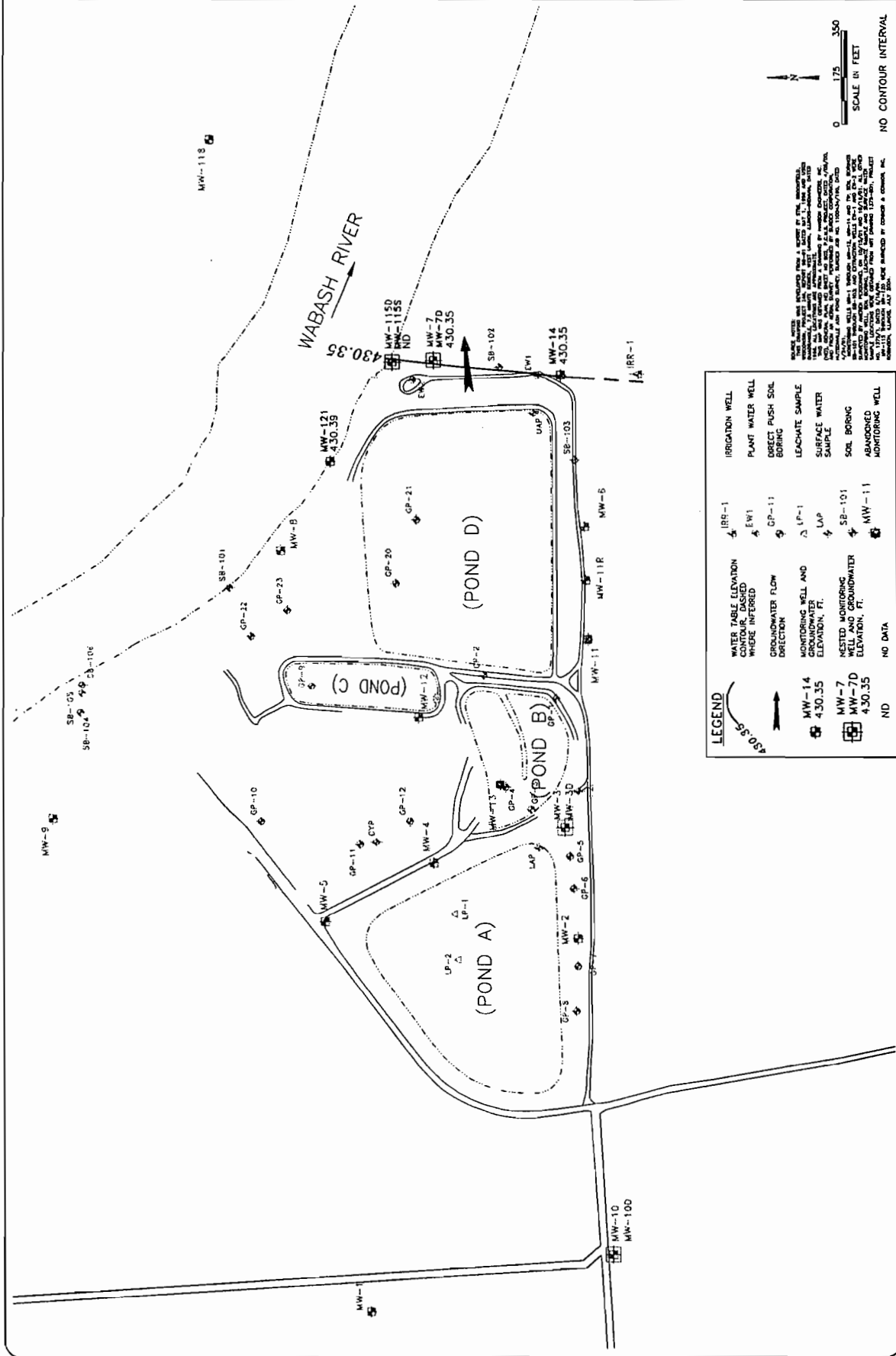
THIRD QUARTER 2003
DEEP ALLUVIAL AQUIFER FLOW
EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS



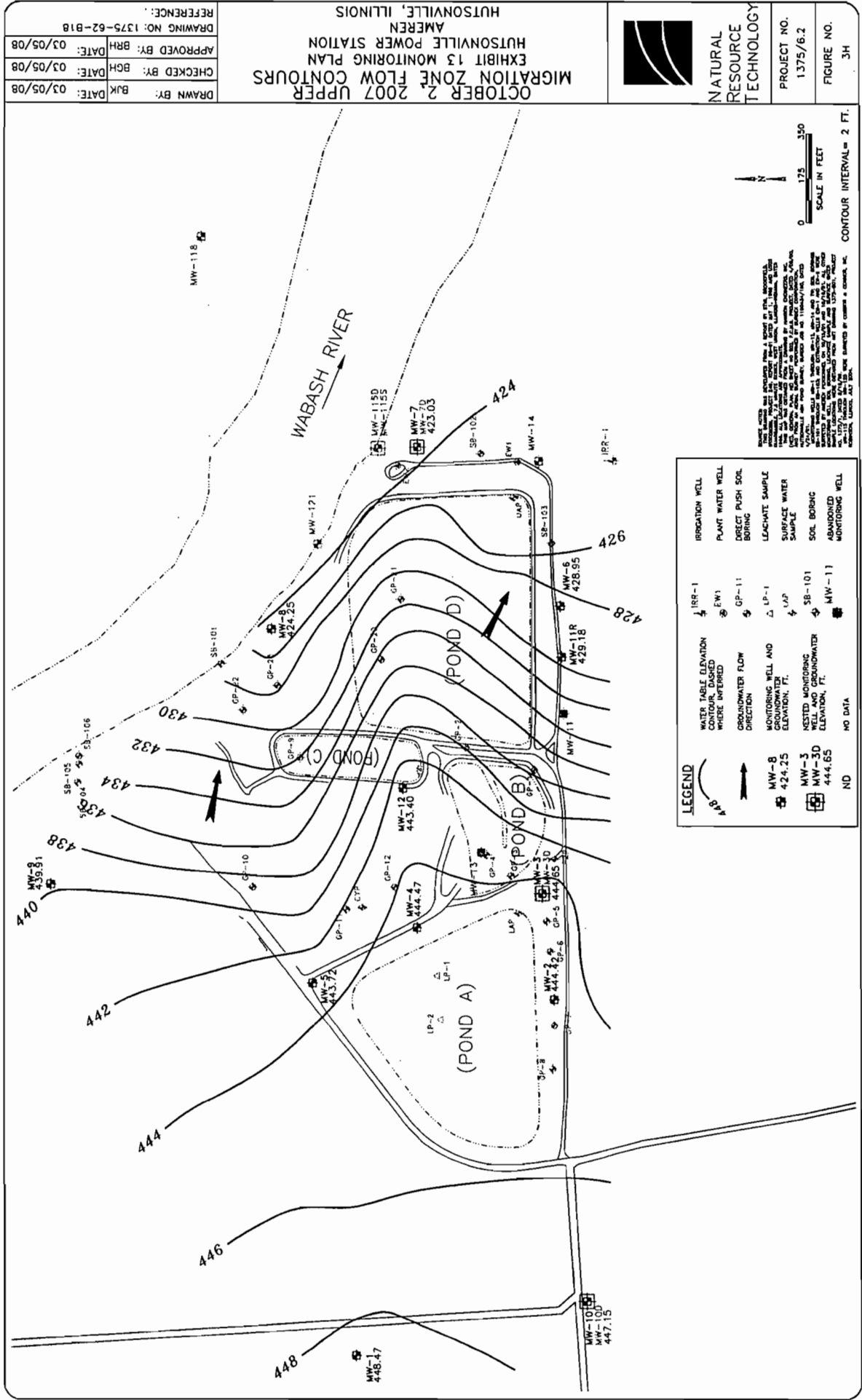
NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
1375/6.2

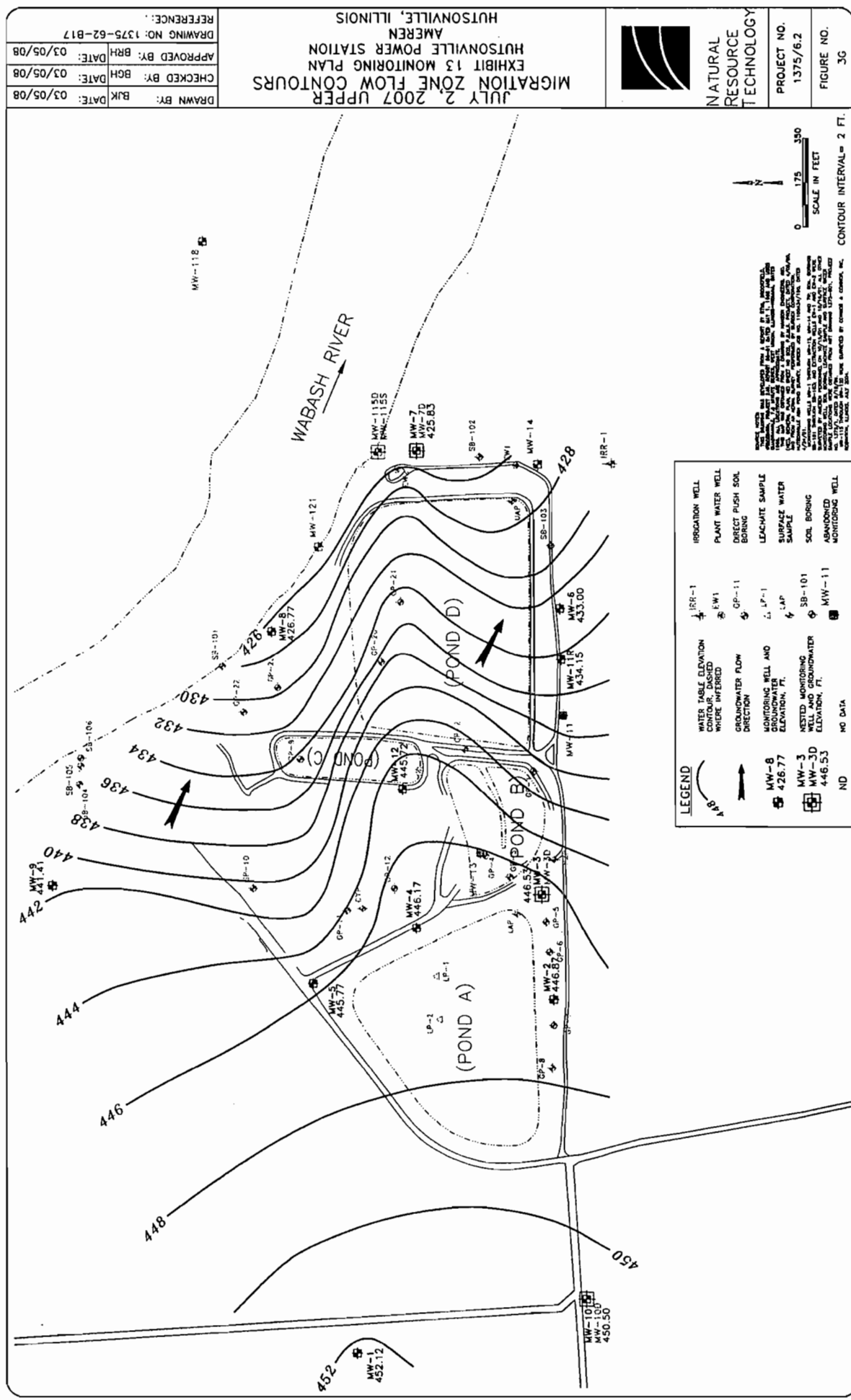
FIGURE NO.
4A

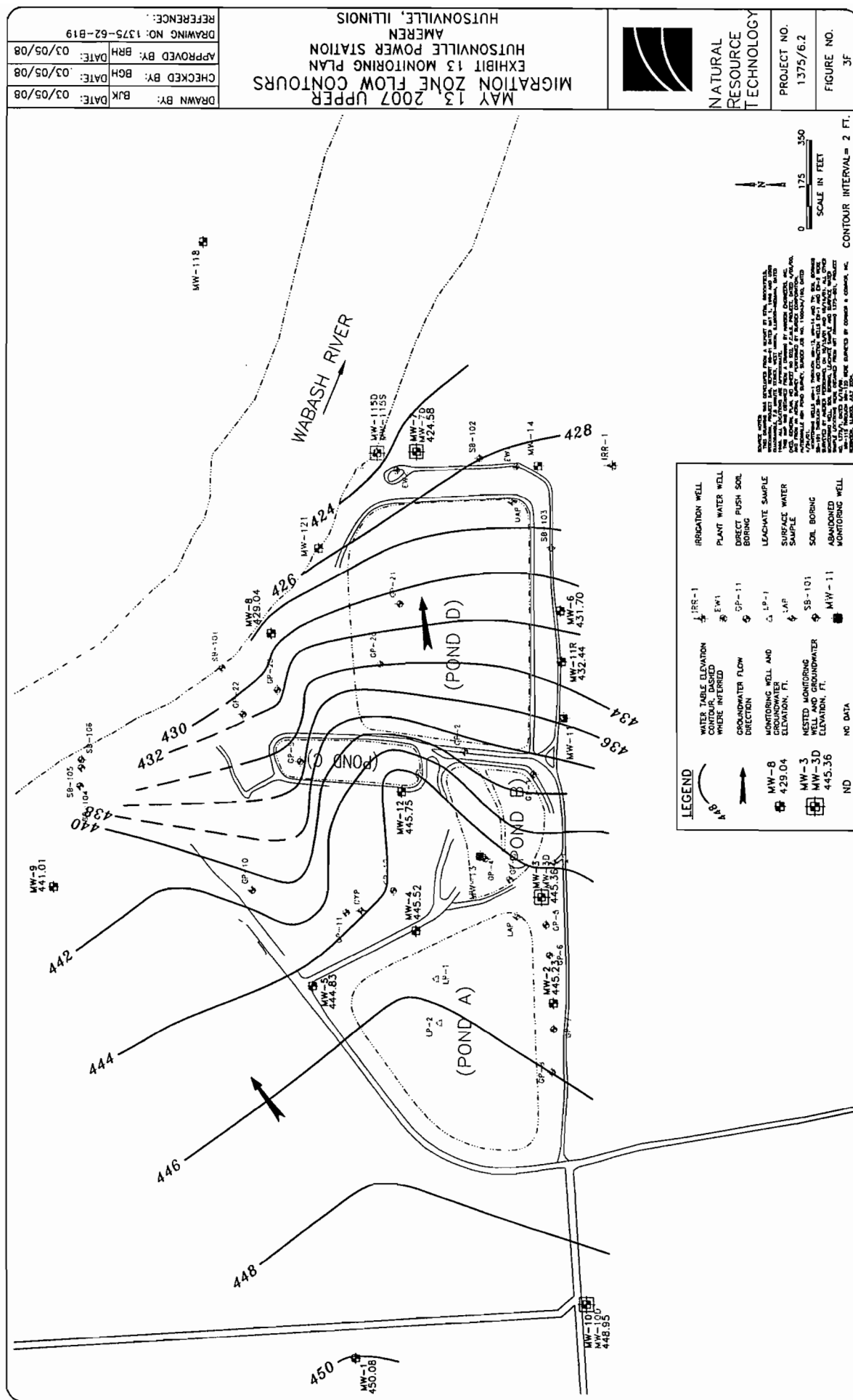


TSD 000557



TSD 000558





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CHECKED BY:	BCH	DATE:	03/05/08
APPROVED BY:	BRH	DATE:	03/05/08
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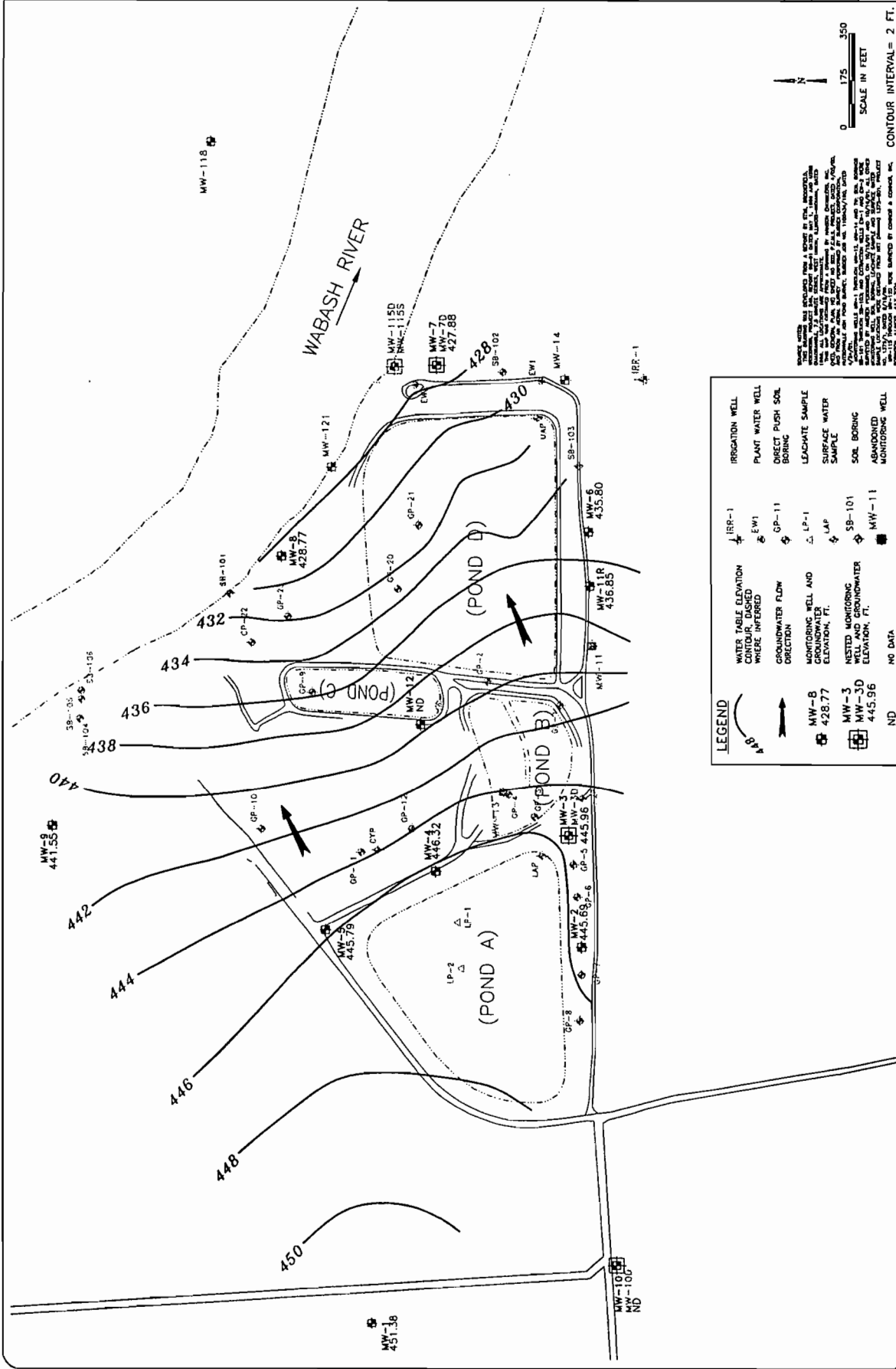
FEBRUARY 12, 2007 UPPER
MIGRATION ZONE FLOW CONTOURS
EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS



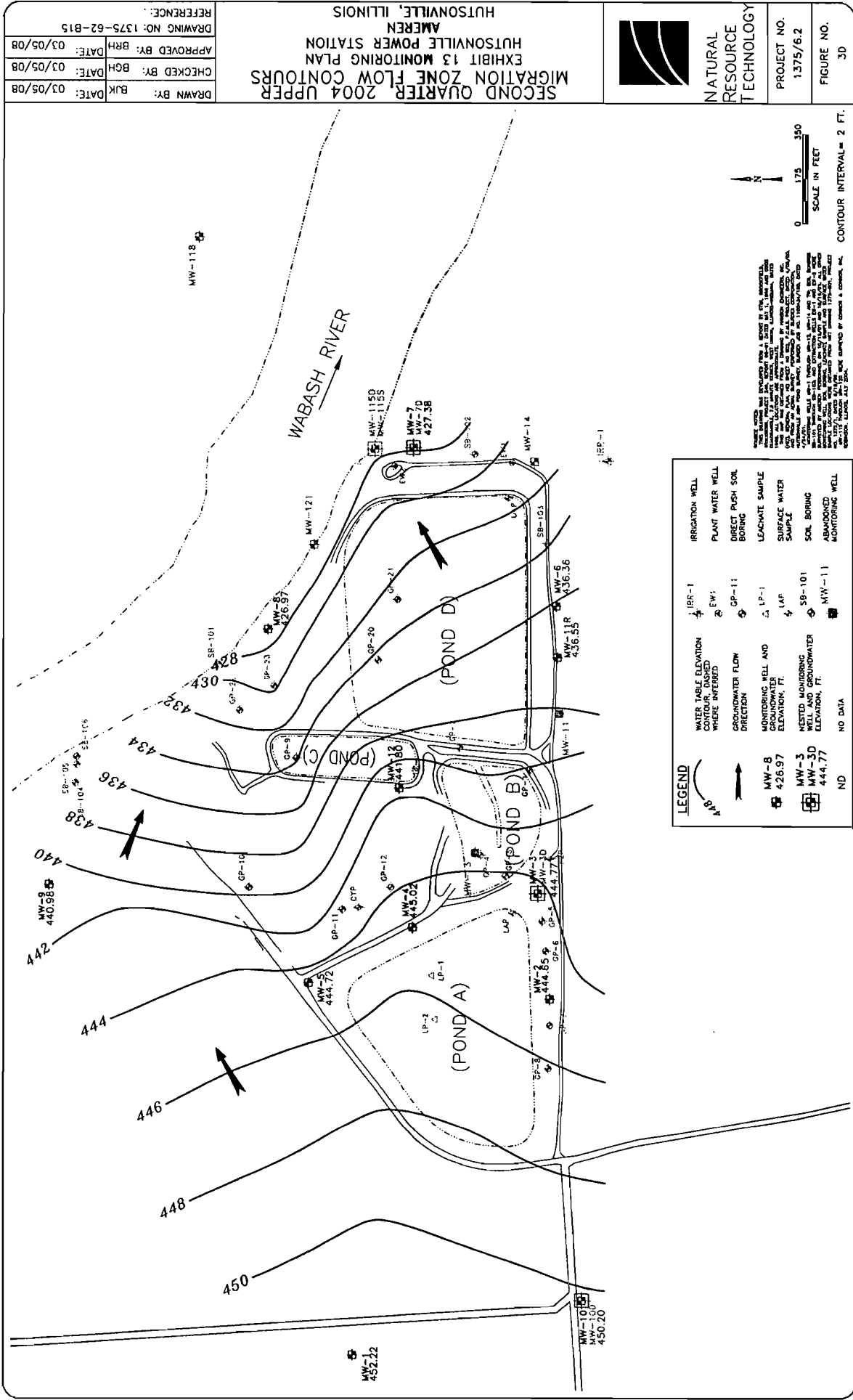
NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
3E



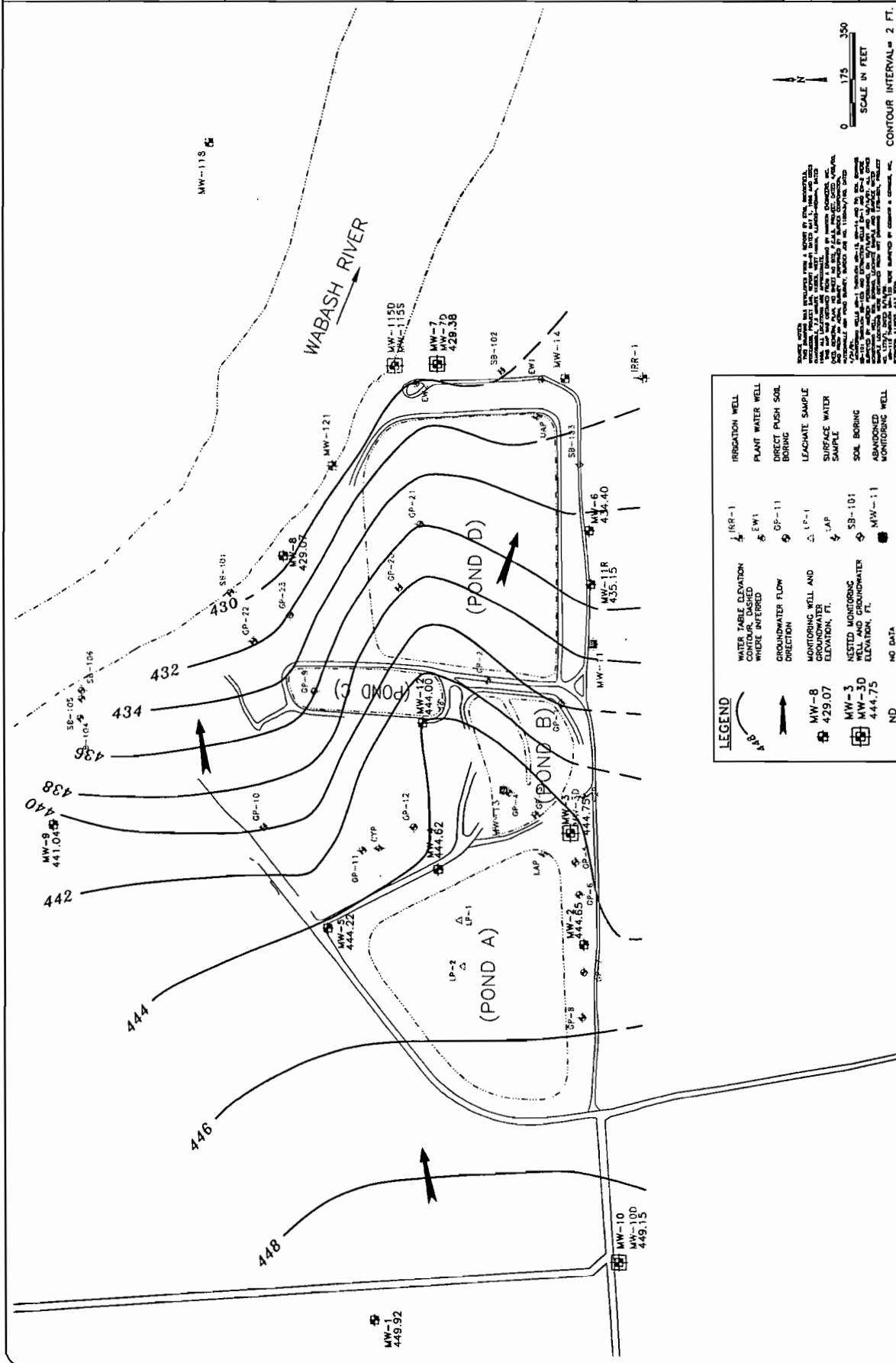
TSD 000561

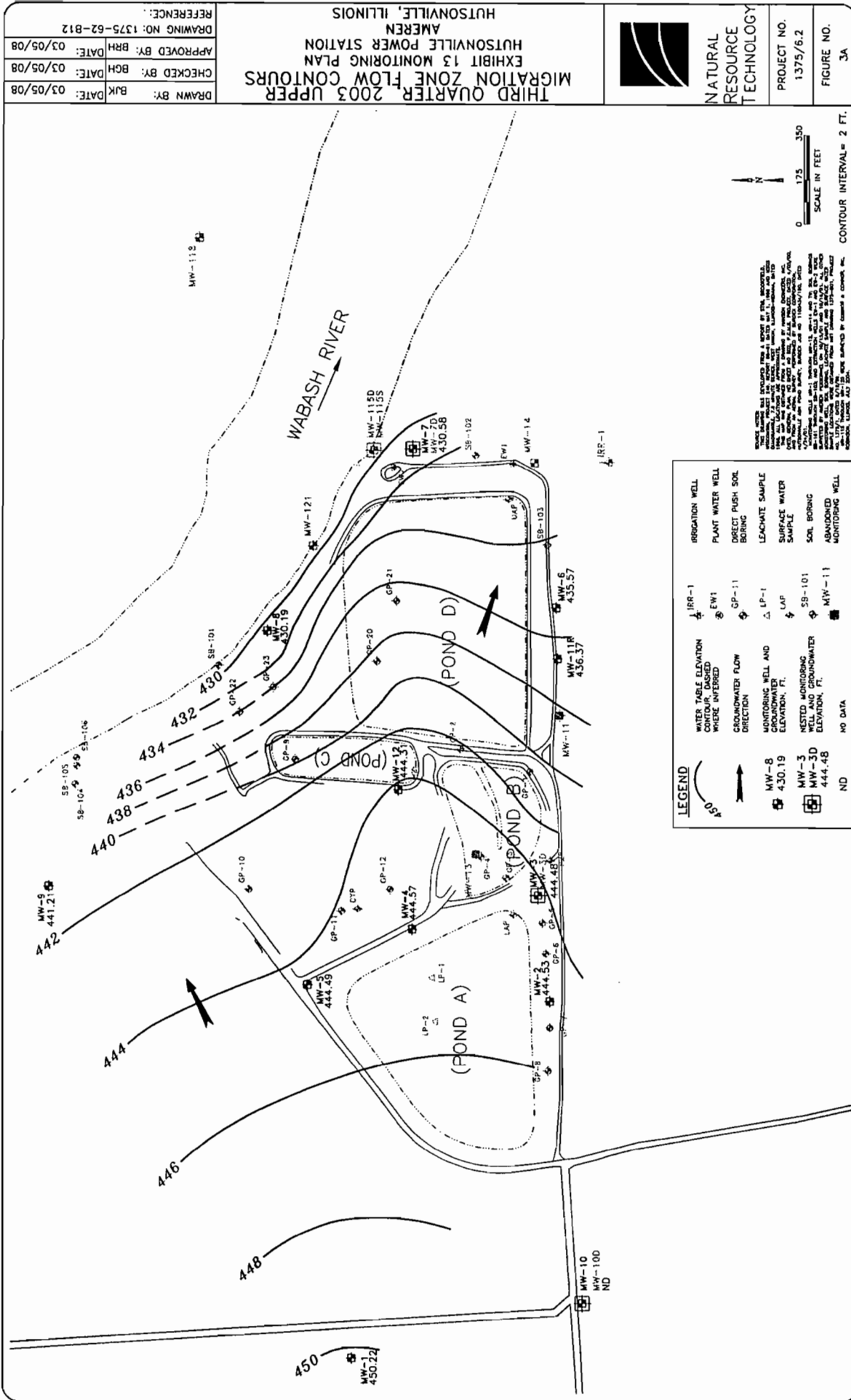


CONTOUR INTERVAL = 2 FT.

FOURTH QUARTER, 2003 UPPER
MIGRATION ZONE FLOW CONTOURS
EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

DRAWN BY: BJK	DATE: 03/05/08
CHECKED BY: BGH	DATE: 03/05/08
APPROVED BY: BRH	DATE: 03/05/08
DRAWING NO: 1375-62-B13	
REFERENCE:	





THIRD QUARTER 2003 UPPER
 EXHIBIT 13 MONITORING PLAN
 HUTSONVILLE POWER STATION
 AMEREN
 HUTSONVILLE, ILLINOIS

DRAWN BY: BJK
 DATE: 03/05/08
 CHECKED BY: BQH
 DATE: 03/05/08
 APPROVED BY: BRH
 DATE: 03/05/08
 DRAWING NO: 1375-62-B12
 REFERENCE:

NATURAL
 RESOURCE
 TECHNOLOGY

PROJECT NO.
 1375/6.2

FIGURE NO.
 3A

SCALE IN FEET
 0 175 350

CONTOUR INTERVAL = 2 FT.

TSD 000565

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

LOG OF BORING

CONTRACTED WITH HANSON ENGINEERS BORING NO. B-1
PROJECT NAME WINSTONVILLE POWER STATION CONTRACT NO. _____
LOCATION PER PLAN
DATUM _____ HAMMER WT. 140# HAMMER DROP 30" HOLE DIA. 8"
SURFACE ELEV. _____ CORE DIA. _____ CASING _____
DATE STARTED 2-14-84 COMPLETED 2-14-84 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA	DEPTH	SAMPLES						NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP		
456.5		0.0	30							
455.6	See #A	0.0								
453.4	Lt. brn. sandy silt, wf. clay, occas. f-c sand, occas. f. gravel roots moist-v. moist	3.1		1-2-3	1	SS	18"	1.0 2.4		
450.1	Lt. br. m-c sand, wf. occas. f-m gravel tr. silt wet	6.4	5	6-5-7	2	SS	17	--		
448.4	Lt. brn. sandstone moist	8.1		6-54- 40/2"	3	SS	14	2.2		
447.4	Lt.-gray sandstone	9.1		65-35/ 1"	4	SS	7	--		
	END OF BORING 9.1'		10							
			15							
										WATER 2-14-84 DD 6.0 8:30am BAR 7.0 8:55am AAR-- WL 6.5 9:05am F-c gravel 5.0'- Screen 9.0'-4.0' 2" PVC Pipe 4.0' Gravel 9.1'-3.0' Bentonite 3.0'-1 Plug 1.5'-surface Water level 4.0 at 2-
										#A Blk. clayey s wf. tr. f. sand occas. organic fibers tonsd moist

TSD 000567



MONITORING WELLS

M-1

ELEVATION 456.5

PIPE & SCREEN

7' pipe	459.5 - 452.5
5' screen	452.5 - 447.5

BACKFILL MATERIALS

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

NOW IN OUR THIRTIETH YEAR OF SERVICE

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

TSD 000568

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BLOOMINGTON, ILLINOIS 61701
(309) 662-5968

LOG OF BORING

CONTRACTED WITH HANSON ENGINEERS BORING NO. M-2
PROJECT NAME HUTSONVILLE POWER STATION CONTRACT NO. _____
LOCATION PEN PLAN
DATUM _____ HAMMER WT. 140# HAMMER DROP 30" HOLE DIA. 8"
SURFACE ELEV. _____ CORE DIA. _____ CASING _____
DATE STARTED 2-10-84 COMPLETED 2-10-84 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA	DEPTH	SAMPLES					NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	CD	
953.3		0.0	30						
952.9	See #A	0.4							
951.2	Brn. silty sand fill v. moist	2.1		8-8-6	1	ss	18"	2.4	
	Brn. m-c sand, wf. m-c gravel tr. silt								
	v. moist		5	7-5-3	2	ss	17	--	
				3-3-3	3	ss	16	--	WATER 2-10-84
444.9		8.4							DD 8.0 8:00am BAR 11.0 10:30 AAR --- WL 7.0 2:10pm
	Brn.-gray m-c sand, wf. m. gravel		10	3-4-7	4	ss	14	--	Screen 18.0-5. 2"PVC pipe 5.0 3.0' surface Gravel 21.5'-2 Bentonite 4.0' Plug 2.0'-surf.
	wet			8-7-0	5	ss	17	--	
439.2		14.1							
	Brn.-gray m-c sand, wf. f-m gravel		15	6-8-10	6	ss	17	--	#A Blk. coal refuse 4" wf. occas. silt fil wet
	wet								
36.0		17.3		10-13	7	ss	17	--	
	Gray silty clay, wf. tr. f. sand, occas. f. gravel			13					
	till moist		20	5-10	8	ss	18	4.2	
				13					

TSD 000569



LOG OF BORING

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CONTRACTED WITH HANSON ENGINEERS BORING NO. M-2
PROJECT NAME HUTSONVILLE POWER STATION CONTRACT NO. _____
LOCATION Per Plan
DATUM _____ HAMMER WT. 140# HAMMER DROP 30" HOLE DIA. 8"
SURFACE ELEV. _____ CORE DIA. _____ CASING _____
DATE STARTED 2-10-84 COMPLETED 2-10-84 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA	DEPTH	SAMPLES						NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP		
453.3		0.0	30							
431.8		21.5		5-7-11	9	SS	18"	4.0		
	END OF BORING 21.5'									

TSD 000570



MONITORING WELLS

M-2

ELEVATION 453.3

PIPE & SCREEN

8' pipe	456.3 - 448.3
13' screen	448.3 - 435.3

BACKFILL MATERIALS

concrete grout collar	453.3 - 451.3
bentonite seal	451.3 - 449.3
1/8" gravel pack	449.3 - 431.8

NOW IN OUR THIRTIETH YEAR OF SERVICE

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TSD 000571

LOG OF BORING



MONITORING WELLS

M-3

ELEVATION 452.1

PIPE & SCREEN

7.9' pipe	455.6 - 447.7
5' screen	447.7 - 442.7

BACKFILL MATERIALS

concrete grout collar	452.1 - 450.1
bentonite seal	450.1 - 448.1
1/8" gravel pack	442.7 - 448.1

NOW IN OUR THIRTIETH YEAR OF SERVICE

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TSD 000573



LOG OF BORING

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(309) 662-5968

CONTRACTED WITH HANSON ENGINEERS BORING NO. 7-11
PROJECT NAME HUTSONVILLE POWER STATION CONTRACT NO. _____
LOCATION PER PLAN
DATUM _____ HAMMER 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	SAMPLES					NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	Q.P.	
454.4		0.0	30						
453.1	Blk. asphalt 1.0"								
	F-m gravel 1.0", brn, clayey silt wf. f-m gravel pavement materials moist	1.3							
451.3	Blk. silt, wf. f-c gravel fill moist	3.1		5-5-7	1	ss	16"	--	
448.5	Brn. silty sand, wf. occas. f-m gravel moist	5.9		4-3-3	2	ss	18	0.9	
446.2	Br. f-m sand wf. silt v. moist	8.2		3-3-4	2	ss	18	--	WATER 2-13-84
443.5	Br. f-m gravel, wf. c-m sand, silt wet	10.0		3-3-3	1	ss	17	0.6	FD 8.0 9:45am BAF 8.0 10:30am AAR --- VL 7.5 11:45am
441.0	Lt.-br. sandstone	13.4		23-77/5"	5	ss	11	--	Screen 12.5' - 5.0' 2" PVC Pipe 5.0' - 2.0'
	END OF BORING 13.4'			100/4"	6	ss	4	4.5t	Gravel 13.4' - 4.0' Bentonite 4.0' - 2.0' Plug 2.0' - surface

TSD 000574



MONITORING WELLS

M-4

ELEVATION 454.4

PIPE & SCREEN

8' pipe	457.4 - 449.4
7.5' 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 THIRD DECADE OF SERVICE

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TSD 000575

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(309) 662-5968

LOG OF BORING

CONTRACTED WITH HANSON ENGINEERS BORING NO. M-5
PROJECT NAME HUTSONVILLE POWER STATION CONTRACT NO. _____
LOCATION PER PLAN
DATUM _____ HAMMER 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	SAMPLES					NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP	
952.3		0.0	30						
951.1	1" coal refuse, brn. clayey silt, wf. f-c gravel	1.2							
	occas. organic fibers fill moist			4-5-5	1	ss	14"	--	
949.2	See #A	3.1							
	Brn. f. sand, wf. occas. c. sand, f. gravel moist v. moist		5	3-2-4	2	ss	17	0.4	WATER 2-13-84
946.4		5.8							DD 8.0 2:50pm
	Br. f-m sand, wf/ c sand			3-3-4	3	ss	18	0.6	BAR 11.0 3:50pm
943.9	wet	8.4							AAR -----
	Brn. m-c sand, wf. f-c gravel occas. blk. coal refuse mottling	10.6	10	3-4-4	4	ss	18	0.9	WL 6.5' 5:45pm
								1.6	Old metal drain pipe 1.0' west boring running from road to station
	Brn.-gray m-c sand, wf. f-m gravel			0-3-3	5	ss	16	--	Screen 18.0'-5.2" PVC pipe 5.0' 3.0' stick
	wet								Gravel 18.0'-4. Bentonite 4.0'. Backfilled 18.0' wf. gravel Plug 2.0'-surf. 1-4" standpipe
936.1		16.2	15	5-6-17	6	ss	12	--	
935.4	Brn.-gray sandstone, wf. f-c gravel occas. blk. sand v. moist	16.2		16-15	7	ss	12	--	#A Brn. gray s
				---	22	ss	6	--	m-c sand, wf. f-c gravel, or white rock ci wet
	Gray sandstone								
933.1		19.2		30-70	8	ss	8	4.5	
	END OF BORING 19.2'		20	2"					

TSD 000576



MONITORING WELLS

M-5

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

NOW IN OUR FORTY-THIRD YEAR OF SERVICE

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

SPRINGFIELD, ILLINOIS - REGIONAL OFFICE

TSD 000577



LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPA
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(309) 662-5968

CONTRACTED WITH HANSON ENGINEERS BORING NO. B-7
PROJECT NAME HUTSONVILLE POWER STATION CONTRACT NO. _____
LOCATION PER PLAN
DATUM _____ HAMMER WT. 140# HAMMER DROP 30" HOLE DIA. 8"
SURFACE ELEV. _____ CORE DIA. _____ CASING _____
DATE STARTED 2-8-84 COMPLETED 2-8-84 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA	DEPTH	SAMPLES						NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP		
437.9		0.0	30							
436.5	Br. clayey silt, wf. tr. f. sand, occas. organic fibers moist	1.4								
434.0	Br. clayey silt, sand, wf. occas. blk. sin-dong fill moist	3.9		3-2-7	1	ss	17"	--		
			5	2-3-4	2	ss	14	--		
429.8	Lt. brn.-brn. sandy silt, wf. clay moist	8.1		3-3-5	3	ss	16	1.7		WATER 2-8-84
			10	2-2-3	4	ss	14	1.2		DD 11.5 11:45a BAR 11.5 3:00p AAR ---- WL 11.5 5:15p
425.0	Brn. sandy silt, wf. tr. clay very moist	12.9		0-0-3	5	ss	15	1.3		Screen 25.0'-1 2" PVC pipe 15 5.0' stick u Gravel 25.0'-1 Bentonite 14.0 12.0
	Brn. silt, wf. f. sand very moist-wet		15	2-2-4	6	ss	16	1.7		Plug 2.0'-surf Bentonite-clay 12.0'-2.0' Standpipe 3.0' 5.1' stick
420.3		17.6		2-2-3	7	ss	18	1.4		
			20	0-1-3	8	ss	17	1.2		

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LOG OF BORING



CONTRACTED WITH HANSON ENGINEERS BORING NO. M-7
PROJECT NAME HUTSONVILLE POWER STATION CONTRACT NO. _____
LOCATION PEB PLAN
DATUM _____ HAMMER WT. 140# HAMMER DROP 30" HOLE DIA. 8"
SURFACE ELEV. _____ CORE DIA. _____ CASING _____
DATE STARTED 2-8-84 COMPLETED 2-8-84 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA	DEPTH	SAMPLES						NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP		
437.9			0.0	30						
416.5	Brn. sandy silt wf.	21.4								
	lenses, f. sand wet									
	Brn. f. sand									
414.5	wet	23.4								
	Brn. f-c gravel, wf.									
412.9	m-c sand, tr. silt			7-7-9	9	ss	12	--		
	wet	25.0								
	END OF BORING 25.0'									



MONITORING WELLS

M-7

ELEVATION 437.9

PIPE & SCREEN

20' pipe	442.9 - 422.9
10' screen	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

NOW IN OUR THIRTY-THIRD YEAR OF SERVICE

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

TSD 000580

Project Name/No. AmerenCIPS - Hutsonville		249-3		Boring No. MW-7D		Start Date 10/5/98		Page 1	
Driller AEC, Indianapolis, IN			Logged by: Steve Mueller/STMI			End Date 10/5/98		Depth to Water ~10 Feet	
Boring Depth 45.0 Feet		Boring Diameter 8 Inches		Surface Elevation 437.5 Feet		Drill Method HSA		Northing 3175.915	
Well Depth 44.3 Feet		Well Diameter 2-in I.D.		TOC Elev. 438.45 Feet		Sample Method 2-ft. split-spoon		Easting 5676.110	
Sample	Blows/6 Inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification	Description	Well Completion	Comments	
						CLAYEY SILT, medium plasticity, trace roots fibers, soft, medium brown, moist, saturated below 10 ft.			
	1, 1, 2, 3	5	75						
	1, 1, 1, 2	10	100		ML				
	1, 1, 2, 3	15	100						
	0, 0, 1, 2	20	100						
	3, 3, 4, 9	25	75		SP	SILTY SAND, well sorted/rounded, fine-grained, quartz, grades from clayey silt above, loose, medium brown, saturated			
	5, 8, 6, 8	30	75			SILTY SAND & GRAVEL, well sorted medium-grained quartz sand, trace coarse sand, fine-grained angular to subangular gravel, medium dense, pale brown, saturated			
					SP-GP				
								Bentonite/cement grout 3-35 ft.	
								5-ft by 4-in square steel stick-up casing to ~1.3 ft; concrete seal 0-3 ft.	

Project Name/No. AmerenCIPS - Hutsonville 249-3			Boring No. MW-7D		Start Date 10/5/98	Page 2
Driller AEC, Indianapolis, IN			Logged by: Steve Mueller/STMI		End Date 10/5/98	Depth to Water -10 Feet
Boring Depth 45.0 Feet		Boring Diameter 8 Inches		Surface Elevation 437.5 Feet	Drill Method HSA	Northing 3175.915
Well Depth 44.3 Feet		Well Diameter 2-in I.D.		TOC Elev. 438.45 Feet	Sample Method 2-ft. split-spoon	Easting 5676.110

Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification	Description	Well Completion	Comments
	sand heave	0	0					
	sand heave	40	0					
	16, 25, 7, 11	45	75		ML	CLAYEY SILT, medium plasticity, trace sand, stiff, brown, moist END OF BORING - 45 feet		Sch. 40 PVC casing flush-threaded to 0.01-in factory-slotted PVC screen 39.3-44.3 ft; #7 fine silica sand 35-38 ft; #5 silica sand pack 38- 45 ft.
		50						
		55						
		60						
		65						



LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY
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BLOOMINGTON, ILLINOIS 61701
(309) 662-5968

CONTRACTED WITH HANSON ENGINEERS BORING NO. M-8
PROJECT NAME HUTSONVILLE POWER PLANT CONTRACT NO. _____
LOCATION PER PLAN
DATUM _____ HAMMER WT. 140# HAMMER DROP 30" HOLE DIA. 8"
SURFACE ELEV. _____ CORE DIA. _____ CASING _____
DATE STARTED 2-7-84 COMPLETED 2-7-84 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA	DEPTH	SAMPLES						NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	Q.P.		
939.9		0.0	30							
938.1	Brn. clayey silt, wf. tr. f. sand, occas. organic fibers moist	1.3								
936.3	Brn. silty sand	3.1		2-5-7	1	ss	18"	1.6		
	Brn. silty sand, wf. tr. f. sand moist		5	2-3-5	2	ss	17	1.4		
934.0		8.4		3-5-5	3	ss	18	3.2		WATER 2-7-84
928.5	Brn. clayey silt, wf. tr. f. sand moist	10.9	10	2-3-3	4	ss	18	1.8		DD 13.0 11:45a BAR 19.0 3:45p AAR ----- WL 12.0 8:30a 2-8-84
	Brn. gray clayey silt, wf. tr. f. sand, sm. gray silt pockets moist		15	2-2-2	5	ss	18	1.2		Screen 21.5'-1 Gravel 21.5'-1 Bentonite 15.5'-13.5'
922.0		17.4		2-2-3	6	ss	18	1.7		Clay & Bentonite 13.5'-4.0' 2" PVC pipe 16 4.9' stick up Bentonite cement grout 4.0'-2.0' Plug 2.0'-surf Standpipe 3.0'
	Brn. sandy silt, wf. occas. f. sand lens			1-2-2	7	ss	18	1.2		
919.6	wet very moist	19.8	20	0-1-2	8	ss	18	1.2		Baled well at 5:15pm 2-9-84 11.0' water level

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LOG OF BORING



CONTRACTED WITH HANSON ENGINEERS BORING NO. M-P
PROJECT NAME HUTSONVILLE POWER STATION CONTRACT NO. _____
LOCATION PEN PLAN
DATUM _____ HAMMER WT. 140# HAMMER DROP 30" HOLE DIA. 8"
SURFACE ELEV. _____ CORE DIA. _____ CASING _____
DATE STARTED 2-7-84 COMPLETED 2-8-84 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA	DEPTH	SAMPLES						NOTES
		DEPTH	SCALE	BLOWS FT.	NO.	TYPE	RECOV.	QP		
<u>439.2</u>		<u>0.0</u>	<u>30</u>							
<u>417.9</u>	Br. silty sand wet	<u>21.5</u>		<u>0-0-0</u>	<u>0</u>	<u>SS</u>	<u>18"</u>	<u>1.1</u>		
	END OF BORING 21.5'									



MONITORING WELLS

M-8

ELEVATION 439.4

PIPE & SCREEN

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

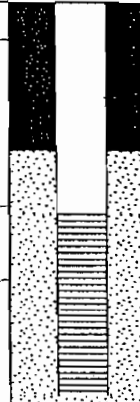
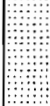
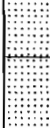
BACKFILL MATERIALS

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

YOU IN OUR FORTH FIVE OF GRAVE

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TSD 000585

Project Name/No. AmerenCIPS - Hutsonville			249-3		Boring No. MW-10		Start Date 10/7/98		Page 1	
Driller AEC, Indianapolis, IN			Logged by: Steve Mueller/STMI				End Date 10/7/98		Depth to Water ~2.5 Feet	
Boring Depth 11 Feet		Boring Diameter 8 Inches		Surface Elevation 452.9 Feet		Drill Method HSA		Northing 4730.478		
Well Depth 10.7 Feet		Well Diameter 2-in I.D.		TOC Elev. 454.23 Feet		Sample Method 2-ft. split-spoon		Easting 2559.807		
Sample	Blows/6 Inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification	Description		Well Completion	Comments	
	1, 2, 2, 2		50		ML	CLAYEY SILT, vegetated with grass, soft, dark brown to black, moist (topsoil)			5-ft by 4-in square steel stick-up casing to ~1.5 ft.	
	1, 2, 2, 6		50		SP	SILTY SAND, well sorted/rounded, fine-grained, quartz, loose, yellowish orange with dark orange lamina (2-3 mm), saturated below ~2.5 ft			Bentonite/cement grout 0-3 ft; 1/4-in bentonite chips 3-4 ft.	
	1, 2, 6, 25	5	100		SP	SILTY SAND, well sorted/rounded, fine-grained, quartz, laminated, dense, light gray to rust colored, predominantly light gray below 7.5 ft, saturated (weathered bedrock)			Sch. 40 PVC casing flush-threaded to 0.01-in factory-slotted PVC screen 5.7-10.7 ft; #5 silica sand pack 4-11 ft.	
	5, 20, 25, 50		63		Ss	SANDSTONE, fine-grained, quartz				
		10				END OF BORING - 11 feet				
		15								
		20								
		25								
		30								

Facility/Project Name AMEREN Energy Generating - Hutsonville Power Plant			License/Permit/Monitoring Number		Boring Number MW-11R
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke			Date Drilling Started 10/03/01	Date Drilling Completed 10/03/01	Drilling Method HSA
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level Feet MSL	Surface Elevation 440.920 Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		3217.083 Feet N 4854.729 Feet E	Lat Long	Local Grid Location (if applicable) ☐ N ☐ E ☐ S ☐ W	
County Crawford			Civil Town/City/ or Village Hutsonville		

Sample Number and Type	Length Alt. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PTD/FID	Soil Properties					RQD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
MW-11R 0-2	18	2 3 4 6	2	0'-5' FILL gray with orange mottling, coarse sand with clay, dry friable	FILL									
MW-11R 2.5-4.5	18	3 4 6 6	4	grades to sand with gravel, coarse										
MW-11R 5-7	20	3 4 4 5	6	5'-8' SAND, orange, poorly graded, coarse	SP									
MW-11R 7.5-9.5	14	2 3 4 3	8	8'-10' SAND with GRAVEL, brown, poorly graded, rounded, fine gravel/coarse sand	SP									
MW-11R 10-12	18	2 2 3 2	10	10'-11'6" SAND, poorly graded, medium to coarse	SP									
MW-11R 12.5-14.5	20	2 3 3 3	12	11'6"-16' SAND with GRAVEL, brown, poorly graded, rounded, fine gravel/coarse sand	SP									
MW-11R 15-17	3	50/3	16	EOB @ 16' Auger Refusal										
			18											
			20											
			22											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm Natural Resource Technology, Inc.
---------------	---

Route for: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

MONITORING WELL CONSTRUCTION

Facility/Project Name Hutsenville Power Station		Local Grid Location of Well ft. ☐ N ☐ S ☐ E ☐ W		Well Name MW-11R	
Facility License, Permit or Monitoring No.		Local Grid Origin ☐ (estimated: ☐) or Well Location ☐		Unique Well No. DNR Well ID No.	
Facility ID		Lat. _____ Long. _____ or _____		Date Well Installed 10/03/2001	
Type of Well Well Code 11 / MW		SL Plane _____ ft. N. _____ ft. E. S/C/N		Well Installed By: Name (first, last) and Firm B. Radke Beart Longene	
Distance from Waste/Source 80 ft		Location of Well Relative to Waste/Source u ☐ Upgradient s ☒ Sidegradient d ☐ Downgradient n ☐ Not Known		Gov. Lot Number	

A. Protective pipe, top elevation _____ ft. MSL		1. Cap and lock? ☒ Yes ☐ No	
B. Well casing, top elevation 443.55 ft. MSL		2. Protective cover pipe: a. Inside diameter: 4.0 in. b. Length: 7.0 ft. c. Material: Steel ☒ 04 Other ☐	
C. Land surface elevation 440.92 ft. MSL		d. Additional protection? ☒ Yes ☐ No If yes, describe: 3" Bumper Post	
D. Surface seal, bottom _____ ft. MSL or 0.6 ft		3. Surface seal: Bentonite ☒ 30 Concrete ☐ 01 Other ☐	
12. USCS classification of soil near screen: GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒ SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐ Bedrock ☐		4. Material between well casing and protective pipe: Bentonite ☐ 30 SAND Other ☒	
13. Sieve analysis performed? ☐ Yes ☒ No		5. Annular space seal: a. Granular/Chipped Bentonite ☒ 33 b. _____ lbs/gal mud weight ... Bentonite-sand slurry ☐ 35 c. _____ lbs/gal mud weight ... Bentonite slurry ☐ 31 d. _____ % Bentonite ... Bentonite-cement grout ☐ 50 e. _____ Ft ³ volume added for any of the above	
14. Drilling method used: Rotary ☐ 50 Hollow Stem Auger ☒ 41 Other ☐		f. How installed: Tremie ☐ 01 Tremie pumped ☐ 02 Gravity ☒ 08	
15. Drilling fluid used: Water ☐ 02 Air ☐ 01 Drilling Mud ☐ 03 None ☒ 99		6. Bentonite seal: a. Bentonite granules ☒ 33 b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite chips ☐ 32 c. Other ☐	
16. Drilling additives used? ☐ Yes ☒ No		7. Fine sand material: Manufacturer, product name & mesh size #7 BADGER MATERIAL	
Describe _____		b. Volume added _____ ft ³	
17. Source of water (attach analysis, if required):		8. Filter pack material: Manufacturer, product name & mesh size #40 AMERICAN MATERIAL	
		b. Volume added _____ ft ³	
E. Bentonite seal, top _____ ft. MSL or 4.0 ft		9. Well casing: Flush threaded PVC schedule 40 ☒ 23 Flush threaded PVC schedule 80 ☐ 24 Other ☐	
F. Fine sand, top _____ ft. MSL or 4.0 ft		10. Screen material: PVC	
G. Filter pack, top _____ ft. MSL or 4.5 ft		a. Screen type: Factory cut ☒ 11 Continuous slot ☐ 01 Other ☐	
H. Screen joint, top _____ ft. MSL or 5.5 ft		b. Manufacturer Johnson	
I. Well bottom _____ ft. MSL or 15.5 ft		c. Slot size: 0.010 in.	
J. Filter pack, bottom _____ ft. MSL or 11.0 ft		d. Slotted length: 10.0 ft	
K. Borehole, bottom _____ ft. MSL or 11.0 ft		11. Backfill material (below filter pack): None ☒ 14 Other ☐	
L. Borehole, diameter 8.3 in.			
M. O.D. well casing 2.35 in.			
N. I.D. well casing 2.15 in.			

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature *[Signature]* Firm NATURAL RESOURCE Technology INC.



BOART LONGYEAR

WELL DEVELOPMENT REPORT

WELL NAME MW-11R

JOB NO# 3410-1824

WELL DIAMETER 2"

LOCATION Hutsonville, IL

(MEASUREMENTS BELOW FROM TOP OF CASING)

DATE 10/3/2001

TOTAL DEPTH 17.7'

DEVELOPED BY G. Jones

DEPTH TO WATER BEFORE
DEVELOPMENT 13.55'

DEPTH TO WATER AFTER
DEVELOPMENT 13.60'

DESCRIPTION OF DEVELOPMENT METHOD

(Check One)

- ☐ SURGED W/BAILER & BAILED
- ☐ SURGED W/BAILER & PUMPED
- ☐ SURGED W/BLOCK & BAILED
- ☒ SURGED W/BLOCK & PUMPED
- ☐ OTHER _____

CAN THIS WELL BE PURGED DRY? ☐ YES ☒ NO

VOLUME OF WATER IN FILTER PACK AND WELL CASING _____ Gallons

VOLUME OF WATER REMOVED FROM WELL 120 Gallons

CLARITY OF WATER BEFORE DEVELOPMENT Drk Br Cloudy

CLARITY OF WATER AFTER DEVELOPMENT Clear

VOLUME OF WATER ADDED None

SOURCE OF WATER ADDED None

TIME SPENT FOR DEVELOPMENT 60 Minutes

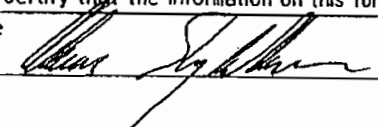
START: _____ END: _____
4:13 P.M. 5:13 P.M.

COMMENTS:

Facility/Project Name AMEREN Energy Generating - Hutsonville Power Plant				License/Permit/Monitoring Number		Boring Number MH-14	
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke				Date Drilling Started 10/03/01		Date Drilling Completed 10/03/01	
Drilling Method HSA							
Facility Well No.		Unique Well No.		Common Well Name		Final Static Water Level Feet MSL	
						Surface Elevation 440.930 Feet MSL	
						Borehole Diameter 8.25 inches	
Boring Location State Plane				2811.508 Feet N 5325.781 Feet E		Lat Long	
						Local Grid Location (if applicable) ☐ N ☐ E ☐ S ☐ W	
County Crawford				Civil Town/City/ or Village Hutsonville			

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PTD/FID	Soil Properties						ROD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200		
			0	0'-7'6" SILT, brown (10YR 4/3), moist, non-plastic											
MW-14 2.5-4.5	18	2 3 2 3	2 4		NL										
MW-14 5-7	18	1 1 2 2	6												
MW-14 7.5-9.5	18	1 2 1 2	8	7'6"-12'6" SILT with SAND, brown (10YR 4/3), low plasticity, moist											
MW-14 10-12	24	1 1 1 1	10 12	yellowish brown (10YR 5/4), increase plasticity to medium	NL										
MW-14 12.5-14.5	18	1 1 1 2	14	12'6"-18'6" LEAN CLAY, brown (7.5YR 4/2), 10-15% grey/orange mottling, medium plasticity											
MW-14 15-17	22	1 1 1 1	16		CL										
MW-14 17.5-19.5	18	1 1 1 1	18												
MW-14 20-22	18	1 1 1 1	20 22	18'6"-26' SAND with SILT, wet, non-plastic	SM										
MW-14 22.5-24.5	20	2 2 3 3		23'6"-24' SAND seam, medium											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm Natural Resource Technology, Inc.
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Sample			Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					ROD/ Comments
Number and Type	Length Att. & Recovered (in)	Blow Counts							Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
	20			24'-26' SAND with SILT, as above	SM									
MW-14 25-27	18	1 2 2 3	26	26'-38' SAND with GRAVEL, coarse sand, platy fine gravel, poorly graded										
MW-14 27.5-28.5	18	2 3 3 4	28	gravel becomes rounded	SP									
MW-14 30-32	20	3 3 4 5	30											
MW-14 32.5-34.5	18	3 3 5 5	32	4" LEAN CLAY with Gravel seam, gray (5Y 5/1), rounded, fine, 2-7% shell fragments	CL									
			34		SP									
			36		SP									
			38											
			40	EOB @ 39'										Advance Hydropunct discrete water sampler Drillers note: sand and gravel as above
			42											
			44											
			46											
			48											
			50											
			52											
			54											
			56											
			58											
			60											
			62											

MONITORING WELL CONSTRUCTION

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name Hutsanville Power Station	Local Grid Location of Well ft. ☐ N. ☐ S. ☐ E. ☐ W.	Well Name MW-14
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐	Unique Well No. ☐ DNR Well ID No. ☐
Facility ID	Lat. _____ Long. _____ or _____	Date Well Installed 10/03/2001
Type of Well Well Code 12/P2	St. Plane _____ ft. N. _____ ft. E. S/C/N	Well Installed By: Name (first, last) and Firm R. Ratke BORET CONCRETE
Distance from Waste/Source 30 ft.	Section Location of Waste/Source 1/4 of _____ 1/4 of Sec. _____ T. _____ N. R. ☐ E. ☐ W.	
Ent. Stds. Apply ☐	Location of Well Relative to Waste/Source a ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known	
	Gov. Lot Number _____	

A. Protective pipe, top elevation _____ ft. MSL

B. Well casing, top elevation **443.35** ft. MSLC. Land surface elevation **440.93** ft. MSLD. Surface seal, bottom _____ ft. MSL or **0.0** ft.

12. USCS classification of soil near screen:

GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis performed? ☐ Yes ☒ No14. Drilling method used: Rotary ☐ 50Hollow Stem Auger ☒ 41Other ☐15. Drilling fluid used: Water ☐ 02 Air ☐ 01Drilling Mud ☐ 03 None ☒ 9916. Drilling additives used? ☐ Yes ☒ No

Describe _____

17. Source of water (attach analysis, if required): _____

E. Bentonite seal, top _____ ft. MSL or **24.0** ft.F. Fine sand, top _____ ft. MSL or **24.0** ft.G. Filter pack, top _____ ft. MSL or **26.0** ft.H. Screen joint, top _____ ft. MSL or **28.0** ft.I. Well bottom _____ ft. MSL or **33.0** ft.J. Filter pack, bottom _____ ft. MSL or **35.0** ft.K. Borehole, bottom _____ ft. MSL or **39.0** ft.L. Borehole, diameter **8.3** in.M. O.D. well casing **2.35** in.N. I.D. well casing **2.10** in.1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:

a. Inside diameter: **4.0** in.b. Length: **7.0** ft.c. Material: Steel ☒ 04Other ☐d. Additional protection? ☒ Yes ☐ NoIf yes, describe: **3" Bumper Post**3. Surface seal: Bentonite ☒ 30Concrete ☐ 01Other ☐

4. Material between well casing and protective pipe:

Bentonite ☐ 30**SAND** Other ☒5. Annular space seal: a. Granular/Chipped Bentonite ☒ 35b. _____ Lbs/gal mud weight _____ Bentonite-sand slurry ☐ 35c. _____ Lbs/gal mud weight _____ Bentonite slurry ☐ 31d. _____ % Bentonite _____ Bentonite-cement grout ☐ 50e. _____ Ft³ volume added for any of the abovef. How installed: Tremie ☐ 01Tremie pumped ☐ 02Gravimetric ☒ 086. Bentonite seal: a. Bentonite granules ☒ 33b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite chips ☐ 32c. _____ Other ☐

7. Fine sand material: Manufacturer, product name & mesh size

#7 BADGERb. Volume added _____ ft³

8. Filter pack material: Manufacturer, product name & mesh size

#40 AMERICAN MATERIALb. Volume added _____ ft³9. Well casing: Flush threaded PVC schedule 40 ☒ 23Flush threaded PVC schedule 80 ☐ 24Other ☐10. Screen material: **PVC**a. Screen type: Factory cut ☒ 11Continuous slot ☐ 01Other ☐b. Manufacturer **Johnson**c. Slot size: **0.010** in.d. Slotted length: **5.0** ft.11. Backfill material (below filter pack): None ☐ 14**FORMATION COLLAPSE** Other ☒

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm

NATURAL RESOURCE TECHNOLOGY INC.

 BOART LONGYEAR
WELL DEVELOPMENT REPORT

WELL NAME MW-14

JOB NO# 3410-1824

WELL DIAMETER 2"

LOCATION Hutsonville, IL

(MEASUREMENTS BELOW FROM TOP OF CASING)

DATE 10/3/2001

TOTAL DEPTH 35.27'

DEVELOPED BY G. Jones

DEPTH TO WATER BEFORE
DEVELOPMENT 18.23'

DEPTH TO WATER AFTER
DEVELOPMENT 18.95'

DESCRIPTION OF DEVELOPMENT METHOD

(Check One)

- ☐ SURGED W/BAILER & BAILED
☐ SURGED W/BAILER & PUMPED
☐ SURGED W/BLOCK & BAILED
☒ SURGED W/BLOCK & PUMPED
☐ OTHER _____

CAN THIS WELL BE PURGED DRY? ☐ YES ☒ NO

VOLUME OF WATER IN FILTER PACK AND WELL CASING Gallons

VOLUME OF WATER REMOVED FROM WELL 150 Gallons

CLARITY OF WATER BEFORE DEVELOPMENT Cloudy Br

CLARITY OF WATER AFTER DEVELOPMENT Clear

VOLUME OF WATER ADDED None

SOURCE OF WATER ADDED None

TIME SPENT FOR DEVELOPMENT 60 Minutes

START: END:
3:01 P.M. 4:01 P.M.

COMMENTS:

TSD 000593



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SOIL BORING LOG

Page 1 of 1

Facility/Project Name Ameren Hutsonville Power Station Drilling		License/Permit/Monitoring Number		Boring Number TW-115s	
Boring Drilled By: Name of crew chief (first, last) and Firm Steve Boart Longyear		Date Drilling Started 5/1/2004		Date Drilling Completed 5/1/2004	
Drilling Method hollow stem auger					
Unique Well No.	Well ID No. TW-115s	Common Well Name	Final Static Water Level Feet MSL	Surface Elevation 438.4 Feet MSL	Borehole Diameter 8.3 inches
Local Grid Origin ☒ (estimated: ☐) or Boring Location ☐		State Plane N, E S/C/N		Local Grid Location ☒ N ☒ E ☐ S ☐ W	
1/4 of		1/4 of Section T R		Long 8046.72 Feet 1176886.34 Feet	
Facility ID		County	State	Civil Town/City/ or Village Hutsonville	

Sample		Blow Counts	Depth From Surface (feet)	Soil/Rock Description And Geologic Origin For Each Major Unit	Hand Pen (tsf)	Field Moisture Condition	USCS Symbol	Graphic Log	PID/FID (ppm)	Well Diagram	RQD/ Comments/ Lab Test
Number and Type	Length An. & Recovered (in)										
			0'-36' Drilled without sampling-see log TW-115d for complete description.				CL				
			5				SC				
			10				CH				
			15				CL				
			20				GP				
			25				SW				
			30				SW				
			35								
				END OF BORING AT 36' Well set at 35'							

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature <i>Paula Richardson</i>	Firm Natural Resource Technology, Inc.	Tel: (262) 523-9000
Paula Richardson	23713 W. Paul Road, Unit D, Pewaukee, WI 53072	Fax: (262) 523-9001

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

TSD 000594

MONITORING WELL CONSTRUCTION

Facility/Project Name Ameren Hutsonville Power Station Drilling	Local Grid Location of Well 898046.72 ft. ☒ N. ☐ S. 1176886.34 ft. ☒ E. ☐ W.	Well Name TW-115s
Facility License, Permit or Monitoring No.	Local Grid Origin ☒ (estimated: ☐) or Well Location ☐ Lat. _____ Long. _____ or _____	Unique Well No. _____ Well Number _____
Facility ID	St. Plane _____ ft. N. _____ ft. E.	Date Well Installed 05/01/2004
Type of Well	Section Location 1/4 of _____ 1/4 of Sec. _____ T. _____ R. _____	Well Installed By: (Person's Name and Firm) Steve
Well Code 12/p2	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known	Gov. Lot Number _____
Distance from Waste/Source ft. _____		Boat Longyear

A. Protective pipe, top elevation _____ ft. MSL B. Well casing, top elevation <u>440.89</u> ft. MSL C. Land surface elevation <u>438.4</u> ft. MSL D. Surface seal, bottom <u>437.4</u> ft. MSL or <u>1.0</u> ft. 12. USCS classification of soil near screen: GP ☐ GM ☐ GC ☐ GW ☐ SW ☒ SP ☒ SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐ Bedrock ☐ 13. Sieve analysis attached? ☐ Yes ☒ No 14. Drilling method used: Rotary ☐ 50 Hollow Stem Auger ☒ 41 Other ☐ 15. Drilling fluid used: Water ☐ 02 Air ☐ 01 Drilling Mud ☐ 03 None ☒ 99 16. Drilling additives used? ☐ Yes ☒ No Describe _____ 17. Source of water (attach analysis, if required): _____	1. Cap and lock? ☒ Yes ☐ No 2. Protective cover pipe: a. Inside diameter: <u>4.0</u> in. b. Length: <u>6.0</u> ft. c. Material: Steel ☒ 04 Other ☐ d. Additional protection? ☐ Yes ☒ No If yes, describe: _____ 3. Surface seal: Bentonite ☒ 30 Concrete ☐ 01 Other ☐ 4. Material between well casing and protective pipe: <u>Sand</u> Bentonite ☐ 30 Other ☒ 5. Annular space seal: a. Granular/Chipped Bentonite ☒ 33 b. _____ Lbs/gal mud weight ... Bentonite-sand slurry ☐ 35 c. _____ Lbs/gal mud weight ... Bentonite slurry ☐ 31 d. _____ % Bentonite ... Bentonite-cement grout ☐ 50 e. _____ Ft³ volume added for any of the above f. How installed: Tremie ☐ 01 Tremie pumped ☐ 02 Gravity ☒ 08 6. Bentonite seal: a. Bentonite granules ☐ 33 b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite chips ☐ 32 c. _____ Other ☐ 7. Fine sand material: Manufacturer, product name & mesh size a. <u>#7 Badger</u> b. Volume added _____ ft³ 8. Filter pack material: Manufacturer, product name & mesh size a. <u>#40 Badger</u> b. Volume added _____ ft³ 9. Well casing: Flush threaded PVC schedule 40 ☒ 23 Flush threaded PVC schedule 80 ☐ 24 Other ☐ 10. Screen material: <u>PVC</u> a. Screen Type: Factory cut ☒ 11 Continuous slot ☐ 01 Other ☐ b. Manufacturer <u>Boat Longyear</u> c. Slot size: <u>0.010</u> in. d. Slotted length: <u>5.0</u> ft. 11. Backfill material (below filter pack): None ☒ 14 Other ☐
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I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature <i>Paula Richardson</i>	Firm Natural Resource Technology, Inc. 23713 W. Paul Road, Unit D, Pewaukee, WI 53072	Tel: (262) 523-9000 Fax: (262) 523-9001
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Template: NRT WELL CONSTRUCTION - Project: 1375 LOGS.GPJ

TSD 000595



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N R T

SOIL BORING LOG

Page 1 of 5

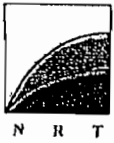
Facility/Project Name Ameren Hutsonville Power Station Drilling		License/Permit/Monitoring Number		Boring Number TW-115d	
Boring Drilled By: Name of crew chief (first, last) and Firm Steve Boari Longyear		Date Drilling Started 4/29/2004		Date Drilling Completed 5/1/2004	
Unique Well No.		Well ID No. TW-115d		Common Well Name	
Final Static Water Level Feet MSL		Surface Elevation 438.4 Feet MSL		Borehole Diameter 8.3 inches	
Local Grid Origin ☒ (estimated: ☐) or Boring Location ☐		State Plane N, E S/C/N		Local Grid Location ☒ N ☒ E	
1/4 of		1/4 of Section T R		Long 8052.56 Feet ☐ S 1176882.3 Feet ☐ W	
Facility ID		County		State	
				Civil Town/City/ or Village Hutsonville	

Sample	Number and Type	Length Att. & 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
1	SS	24 12			0'-3.5' <u>SANDY CLAY</u> , very dark greyish brown (10 YR 3/2), very fine sand, moist							
2	SS	24 24						CL				
3	SS	24 24		5	3.5'-6' <u>CLAYEY SAND</u> mottled grey-brown to tan, very fine sand, moist			SC				
4	SS	24 24			6'-22' <u>FAT CLAY</u> , brown (10 YR 4/3), soft, plastic, moist							
5	SS	24 24										
6	SS	24 4		10				CH				
7	SS	24 24										
8	SS	24 24		15	wet at 13'							

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature <i>Paula Richardson</i>	Firm Natural Resource Technology, Inc.	Tel: (262) 523-9000
Paula Richardson	23713 W. Paul Road, Unit D, Pewaukee, WI 53072	Fax: (262) 523-9001
Template: NRT BORING LOG - Project: 1375 LOGS.GPJ		

TSD 000596



Sample		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
Number and Type	Length Att. & Recovered (in)										
9 SS	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)							
10 SS	24 24						CH				
11 SS	24 24		20	at 19.8' 2" sand seam, very fine sand 20'-22' trace very fine sand							
12 SS	24 24			22'-22.9' <u>SANDY CLAY</u>			CL				
13 SS	24 0		25	22.9'-32' <u>POORLY GRADED GRAVEL WITH SAND</u> , olive grey (5Y 5/2), rounded, very fine to fine sand							
14 SS	24 8						GP				
15 SS	24 7										
16 SS	24 4		30								
17 SS	24 5			32'-33' <u>WELL GRADED SAND</u> fine to coarse, trace rounded gravel			SW				
18 SS	24 14		35	33'-36' <u>WELL GRADED SAND WITH GRAVEL</u> , very fine to coarse sand, fine to medium gravel, rounded			SW				
19 SS	24 8			36'-39' <u>POORLY GRADED SAND</u> very fine to medium, trace gravel, rounded			SP				
20 SS	24 14										
21 SS	24 11		40	39'-40' <u>WELL GRADED SAND WITH GRAVEL</u> , fine to coarse gravel and sand			SW GW				



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N R T

Boring Number **TW-1150** Page 3 of 5

Sample		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				
Number and Type	Length At & Recovered (in)														
22 SS	24 12			40'-42' <u>WELL GRADED GRAVEL WITH SAND</u> , fine to coarse sand, fine to coarse gravel, rounded 42'-58' <u>WELL GRADED SAND</u> fine to coarse sand, trace gravel, rounded 2" gravelly sand seam, fine to coarse gravel at 44'			GW								
23 SS	24 12		45												
24 SS	24 13														
25 SS	24 14														
26 SS	24 13		50			SW									
27 SS	24 16														
28 SS	24 15		55												
29 SS	24 9														
30 SS	24 3			58'-70' <u>WELL GRADED GRAVEL WITH SAND</u> , fine to coarse sand, fine to coarse gravel, rounded			GW								
31 SS	24 7		60												
32 SS	24 24														
33 SS	24 12		65												
34 SS	24 4														

TSD 000598



Sample		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
Number and Type	Length Att. & Recovered (in)										
35 SS	24 0			58'-70' <u>WELL GRADED GRAVEL WITH SAND</u> , fine to coarse sand, fine to coarse gravel, rounded			GW				
36 SS	24 6		70	70'-74' <u>WELL GRADED SAND</u> fine to coarse			SW				
37 SS	24 4										
38 SS	24 0		75	74'-88' Logged from cuttings, <u>WELL GRADED GRAVEL WITH SAND</u> fine to coarse sand, fine to coarse gravel -							Gravel starts coming up in cuttings.
39 SS	24 0										
40 SS	24 0										
41 SS	24 0		80				GW				
42 SS	24 0										
43 SS	24 0		85								
44 SS	24 0										
45 SS	24 12			88'-90' <u>WELL GRADED SAND</u> very fine to medium			SW				
46 CORE	180		90	90'-105' <u>SHALE</u> , grey-blue, friable, moist			SHALE				



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N R T

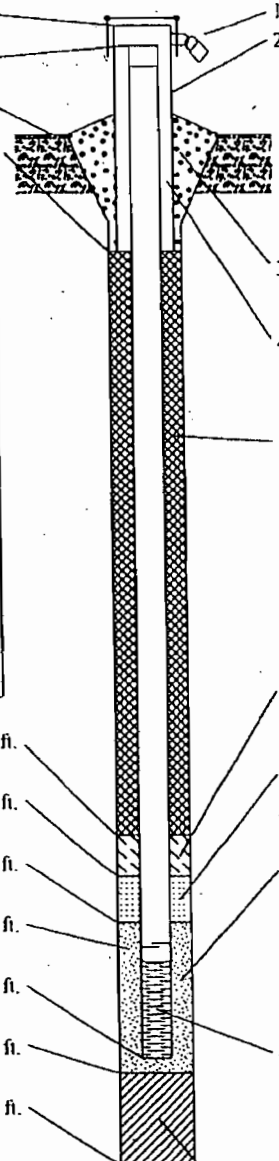
Boring Number TW-115d Page 5 of 5

Sample		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
Number and Type	Length Att. & Recovered (in)										
			95	90'-105' <u>SHALE</u> , grey-blue, friable, moist							
			100								
			105	END OF BORING AT 105' Well set at 87'							

TSD 000600

MONITORING WELL CONSTRUCTION

Facility/Project Name Ameren Hutsonville Power Station Drilling	Local Grid Location of Well 898052.56 ft. ☒ N. ☐ S. 1176882.3 ft. ☒ E. ☐ W.	Well Name TW-115d
Facility License, Permit or Monitoring No.	Local Grid Origin ☒ (estimated: ☐) or Well Location ☐	Unique Well No. ☐ Well Number ☐
Facility ID	Lat. _____ Long. _____ or	Date Well Installed 05/01/2004
Type of Well Well Code 12/p2	Section Location 1/4 of _____ 1/4 of Sec. _____ T. _____ R. _____	Well Installed By: (Person's Name and Firm) Steve
Distance from Waste/ Source ft.	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known	Gov. Lot Number Boart Longyear

4. Protective pipe, top elevation _____ ft. MSL 3. Well casing, top elevation 440.80 ft. MSL 2. Land surface elevation 438.4 ft. MSL 1. Surface seal, bottom 437.4 ft. MSL or 1.0 ft. 12. USCS classification of soil near screen: GP ☐ GM ☐ GC ☐ GW ☒ SW ☐ SP ☐ SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐ Bedrock ☐ 13. Sieve analysis attached? ☐ Yes ☒ No 14. Drilling method used: Rotary ☐ 50 Hollow Stem Auger ☒ 41 rock core _____ Other ☒ 15. Drilling fluid used: Water ☒ 02 Air ☐ 01 Drilling Mud ☐ 03 None ☐ 99 16. Drilling additives used? ☐ Yes ☒ No Describe _____ 17. Source of water (attach analysis, if required): Ameren well	 1. Cap and lock? ☒ Yes ☐ No 2. Protective cover pipe: a. Inside diameter: 4.0 in. b. Length: 6.0 ft. c. Material: Steel ☒ 04 Other ☒ d. Additional protection? ☐ Yes ☒ No If yes, describe: _____ 3. Surface seal: Bentonite ☒ 30 Concrete ☐ 01 Other ☒ 4. Material between well casing and protective pipe: Sand Bentonite ☐ 30 Other ☒ 5. Annular space seal: a. Granular/Chipped Bentonite ☒ 33 b. _____ Lbs/gal mud weight ... Bentonite-sand slurry ☐ 35 c. _____ Lbs/gal mud weight ... Bentonite slurry ☐ 31 d. _____ % Bentonite ... Bentonite-cement grout ☐ 50 e. _____ Ft³ volume added for any of the above f. How installed: Tremie ☐ 01 Tremie pumped ☒ 02 Gravity ☐ 08 6. Bentonite seal: a. Bentonite granules ☐ 33 b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒ 32 c. _____ Other ☒ 7. Fine sand material: Manufacturer, product name & mesh size a. #7 Badger b. Volume added _____ ft³ 8. Filter pack material: Manufacturer, product name & mesh size a. #40 Badger b. Volume added _____ ft³ 9. Well casing: Flush threaded PVC schedule 40 ☒ 23 Flush threaded PVC schedule 80 ☐ 24 Other ☒ 10. Screen material: PVC a. Screen Type: Factory cut ☒ 11 Continuous slot ☐ 01 Other ☒ b. Manufacturer Boart Longyear c. Slot size: 0.010 in. d. Slotted length: 5.0 ft. 11. Backfill material (below filter pack): None ☐ 14 bentonite Other ☒
--	---

E. Bentonite seal, top **361.4** ft. MSL or **77.0** ft.

F. Fine sand, top **358.4** ft. MSL or **80.0** ft.

G. Filter pack, top **357.4** ft. MSL or **81.0** ft.

H. Screen joint, top **356.4** ft. MSL or **82.0** ft.

I. Well bottom **351.4** ft. MSL or **87.0** ft.

J. Filter pack, bottom **350.4** ft. MSL or **88.0** ft.

K. Borehole, bottom **333.4** ft. MSL or **105.0** ft.

L. Borehole, diameter **8.3** in.

M. O.D. well casing **2.33** in.

N. I.D. well casing **2.00** in.

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature *Paula Richardson* Paula Richardson

Firm Natural Resource Technology, Inc.
23713 W. Paul Road, Unit D, Pewaukee, WI 53072

Tel: (262) 523-9000
Fax: (262) 523-9001

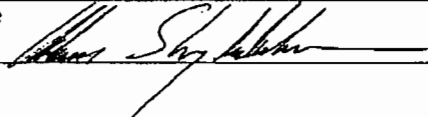
Template: NRT WELL CONSTRUCTION - Project: 1375 LOGS.GPJ

TSD 000601

Facility/Project Name <i>AMEREN Energy Generating - Hutsonville Power Plant</i>			License/Permit/Monitoring Number		Boring Number <i>TW MW-121</i>	
Boring Drilled By (Firm name and name of crew chief) <i>Boart Longyear Randy Radke</i>			Date Drilling Started <i>10/02/01</i>	Date Drilling Completed <i>10/02/01</i>	Drilling Method <i>HSA</i>	
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level <i>Feet MSL</i>	Surface Elevation <i>437.814 Feet MSL</i>	Borehole Diameter <i>8.25 inches</i>	
Boring Location State Plane		<i>3717.203 Feet N 5605.471 Feet E</i>	Lat <i>Long</i>	Local Grid Location (if applicable) ☐ N ☐ E ☐ S ☐ W		
County <i>Crawford</i>			Civil Town/City/ or Village <i>Hutsonville</i>			

Sample Number and Type	Length Ail & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PTD/FID	Soil Properties					RQD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			2	0'-5'6" <u>SILT with SAND</u> , very dark brown (10YR 2/2), grades from topsoil, trace organics throughout										
TW 2.5-4.5	20	2 2 3 3	4		ML									
TW 5-7	18	2 1 2 4	6	5'8"-23' <u>LEAN CLAY</u> , brown (10YR 4/3), medium plasticity, moist										
			8	weak red (2.5Y 5/3), trace orange mottling										
TW 7.5-9.5	16	1 1 1 2	10											
TW 10-12	20	1 1 1 1	12											
TW 12.5-14.5	18	1 1 1 1	14	trace horizontal fracture, wet	CL									
TW 15-17	18	1 1 1 1	16	5-10% fine sand										
TW 17.5-19.5	20	1/24	18	very dark gray (2.5Y 3/1), trace wood and white shell fragments										
TW 20-22	24	1/24	20											
TW 22.5-24.5	10	1/24	22	23'-25'6" <u>SAND</u> , very dark gray (2.5Y 3/1),	SP									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm Natural Resource Technology, Inc.
--	--

Sample			Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)	Blow Counts							Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
	10	1/24		medium, loose, wet	SP									
TW 25-27	18	2 2 2 2	26	25'6"-26' LEAN CLAY, as above	CL									
				26'-27'6" SAND with GRAVEL, poorly graded, coarse sand, fine gravel, rounded	SP									
TW 27.5-28.5	20	3 5 8 10	28	27'6"-31' SAND, gray/black and white, poorly graded, medium to coarse, increased coarseness with depth	SP									
			30											
TW 30-32	20	4 6 8 9	32	31'-32'6" SAND and GRAVEL, coarse sand, poorly graded, fine gravel, rounded	SP									
			34	32'6"-38'6" SAND, gray, poorly graded, medium to coarse, 5-15% gravel										
TW 32.5-34.5	12	1 1 1 1	36		SP									
			38											
TW 35-37	24	2 2 3 4	40	EOB @ 39'6"										
			42											
			44											
			46											
			48											
			50											
			52											
			54											
			56											
			58											
			60											
			62											

Route to: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

MONITORING WELL CONSTRUCTION

Facility/Project Name <u>Hutsonville Power Station</u>		Local Grid Location of Well ft. ☐ N. ☐ S. ☐ E. ☐ W.		Well Name <u>TW MW-121</u>	
Facility License, Permit or Monitoring No.		Local Grid Origin ☐ (estimated: ☐) or Well Location ☐		Unique Well No. <u>DNR Well ID No.</u>	
Facility ID		St. Plane <u>ft. N.</u> <u>ft. E.</u> S/C/N		Date Well Installed <u>10/02/2001</u> m m d d y y y y	
Type of Well Well Code <u>12 / P2</u>		Section Location of Waste/Source <u>1/4 of</u> <u>1/4 of Sec.</u> T. <u>N.</u> R. <u>W.</u>		Well Installed By: Name (first, last) and Firm <u>R. Radke</u> <u>BOART LONGYEAR</u>	
Distance from Waste/Source <u>80</u> ft.		Location of Well Relative to Waste/Source n ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known		Gov. Lot Number	
Enl. Strds. Apply ☐					

A. Protective pipe, top elevation ft. MSL

B. Well casing, top elevation 440.59 ft. MSL

C. Land surface elevation 432.81 ft. MSL

D. Surface seal, bottom ft. MSL or 0.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis performed? ☐ Yes ☒ No

14. Drilling method used: Rotary ☐ 50
Hollow Stem Auger ☒ 41
Other ☐

15. Drilling fluid used: Water ☐ 02 Air ☐ 01
Drilling Mud ☐ 03 None ☒ 99

16. Drilling additives used? ☐ Yes ☒ No

Describe

17. Source of water (attach analysis, if required):

E. Bentonite seal, top ft. MSL or 30.0 ft.

F. Fine sand, top ft. MSL or 30.0 ft.

G. Filter pack, top ft. MSL or 32.0 ft.

H. Screen joint, top ft. MSL or 34.0 ft.

I. Well bottom ft. MSL or 39.0 ft.

J. Filter pack, bottom ft. MSL or 39.5 ft.

K. Borehole, bottom ft. MSL or 39.5 ft.

L. Borehole, diameter 8.3 in.

M. O.D. well casing 2.35 in.

N. I.D. well casing 2.10 in.

1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:

a. Inside diameter: 4 in.

b. Length: 7.0 ft.

c. Material: Steel ☒ 04

Other ☐

d. Additional protection? ☒ Yes ☐ No

If yes, describe: 3" Bumper Posts

3. Surface seal: Bentonite ☒ 30

Concrete ☐ 01

Other ☐

4. Material between well casing and protective pipe:

Bentonite ☐ 30

SAND Other ☒

5. Annular space seal: a. Granular/Chipped Bentonite ☒ 33

b. Lbs/gal mud weight... Bentonite-sand slurry ☐ 35

c. Lbs/gal mud weight... Bentonite slurry ☐ 31

d. % Bentonite... Bentonite-cement grout ☐ 50

e. Ft³ volume added for any of the above

f. How installed: Tremie ☐ 01

Tremie pumped ☐ 02

Gravity ☒ 08

6. Bentonite seal: a. Bentonite granules ☒ 33

b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite chips ☐ 32

c. Other ☐

7. Fine sand material: Manufacturer, product name & mesh size

#7 BAQUER

b. Volume added ft³

8. Filter pack material: Manufacturer, product name & mesh size

#40 AMERICAN MATERIAL

b. Volume added ft³

9. Well casing: Flush threaded PVC schedule 40 ☒ 23

Flush threaded PVC schedule 80 ☐ 24

Other ☐

10. Screen material: PVC

a. Screen type: Factory cut ☒ 11

Continuous slot ☐ 01

Other ☐

b. Manufacturer Johnson

c. Slot size: 0.010 in.

d. Slotted length: 5.0 ft.

11. Backfill material (below filter pack): None ☒ 14

Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm

NATURAL RESOURCE Technology Inc.

 BOART LONGYEAR
WELL DEVELOPMENT REPORT

WELL NAME TW (MW-121)

JOB NO# 3410-1824

WELL DIAMETER 2"

LOCATION Hutsonville, IL

(MEASUREMENTS BELOW FROM TOP OF CASING)

DATE 10/2/2001

TOTAL DEPTH 41.8'

DEVELOPED BY G. Jones

DEPTH TO WATER BEFORE
DEVELOPMENT 16.3'

DEPTH TO WATER AFTER
DEVELOPMENT 16.3'

DESCRIPTION OF DEVELOPMENT METHOD

(Check One)

- ☐ SURGED W/BAILER & BAILED
☐ SURGED W/BAILER & PUMPED
☐ SURGED W/BLOCK & BAILED
☒ SURGED W/BLOCK & PUMPED
☐ OTHER _____

CAN THIS WELL BE PURGED DRY? ☐ YES ☒ NO

VOLUME OF WATER IN FILTER PACK AND WELL CASING _____ Gallons

VOLUME OF WATER REMOVED FROM WELL 120 Gallons

CLARITY OF WATER BEFORE DEVELOPMENT Trubid Gry

CLARITY OF WATER AFTER DEVELOPMENT Clear

VOLUME OF WATER ADDED None

SOURCE OF WATER ADDED None

TIME SPENT FOR DEVELOPMENT 75 Minutes

START: _____ END: _____
6:00 P.M. 7:15 P.M.

COMMENTS:

Chapter 11

Natural Resource Technology, Inc.

MEMORANDUM

TO: Michael Bollinger, Ameren Services
FROM: Bruce Hensel
DATE: August 19, 1999
RE: STORET Data, Wabash River near Hutsonville, IL

Wabash River water quality data from the STORET database were not included in the hydrogeologic assessment for the Hutsonville ash impoundments because the closest downstream station with relevant parameters is in Hutsonville, about two river miles downstream, and because there are no upstream data with relevant data for comparison. However, I thought you might be interested in these data as an overview of general water quality in the Wabash River; therefore, they are summarized in this separate memorandum.

The STORET data contained records from Station 3341920, "Wabash River at Hutsonville", for boron, manganese, iron, and nickel. Only one other nearby station contained boron data, and records for that station, which was just downriver of the station I used, had no records after 1980. There was also one station that, based on latitude, may have been at the plant; however, boron, iron, manganese, and nickel were not monitored at that station (although sulfate was). Two agencies reported duplicate samples to the database for the station that I used, so I queried it to only report records for the agency with the most records. The results are provided in Table 1.

The results in Table 1 show that maximum Wabash River concentrations at the City of Hutsonville are similar to the 95th percentile concentrations of background groundwater quality presented in Table 7 of the hydrogeologic assessment, and median concentrations are lower than or similar to the medians displayed on Figures 10, 13, 14, and 15 of the hydrogeologic assessment.

I also included a plot of boron concentration in the Wabash River at Hutsonville versus time, and the resulting graph appears to indicate annual peaks occurring at the end of almost every year. Whether these peaks are due to river stage or some other cause are unknown.

Overall, Wabash River water quality appears to be good at this station, relative to background groundwater concentrations observed at the plant; however, it is difficult to determine possible plant impacts on Wabash River water quality because there are no upstream data for comparison.

Table 1**Wabash River Water Quality Statistics from STORET Database****a. Statistics**

	Sulfate	Boron	Iron	Manganese	Nickel
Count	0	113	118	118	117
Max (mg/L)		0.204	0.100	0.049	0.025
Median (mg/L)		0.055	0.050	0.015	0.015
Average (mg/L)		0.071	0.051	0.012	0.013
Min (mg/L)		0.005	0.010	0.005	0.005

b. STORET Station Information

AGENCY	STATION NO	LAT	LONG	LOCATION NAME
21ILAMB	3341920	390637	873918	WABASH RIVER AT HUTSONVILLE IL

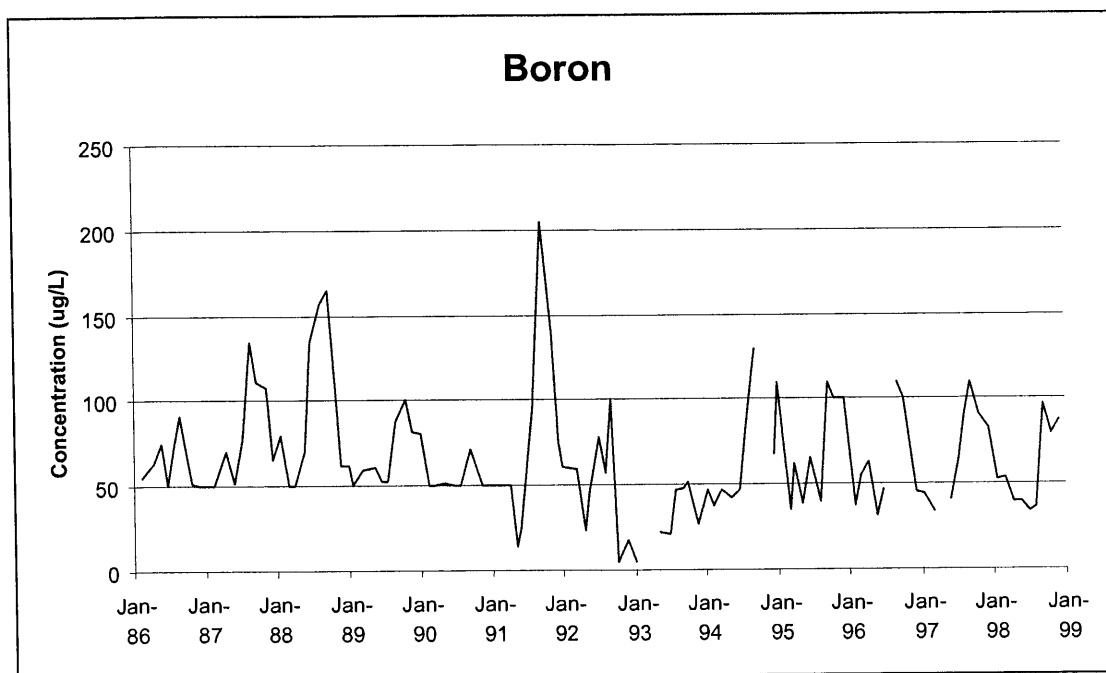
c. Period of Record

Station

10/8/69 through 12/15/98

d. Data Distribution of Selected Parameters (based on iron count)

Year(s)	Number of Records	Records/yr
1969 - 1979	0	0
1980	2	2
1981 - 1985	0	0
1986 - 1989	35	9
1990 - 1998	81	9



Chapter 12

TECHNICAL MEMORANDUM

www.naturalrt.com

Date: April 2, 2009

Subject: Mixing Calculation, Proposed Groundwater Collection Trench: Hutsonville Pond D

From: Bruce Hensel

A mixing calculation was performed to determine whether or not discharge from a proposed groundwater collection trench has the potential to cause boron concentrations in the plant's NPDES-permitted outfall #002 (IL0000175) to exceed the permit-specified limit of 10 mg/L. Results of this calculation indicate that concentrations not exceed the 10 mg/L limit. Details are provided below.

		Averages	Maximums	Source
Plant Sluice Volume (GPD)	V1	1,680,000	1,680,000	Oct 2003 NPDES Permit, Outfall 002
Sluice Concentration (mg/L)	C1	1.5	4.1	See Note 1
Trench Volume (GPD)	V2	225,091	225,091	See Note 2
(GPM)		156	156	
Trench Concentration (mg/L)	C2	5.4	18	See Note 3
Total Volume (GPD)		1,905,091	1,905,091	= V1+V2
Total Concentration (mg/L)		2.0	5.7	= [(V1*C1) + (V2*C2)] / (V1+V2)

Notes:

- 1 Long-term average boron concentration specified in Oct 2003 NPDES permit is 1.5 mg/L, maximum observed value = 4.1 mg/L.
- 2 Trench volume based on model simulation CO-2, LEOa-3 (synthetic cap, shallow drain along south side), multiplied by 2.6 to account for extended drain length.
- 3 Average & maximum trench concentration based on observed data at MW2, MW3, MW6, MW11R from 2002-2008.