NATURAL RESOURCE TECHNOLOGY

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May 5, 2008
(1375-6.2)

RE: Groundwater Monitoring Program – Hutsonville Ash Impoundment Pond D

Dear John:

This letter outlines a program to monitor groundwater at the above-mentioned facility. Included are background materials, completion details for the monitoring wells, and a description of a conceptual plan for monitoring groundwater at this facility that includes proposed adjusted standards. Upon closure of Pond D, a formal monitoring plan will be prepared in accordance with conditions stipulated by the IPCB in response to the requested variance. The anticipated plan would likely include: listing procedures for groundwater sampling, sample preservation and shipment, analytical methods, quality assurance and quality control, recordkeeping and reporting of results.

BACKGROUND

Ameren Energy Generating Company (AEG) operates an impoundment system with five ponds at the Hutsonville generating station (Figure 1-Site Plan). 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 at 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 during the period used to calculate background statistics, described later in this document, and for which complete sample sets were available. Unfortunately, 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, a 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 elevated concentrations of boron and sulfate in Pond D monitoring wells screened in the upper migration zone (Figure 5a and 5b). In addition, there are slightly elevated (higher than background, lower than Class I standards) concentrations of boron and sulfate in one monitoring well in the deep alluvial aquifer (Figure 6a and 6b). 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. Concentrations of boron and sulfate have recently[1] been as high as 16 mg/L and 960 mg/L, respectively (Figures 5a and 5b). The impacted well within the deep alluvial aquifer is MW-14, where boron and sulfate concentrations were as high as 1.5 mg/L and 230 mg/L, respectively (Figures 6a and 6b). The fine-grained alluvial deposits overlying the deep alluvial aquifer occur over an elevation range that overlaps the upland shale (Figure 2, 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[2], and five parameters with listed limitations, on a monthly basis (Table 1). The Pond A monitoring program is in compliance with monitoring regulations under 35 Ill. Adm. Code 620, as evidenced by a permit to operate this facility issued on June 14, 2005 (Permit No. 2005-EO-3689).

POND D MONITORING PROGRAM

This monitoring plan was prepared in anticipation of Pond D closure and groundwater monitoring under 35 Ill. Adm. Code 811.318 and 319. Some of the regulatory requirements for that program are designed for detection monitoring at new sites, where groundwater quality has not been affected by prior releases. The situation at Pond D differs because it was constructed prior to modern regulatory requirements, and a release has already occurred. Relief from certain monitoring requirements will be sought in a petition to the

[1] Based on data collected between September 2002 and March 2005, the period when consecutive quarterly samples were collected. Boron concentrations as high as 50 mg/L were observed in the mid-to-early 1980s.
[2] The deep alluvial aquifer does not extend beneath the zone of attenuation at Pond A.

Pollution Control Board. The following monitoring program (Table 2) is proposed assuming a positive decision on the petition.

Objective of Pond D Monitoring Program

The objectives of the monitoring program for Pond D are:

- To verify that concentrations in the upper migration zone near this closed facility decrease or are maintained at levels below adjusted standards. Groundwater flow and transport modeling suggests that concentrations south of Pond D (wells MW-6 and MW-11R) will decrease over time. However, significant concentration decreases are not expected to the east (MW-7 and MW-8), because these monitoring wells are downgradient of saturated ash areas within Pond D, and leachate will continue to be generated by groundwater flowing through this ash, even after the impoundment is capped.
- To verify that concentrations in the deep alluvial aquifer do not increase to levels higher than background or adjusted groundwater quality standards as appropriate.

Monitoring Wells

Tables 3 and 4 list monitoring well completion details; boring and well completion logs are provided in Attachment E. The existing wells are compliant with 35 Ill. Adm. Code 811.318 with the exception that well nest MW-7/MW-7D is not within the 100-foot zone of attenuation. However these wells are as close as possible without interfering with facility operations, and are capable of detecting a release from Pond D as demonstrated by observed concentrations of coal ash indicator parameters (boron and sulfate) in MW-7. Furthermore, Ameren is seeking an adjusted standard to extend the zone of attenuation eastward to the property boundary, which will cause MW-7 to be within the zone of attenuation.

Monitoring wells MW-1 and MW-10 provide background 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. Therefore, historic data from MW-7D and MW-121 (formerly MW-TW) were used to calculate background for this aquifer. Comparison of analytical results from the proposed deep alluvial aquifer background wells (MW-7D and MW-121) to the upper migration zone background wells (MW-1 and MW-10) shows similar ranges of groundwater quality for all parameters except manganese (Figures 7a through 7g). Manganese is released to groundwater from manganese oxides under reducing conditions, and the concentrations observed at MW-7D and TW-121 (which are higher than those observed in MW-14) suggest greater manganese dissolution in the confined, deep alluvial aquifer than in the unconfined, upper migration zone background wells. Concentrations for the ash indicator constituents (boron and sulfate) will be inspected at MW-7D and MW-121 annually, and if concentrations increase for two consecutive years, an investigation will be performed to determine whether these wells are still representative of background conditions or if they should be reclassified as AGQS wells, as defined below. All wells used for calculating background will be monitored on the same schedule as the downgradient wells as provided in Table 2.

Wells MW-6, MW-7, MW-8, and MW-11R will be used to monitor downgradient groundwater quality in the upper migration zone. Wells MW-14, MW-115S, and MW-115D will be used to monitor downgradient

groundwater quality in the deep alluvial aquifer. All of these monitoring wells will serve as AGQS wells as required by 35 Ill. Adm. Code 811.318(b)(5).[3]

Analytical Parameters

Boron and sulfate are the primary indicators of coal ash leachate. These parameters are persistent, mobile, and always present in elevated concentrations in coal ash leachate.[4] Additional monitoring of pH, temperature, specific conductance, groundwater elevation, and monitoring well depth are required under 35 Ill. Adm. Code 811.318(e). Biannual monitoring of organic compounds is required under 35 Ill. Adm. Code 811.319(a)(3); however, there is no expectation that organics will leach in detectable concentrations from a CCB management facility because the fly ash and bottom ash have passed through a power plant boiler at temperatures of nearly 3,000°F, which is hotter than high-temperature thermal desorption units (1,000°F) used to volatilize organic compounds from contaminated soils, and equivalent to the hottest-burning incinerators that degrade organic compounds into base elements. As a result, organic compounds are not expected to be present in fly and bottom ash produced during the combustion process.

In addition to the field parameters and ash indicator parameters, total dissolved solids (TDS) and manganese will be monitored. Each of these parameters had concentrations higher than Class I groundwater quality standards in some upper migration zone monitoring wells. TDS concentrations reflect major ion chemistry (e.g., sulfate) in the groundwater. Manganese concentrations may, in some cases, be naturally occurring, as evidenced by concentrations in exceedance of the Class I standard in upper migration zone background wells MW-1 and MW-10D. The monitoring parameters proposed for Pond D are the same as those with listed limitations in the State operating permit issued for Pond A.

Schedule

Groundwater samples will be obtained upon approval of this petition and for a period of *at least* five years after closure.[5] Monitoring will be on a quarterly basis for the first five years after closure. After this five-year period, Ameren may request a reduction to semi-annual sample frequency when conditions meet the criteria of Title 35, Part 811.319(a)(1)(A), specifically when monitoring effectiveness will not be compromised, when sufficient quarterly data have been collected to characterize groundwater, and when concentrations of monitored constituents at the AGQS wells are below the appropriate AGQS.[6]

Beginning 15 years after closure, or five years after concentrations of monitored constituents at AGQS wells are below the appropriate AGQS, Ameren may request a reduction to annual sampling if the conditions of Title 35, Part 811.319(a)(1)(B) are met; specifically when all constituents monitored at the AGQS wells are

[3] As noted in the paragraph above, MW-7D and/or MW-121 may in the future be converted to AGQS wells if it becomes apparent that concentrations are increasing due to leachate migration from Pond D.
[4] Reference: *Chemical Characterization of Fossil Fuel Combustion Wastes*. EPRI Final Report EA-5321, August 1987.
[5] The five-year period is appropriate according to Title35, Part 811(a)(1)(C) because this is an on-site facility that is not a municipal solid waste landfill, and has only accepted wastes generated at the site.
[6] Specifically, when concentrations are below the AGQS as defined under Title 35, Part 811.320 or the adjusted standard as set forth later in this monitoring plan and approved by the Illinois Pollution Control Board if such an adjusted standard exists for the particular well-constituent combination.

less than or equal to their appropriate AGQS for eight consecutive quarters and there are no statistically significant increasing trends in the monitoring data.

Monitoring will be discontinued when no statistically significant increase is detected in the concentration of any constituent above that measured and recorded during the immediately preceding scheduled sampling for three consecutive years after changing to an annual monitoring frequency.

Calculation of Background

Background concentrations were determined based on analytical data compiled for monitoring wells MW-1 and MW10 in the upper migration zone, and MW-7D and MW-121 in the deep alluvial aquifer (Appendix D). As previously noted, comparison of analytical results from MW-7D and MW-121 to the upper migration zone background wells (MW-1 and MW-10) shows similar ranges of groundwater quality for all parameters except manganese (Figures 7a through 7g). Furthermore, there are no trends or seasonality in the concentrations of the mobile ash indicator constituents, boron and sulfate (Figure 8a and 8b).

The background period consists of consecutive quarterly sample events from September 2002 through March 2005. Consecutive quarterly data do not exist prior to or after this period. MW-1 has been sampled monthly as part of the Pond A monitoring program, while MW-10 was sampled quarterly over the background sample period. In order to avoid biasing the background data with the large number of samples from MW-1, only the samples collected from MW-1 during the same month as the MW-10 samples were used in the background calculation. A Wilcoxon Rank-Sum statistical comparison of the monthly MW-1 data record during the background data period to the subset of MW-1 quarterly samples collected during this period demonstrated that the quarterly and monthly data are statistically similar (Attachment A).

Background concentrations were calculated for the quarterly data according to the following procedure:

1) Data were reviewed for outliers using Dixon's Outlier test. One potential outlier was identified, but was not excluded from the dataset because there was no additional evidence to suggest that it was in error (Attachment B1).
2) Background data were pooled.
3) Detection frequency was determined (Attachments B2 and B3).
4) Data normality was determined using the Shapiro-Wilk W test for normality (Attachments B2 and B3).
5) Tolerance Intervals were calculated based on the following criteria (Attachments B2 and B3):
   - 99 percent confidence level, 95 percent coverage.
   - Data were log-transformed if necessary to meet the parametric distribution requirement of the test.
   - Non-detects were replaced with ½ the PQL if the percentage of non-detects was less than or equal to 15%, and Cohen's adjustment was used for datasets where the detection frequency was between 15 and 50%. (There were no no-detects in the background data set)
   - A parametric tolerance interval was calculated for parametric or log-parametric datasets.

- A non-parametric tolerance interval was determined for non-parametric datasets.

6) The background concentrations presented in Table 5 are:
   - The upper tolerance interval for all constituents except for pH.
   - The range between the upper and lower tolerance intervals for pH.

Adjusted Standards

Adjusted standards were determined individually for boron, sulfate, manganese, TDS, and pH at selected AGQS monitoring well (Table 6) using tolerance intervals.[7] The tolerance intervals were calculated using data from consecutive quarterly sample events from September 2002 through March 2005. Consecutive quarterly data do not exist prior to or after this period. Time series plots were prepared for these data (Figures 9 and 10). The only constituent with an apparent trend was boron at MW14, and that trend leveled off over the last five quarters of sampling (Figure 10a). Otherwise, the data showed no apparent trends or seasonality.

The statistical procedure outlined below was followed for each well/parameter combination to calculate the tolerance intervals:

1) Data were reviewed for outliers using Dixon's Outlier test. Two potential outliers were identified, but not excluded from the dataset because there was no additional evidence to suggest that the values were in error (Attachment C1).
2) Detection frequency was determined (Attachment C2).
3) Data normality was determined using the Shapiro-Wilk W test for normality (Attachment C2).
4) Tolerance Intervals were calculated based on the following criteria (Attachment C2):
   - 99 percent confidence level, 95 percent coverage.
   - Data were log-transformed if necessary to meet the parametric distribution requirement of the test.
   - Non-detects were replaced with ½ the PQL if the percentage of non-detects was less than or equal to 15%, and Cohen's adjustment was used for datasets where the detection frequency was between 15 and 50%. (There were no no-detects)
   - A parametric tolerance interval was calculated for parametric or log-parametric datasets.
   - A non-parametric tolerance interval was determined for non-parametric datasets.
5) Adjusted standards (Table 6) are proposed for any well/constituent combination where the tolerance interval is outside the lower of the background data range or Class I standard.

[7] Adjusted standards were not calculated for MW-115s and MW-115d because concentrations of ash indicator constituents were lower than background (in limited sampling).

CLOSING

Please do not hesitate to contact me if you have any questions concerning this or other issues associated with this facility.

Sincerely,

NATURAL RESOURCE TECHNOLOGY, INC.

Bruce R. Hensel, PG
Senior Hydrogeologist

Encs: Figures 1 through 10
Tables 1 through 6
Attachment A: Statistical Comparison of Upper Migration Zone and Deep Alluvial Aquifer Background Well Data
Attachment B: Background Statistical Calculations
Attachment C: Statistical Calculations for Adjusted Standards
Attachment D: Data used in Statistical Calculations
Attachment E: Boring Logs and Well Completion Reports

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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	Purpose/Position	Deep Alluvial Aquifer*	Purpose/Position
MW-1	Background/Upgradient	MW-7D	Background#/Downgradient
MW-10	Background/Upgradient	MW-121 (MW-TW)	Background#/Downgradient
MW-6	AGQS/Sidegradient	MW-14	AGQS/Downgradient
MW-7	AGQS/Downgradient	MW-115D (TW-115D)	AGQS/Downgradient
MW-8	AGQS/Downgradient	MW-115S (TW-115S)	AGQS/Downgradient
MW-11R	AGQS/Sidegradient		

Note:

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

MW-7D and MW-121 may be converted to AGQS wells if future monitoring and investigation determines that these wells are impacted by ash leachate impacts from Pond D.

b. Parameters

Parameter	Schedule	Notes
pH	every sample	field parameter
Temperature	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
Manganese	every sample	elevated concentrations near Pond D
TDS	every sample	elevated concentrations near Pond D

c. 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[2])	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 (TW-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 (TW-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 (MW-TW)	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,

Table 4
Monitoring Well Positions: Hutsonville Pond D Monitoring Wells

Well	Position Relative to Pond D	Distance from Pond D	Within Pond D Zone of Attenuation?
MW-1	*(Background)*	>2000	no - more than 100 ft distant
MW-6	Sidegradient	70	Yes
MW-7	Downgradient	140	no - more than 100 ft distant
MW-7D	*(Background)*	140	no - not uppermost aquifer
MW-8	Downgradient	20	Yes
MW-10	*(Background)*	>2000	no - more than 100 ft distant
MW-11R	Sidegradient	60	Yes
MW-14	Downgradient	80	no - not uppermost aquifer
MW-115D (TW-115D)	Downgradient	80	no - not uppermost aquifer
MW-115S (TW-115S)	Downgradient	80	no - not uppermost aquifer
MW-121 (MW-TW)	*(Background)*	30	no - not uppermost aquifer

Notes:

Distance measurements from base of berm provided by plant personnel

Table 5a
Background Calculation: Hutsonville Pond D Monitoring Program - Upper Migration Zone

Wells	Parameter	Units	% Non-Detects	Normal?	Log-normal?	Tolerance Interval Method[1]	Confidence Level	Background
MW1, MW10	Boron, total	mg/L	0	Yes	Yes	PTI	0.99	0.22
MW1, MW10	Manganese, total	mg/L	0	No	Yes	TTI	0.99	1.9
MW1, MW10	pH (field)	std	0	Yes	Yes	PTI	0.99	6.7 - 7.7
MW1, MW10	Sulfate, total	mg/L	0	No	Yes	TTI	0.99	97
MW1, MW10	Total Filterable Residue (TDS)	mg/L	0	Yes	No	PTI	0.99	566

Table Notes:

1. PTI = parametric tolerance interval, TTI = tolerance interval on log-transformed data, NTI = non-parametric tolerance interval

2. No standards are proposed for field parameters other than pH

Table 5b
Background Calculation: Hutsonville Pond D Monitoring Program - Deep Alluvial Aquifer

Wells	Parameter	Units	% Non-Detects	Normal?	Log-normal?	Tolerance Interval Method[1]	Confidence Level	Background
MW7D, MW121	Boron, total	mg/L	0	No	Yes	TTI	0.99	0.27
MW7D, MW121	Manganese, total	mg/L	0	No	Yes	TTI	0.99	2.4
MW7D, MW121	pH (field)	std	0	Yes	Yes	PTI	0.99	7.0 - 7.8
MW7D, MW121	Sulfate, total	mg/L	0	Yes	Yes	PTI	0.99	84
MW7D, MW121	Total Filterable Residue (TDS)	mg/L	0	Yes	Yes	PTI	0.99	500

Table Notes:

1. PTI = parametric tolerance interval, TTI = tolerance interval on log-transformed data, NTI = non-parametric tolerance interval

2. No standards are proposed for field parameters other than pH

Table 6a
Proposed Adjusted Standards: Hutsonville Pond D Monitoring Program - Upper Migration Zone

Well	Parameter	Units	Normal?	Log-normal?	% Non-Detects	Tolerance Interval Method[1]	Confidence Level	Tolerance Interval Limit	Background	Class I	Adjusted Standard
MW-6	Boron, total	mg/L	Yes	Yes	0.0	PTI	0.99	21.5	0.22	2.0	21.5
MW-6	Manganese, total	mg/L	No	No	0.0	NTI	0.43	3.6	1.9	0.15	3.6
MW-6	pH (field)	std	Yes	Yes	0.0	PTI	0.99	6.1 - 7.9	6.7 - 7.7	6.5 - 9.0	6.1 - 7.9
MW-6	Sulfate, total	mg/L	Yes	Yes	0.0	PTI	0.99	576	97	400	576
MW-6	Total Filterable Residue (TDS)	mg/L	Yes	Yes	0.0	PTI	0.99	1128	566	1200	1128
MW-7	Boron, total	mg/L	No	No	0.0	NTI	0.43	2.6	0.22	2.0	2.6
MW-7	Manganese, total	mg/L	No	Yes	0.0	TTI	0.99	1.8	1.9	0.15	1.9
MW-7	pH (field)	std	Yes	Yes	0.0	PTI	0.99	6.4 - 7.5	6.7 - 7.7	6.5 - 9.0	6.4 - 7.7
MW-7	Sulfate, total	mg/L	Yes	Yes	0.0	PTI	0.99	416	97	400	416
MW-7	Total Filterable Residue (TDS)	mg/L	Yes	Yes	0.0	PTI	0.99	1262	566	1200	1262
MW-8	Boron, total	mg/L	Yes	Yes	0.0	PTI	0.99	16.2	0.22	2.0	16.2
MW-8	Manganese, total	mg/L	Yes	Yes	0.0	PTI	0.99	6.1	1.9	0.15	6.1
MW-8	pH (field)	std	No	No	0.0	NTI	0.43	6.9 - 7.4	6.7 - 7.7	6.5 - 9.0	none
MW-8	Sulfate, total	mg/L	Yes	Yes	0.0	PTI	0.99	1241	97	400	1241
MW-8	Total Filterable Residue (TDS)	mg/L	No	No	0.0	NTI	0.43	1800	566	1200	1800
MW-11R	Boron, total	mg/L	Yes	Yes	0.0	PTI	0.99	11.6	0.22	2.0	11.6
MW-11R	Manganese, total	mg/L	No	Yes	0.0	TTI	0.99	9.5	1.9	0.15	9.5
MW-11R	pH (field)	std	No	No	0.0	NTI	0.40	6.0 - 7.2	6.7 - 7.7	6.5 - 9.0	6.0 - 7.7
MW-11R	Sulfate, total	mg/L	No	No	0.0	NTI	0.43	720	97	400	720
MW-11R	Total Filterable Residue (TDS)	mg/L	No	No	0.0	NTI	0.43	1300	566	1200	1300

Table Notes:

1. PTI = tolerance interval, TTI = tolerance interval on log-transformed data, NTI = larger of non-parametric tolerance interval or mean+stdev*2

2. No standards are proposed for field parameters other than pH

Table 6b
Proposed Adjusted Standards: Hutsonville Pond D Monitoring Program - Deep Alluvial Aquifer

Well	Parameter	Units	Normal?	Log-normal?	% Non-Detects	Tolerance Interval Method[1]	Confidence Level	Tolerance Interval Limit	Background	Class I	Adjusted Standard
MW-14	Boron, total	mg/L	Yes	Yes	0.0	PTI	0.99	2.3	0.27	2.0	2.3
MW-14	Manganese, total	mg/L	Yes	Yes	0.0	PTI	0.99	0.67	2.4	0.15	2.4
MW-14	pH (field)	std	No	No	0.0	NTI	0.43	6.8-7.3	7.0 - 7.8	6.5 - 9.0	6.8-7.8
MW-14	Sulfate, total	mg/L	Yes	No	0.0	PTI	0.99	305	84	400	305
MW-14	Total Filterable Residue (TDS)	mg/L	No	No	0.0	NTI	0.43	830	500	1200	830

Table Notes:

1. PTI = tolerance interval, TTI = tolerance interval on log-transformed data, NTI = larger of non-parametric tolerance interval or mean+stdev*2

2. No standards are proposed for field parameters other than pH

SITE PLAN

LEACHATE MANAGEMENT AND FINAL COVER ALTERNATIVES REPORT
HUTSONVILLE POWER STATION–POND D CLOSURE
AMEREN ENERGY GENERATING, HUTSONVILLE, ILLINOIS

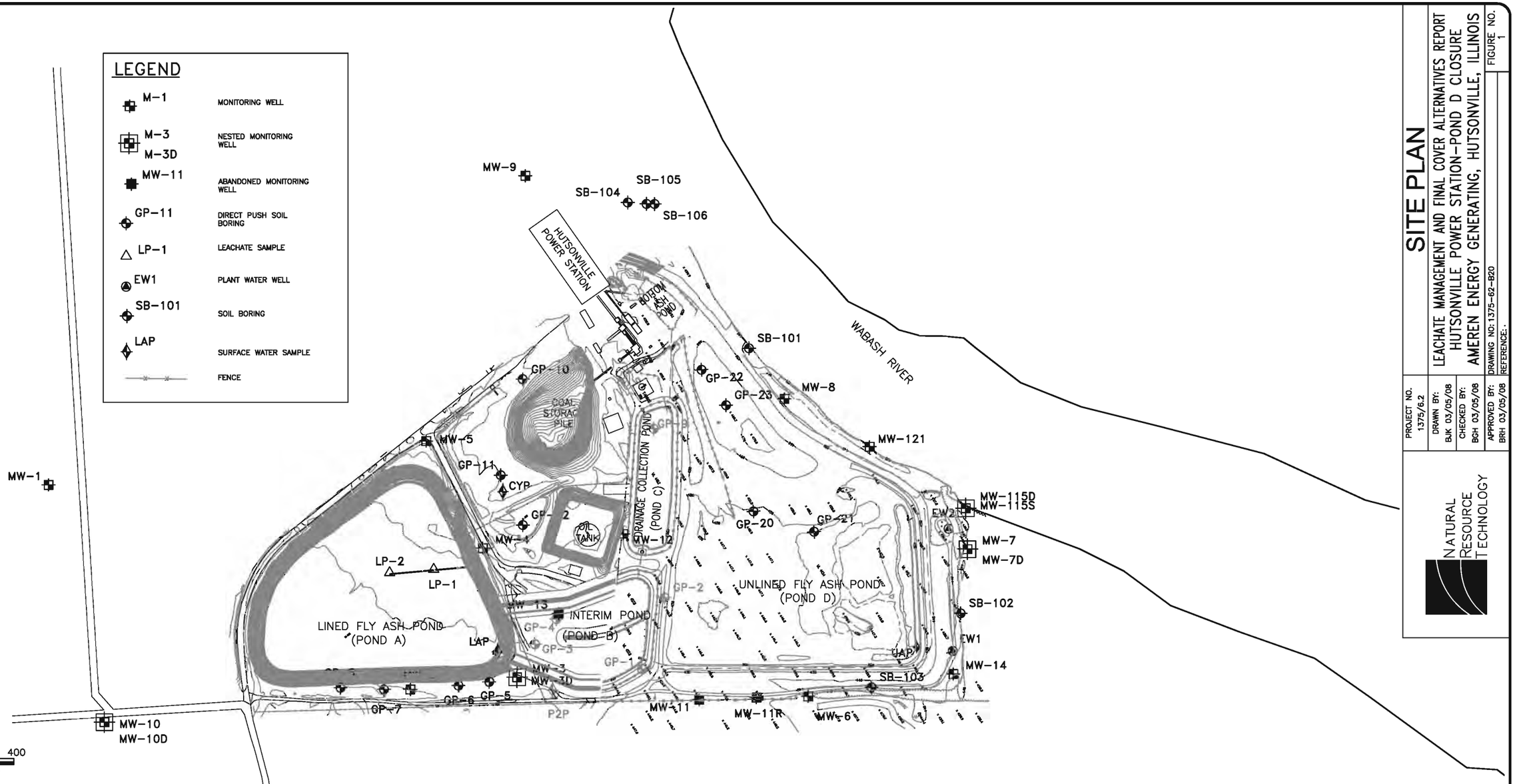
FIGURE NO. 1

PROJECT NO. 1375/6.2
DRAWN BY: BJK 03/05/08
CHECKED BY: BGH 03/05/08
APPROVED BY: BRH 03/05/08
DRAWING NO: 1375-62-B20
REFERENCE: -

NATURAL RESOURCE TECHNOLOGY

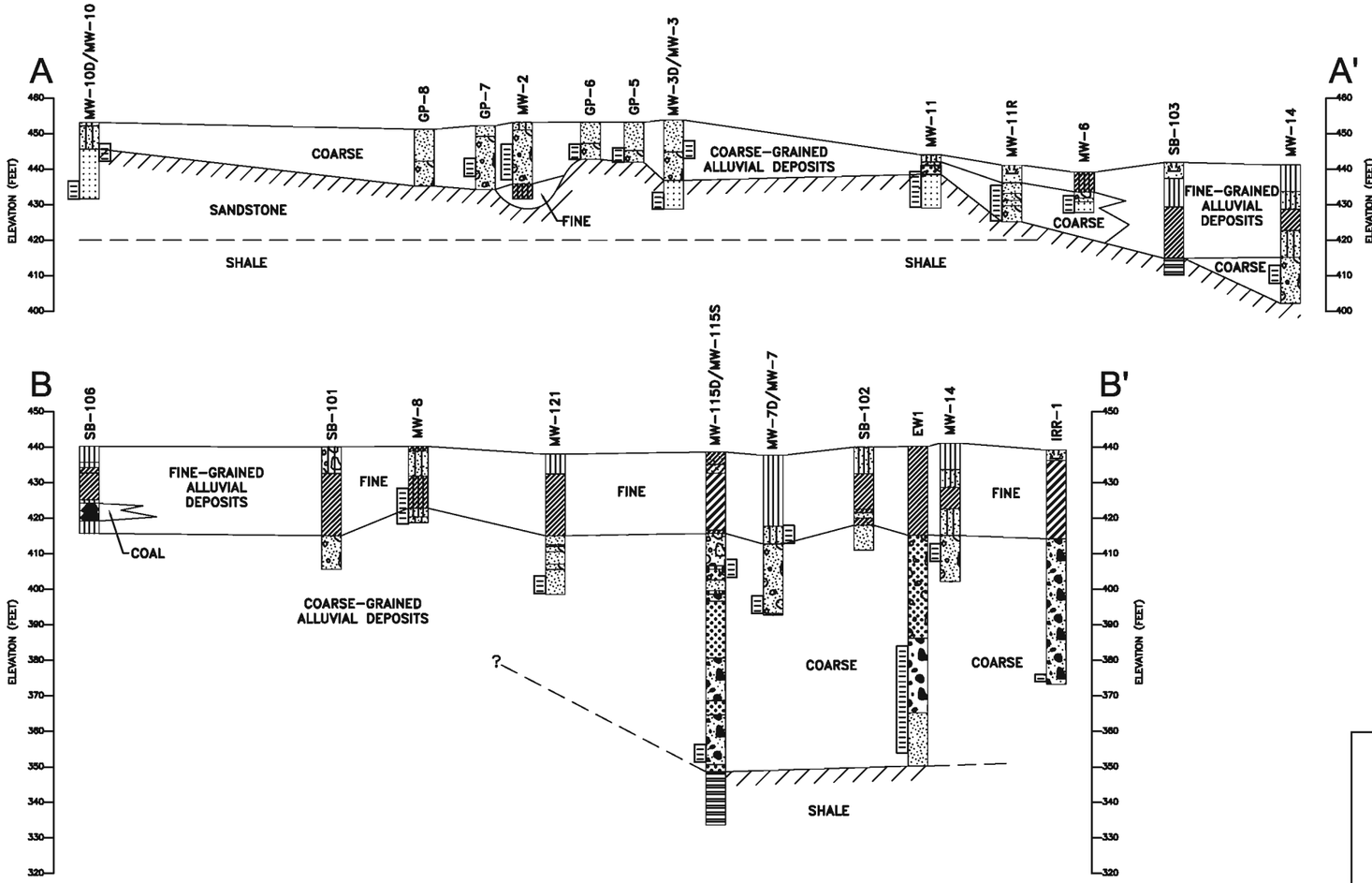
LEGEND

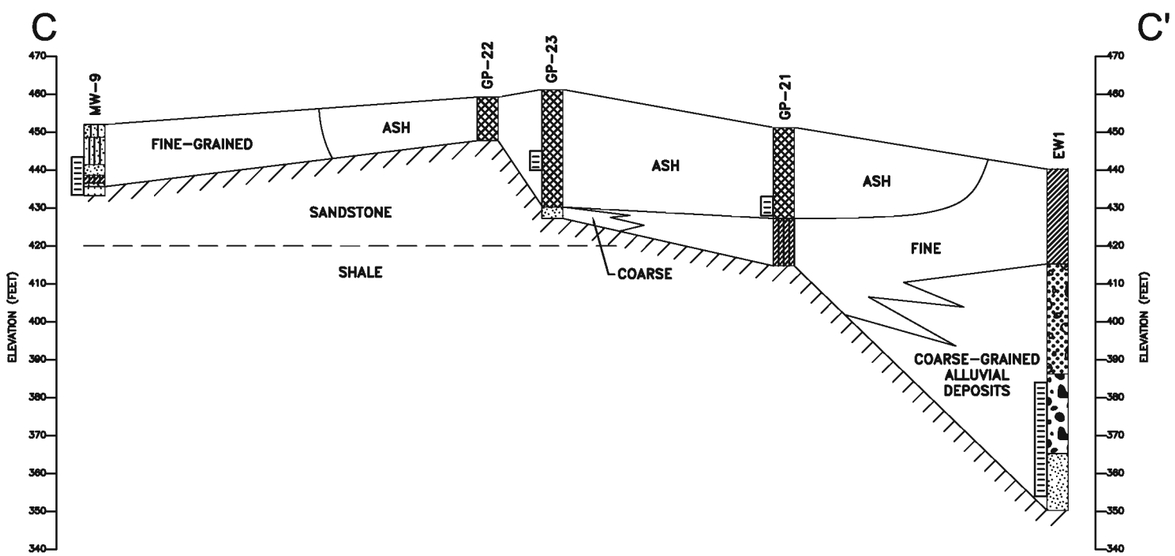
- M-1 — MONITORING WELL
- M-3 / M-3D — NESTED MONITORING WELL
- MW-11 — ABANDONED MONITORING WELL
- GP-11 — DIRECT PUSH SOIL BORING
- LP-1 — LEACHATE SAMPLE
- EW1 — PLANT WATER WELL
- SB-101 — SOIL BORING
- LAP — SURFACE WATER SAMPLE
- FENCE



SOURCE NOTES:
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
TW-115D AND TW-115S WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

NOTES:
1. DISCONTINUITIES BETWEEN SURVEYS ARE INDICATED BY BREAKS IN CONTOUR LINES.
2. SOIL BORINGS GP-1 THROUGH GP-4, GP-9 AND SURFACE WATER SAMPLE P2P ARE SCREENED SINCE THEY ARE ASSOCIATED WITH FORMER ASH LAYDOWN AREA NOW REPLACED WITH THE INTERIM POND AND THE DRAINAGE COLLECTION POND. SEE NRT REPORT "HYDROGEOLOGIC ASSESSMENT" FOR FURTHER INFORMATION.



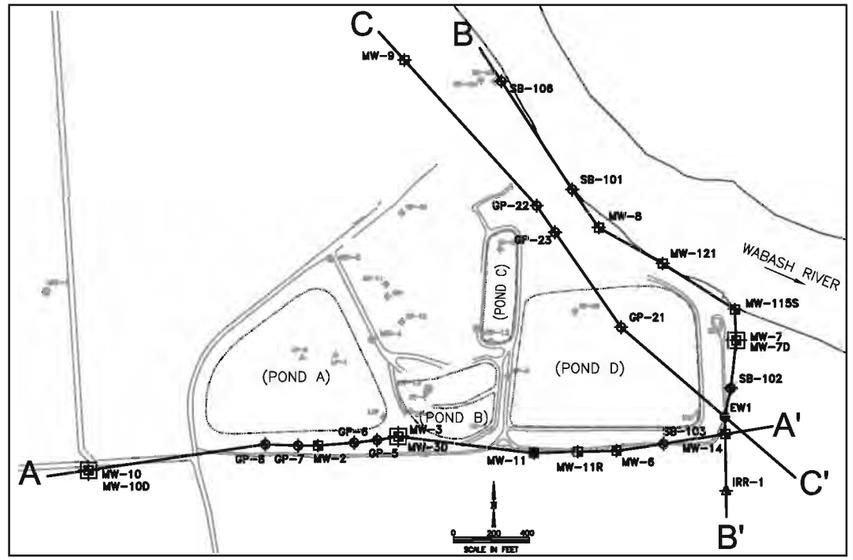


LEGEND

- TOPSOIL
- SILT
- SILTY LEAN CLAY
- SANDY SILT
- SILTY SAND
- LEAN CLAY
- FAT CLAY
- GRAVELLY SILT
- SANDSTONE
- SHALE
- COAL
- WELL GRADED SAND
- WELL GRADED GRAVEL WITH SAND
- WELL GRADED SAND WITH GRAVEL
- POORLY GRADED SAND
- POORLY GRADED SAND WITH GRAVEL
- SANDY LEAN CLAY
- ASH
- WELL GRADED GRAVEL
- SCREENED INTERVAL

NOTES:
1. IRR-1 IS THE WAMPLER IRRIGATION WELL (ISGS WELL #12-033-36667-00).
2. EW1 IS BASED ON ISGS WELL, PERMIT #47367.
3. SURFACE ELEVATION FOR SB-106 WAS ESTIMATED FROM NEIGHBORING BORING ELEVATIONS.
4. C-C' SHALE/SANDSTONE CONTACT EXTRAPOLATED FROM A-A'.

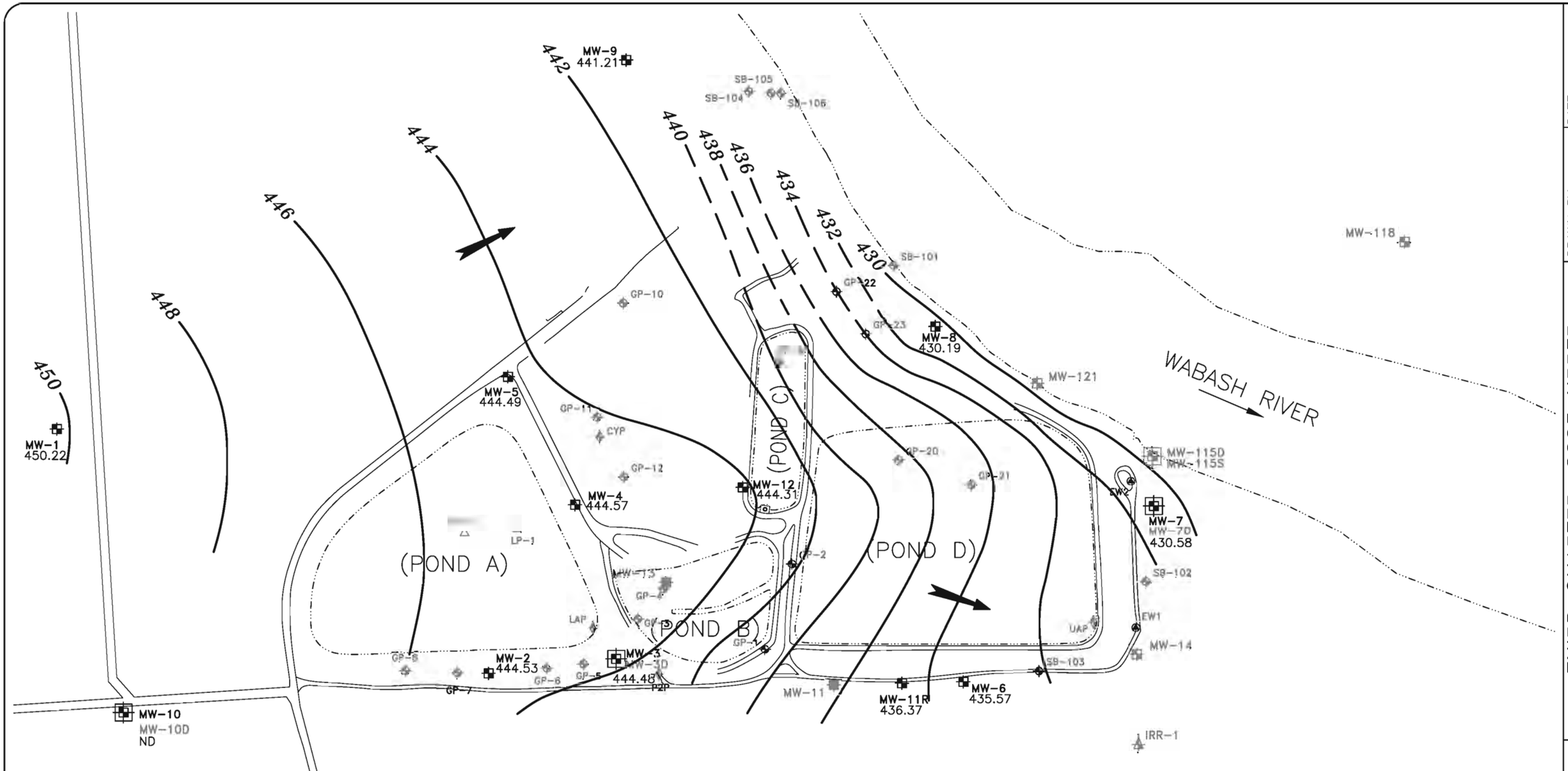
VERTICAL SCALE IN FEET: 20
HORIZONTAL SCALE IN FEET: 200
VERTICAL EXAGGERATION =10



C-C'	BGH	03/05/08	BRH
B-B'	BGH	03/05/08	BRH
A-A'	BGH	03/05/08	BRH
ID	CHK'D BY:	DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1375/6.2	GEOLOGIC CROSS SECTIONS
DRAWN BY: BJK 02/27/08	EXHIBIT 13 MONITORING PLAN HUTSONVILLE POWER STATION AMEREN HUTSONVILLE, ILLINOIS
CHECKED BY: BGH 03/05/08	
APPROVED BY: BRH 03/05/08	DRAWING NO: 1375-62-B03
	REFERENCE: .
	FIGURE NO. 2



LEGEND

450	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-8 430.19	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-3 MW-3D 444.48	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STM, BROOKFIELD, WISCONSIN, PROJECT 248, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1968. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (H3), GENERAL PLAN, H3 SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

THIRD 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-B12
REFERENCE:.

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
3A

FOURTH QUARTER, 2003 UPPER MIGRATION ZONE FLOW CONTOURS

EXHIBIT 13 MONITORING PLAN

HUTSONVILLE POWER STATION

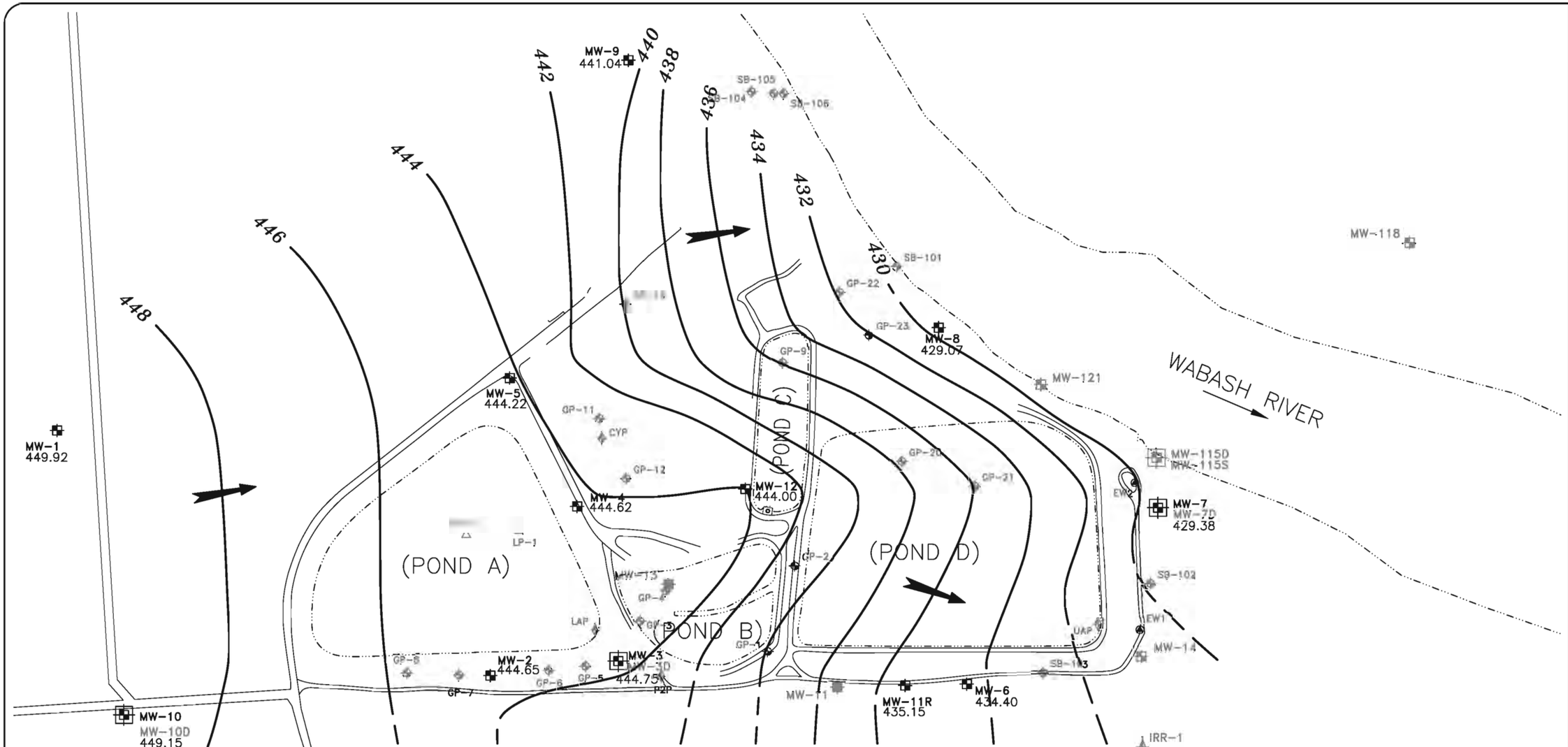
AMEREN

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: .



LEGEND

448	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-8 429.07	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-3 MW-3D 444.75	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 249, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1998. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350

SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1375/6.2

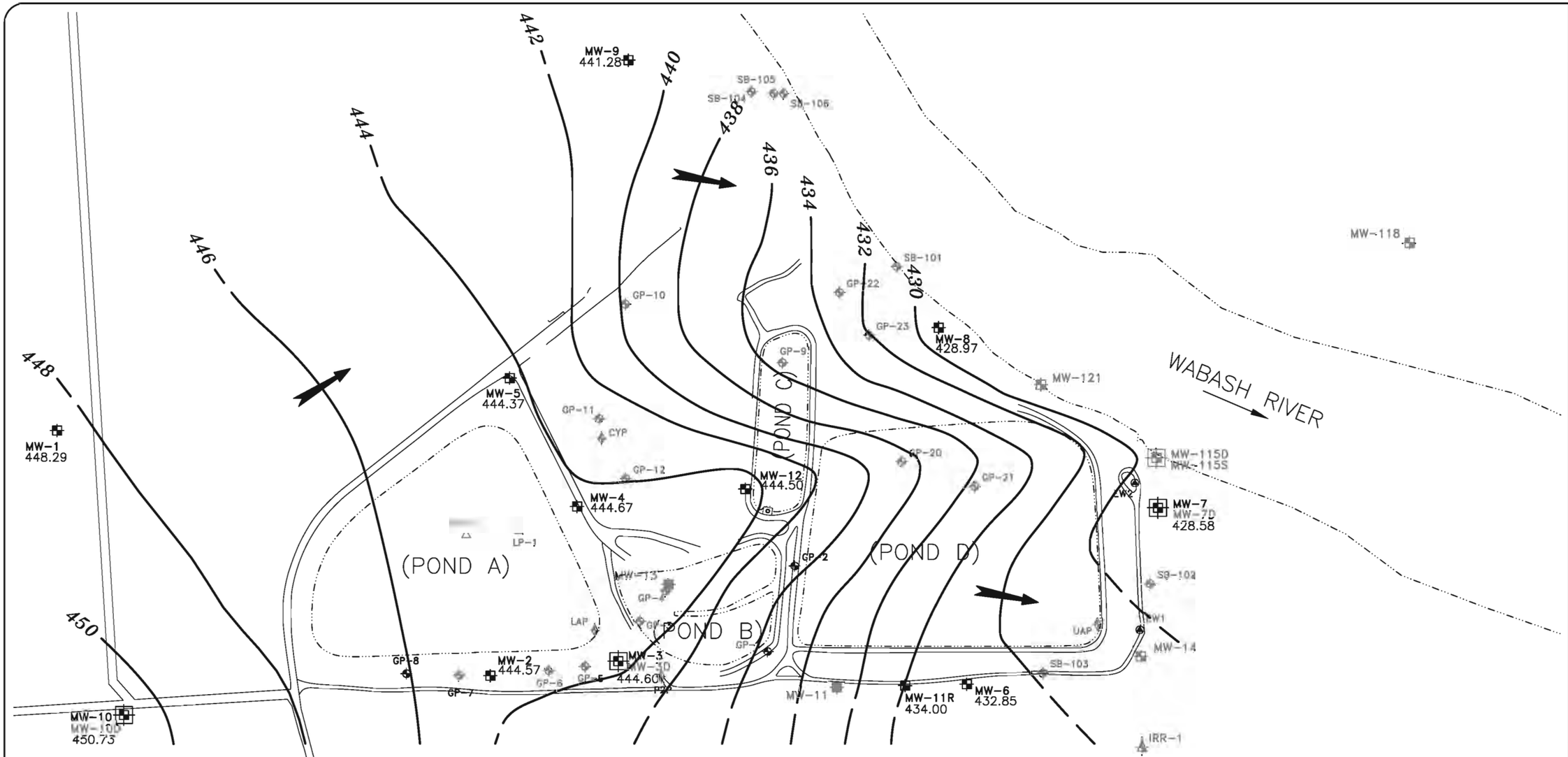
FIGURE NO. 3B

FIRST QUARTER, 2004 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-B14
REFERENCE:.



LEGEND

448	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-8 428.97	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-3 MW-3D 444.60	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 249, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1966. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

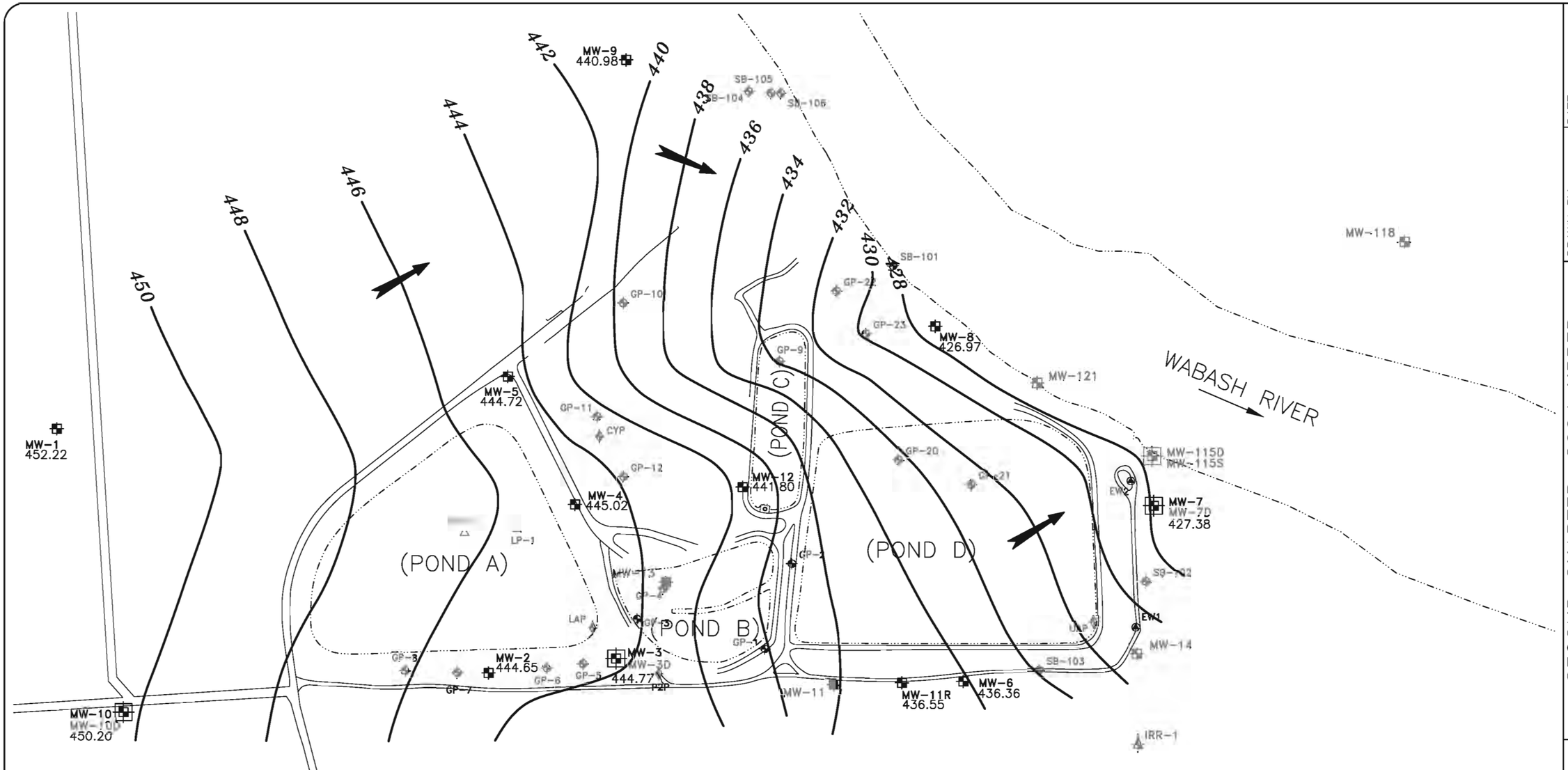
0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
3C



LEGEND

448	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-8 426.97	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-3 MW-3D 444.77	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 249, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1995. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

SECOND QUARTER, 2004 UPPER MIGRATION ZONE FLOW CONTOURS

EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

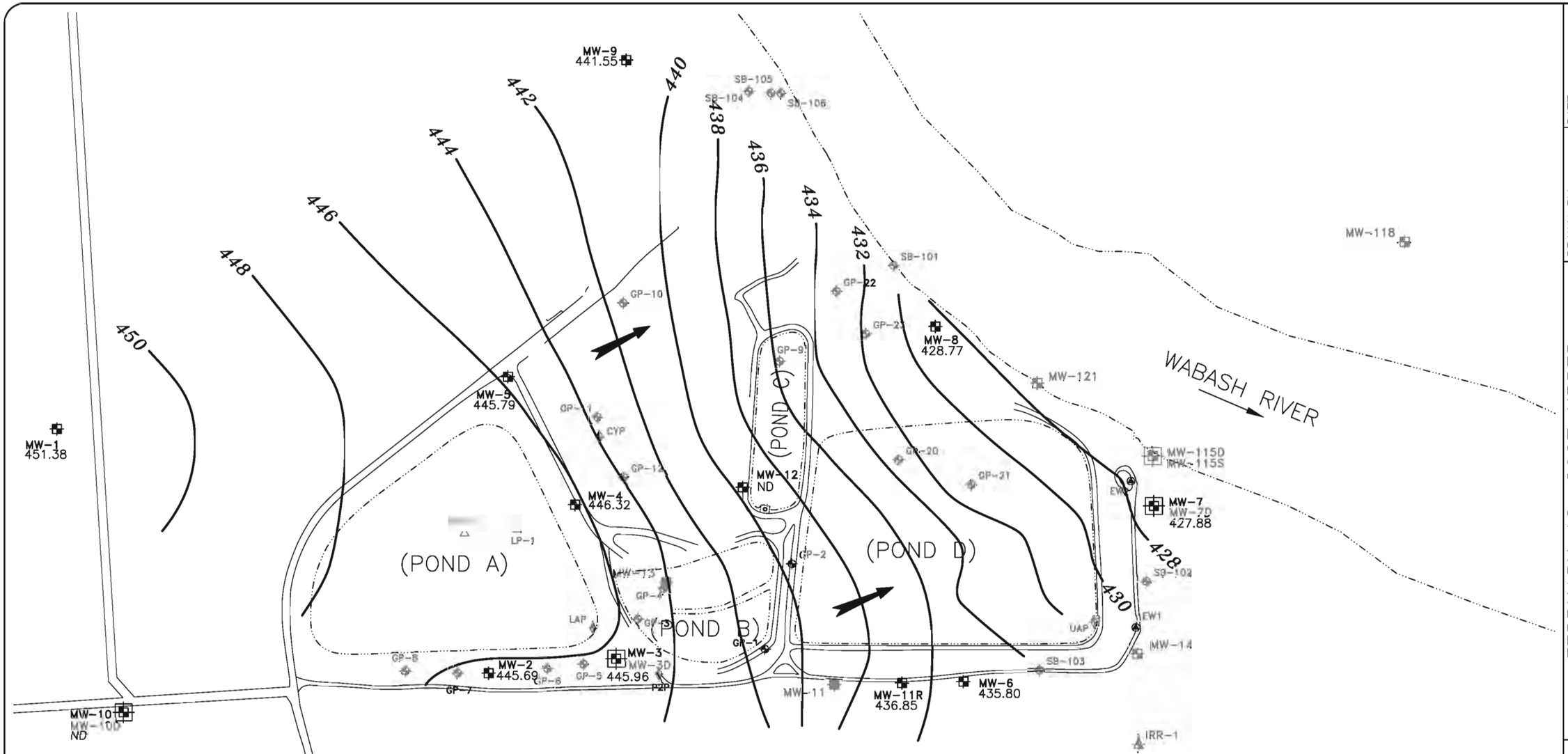
DRAWN BY:	BJK	DATE: 03/05/08
CHECKED BY:	BGH	DATE: 03/05/08
APPROVED BY:	BRH	DATE: 03/05/08

DRAWING NO: 1375-62-B15
REFERENCE:.

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
3D



LEGEND

448	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-8 428.77	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-3 MW-3D 445.96	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 249, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1968. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/98.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

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-B16		
REFERENCE:.		

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

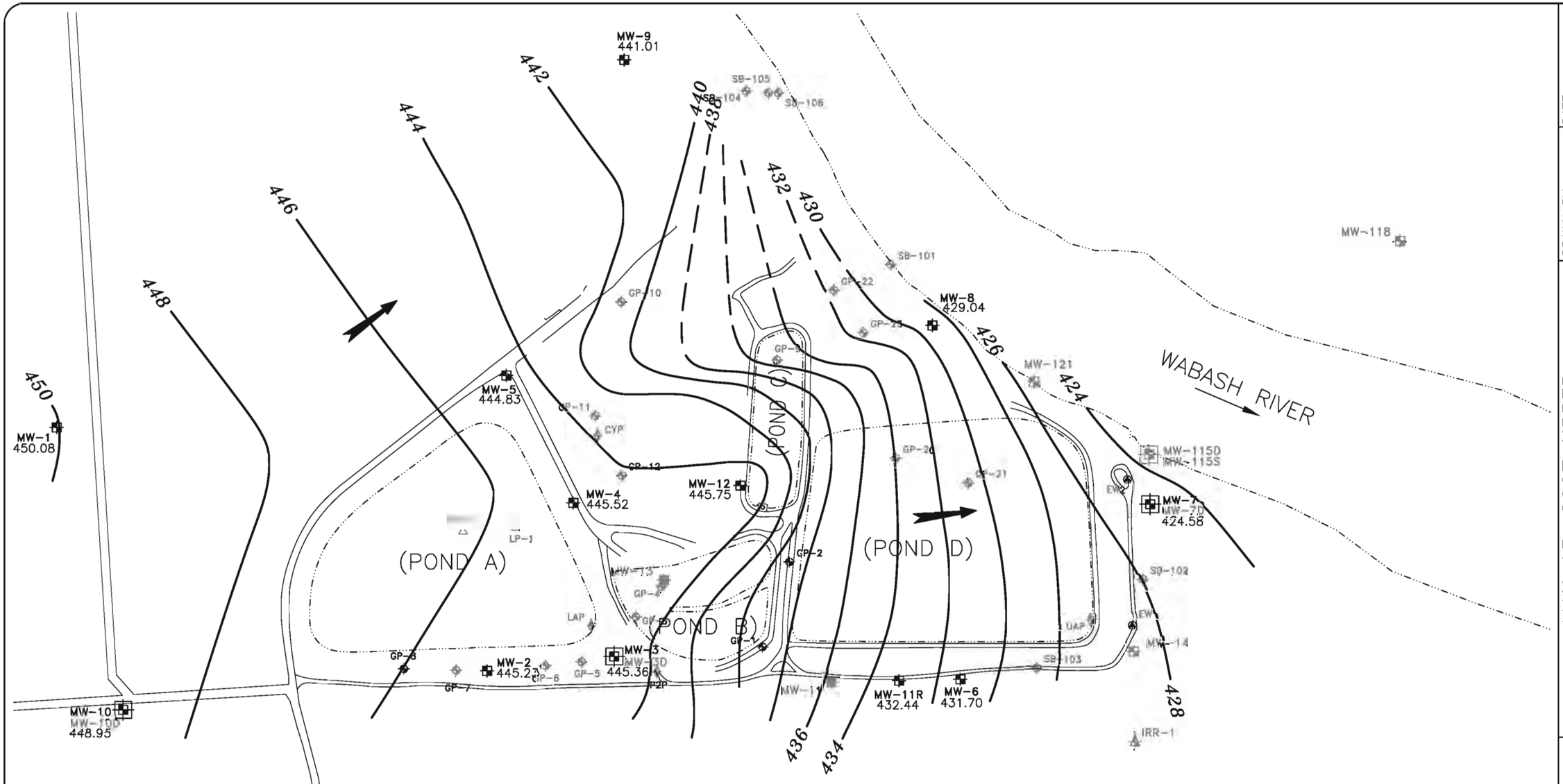
FIGURE NO.
3E

MAY 13, 2007 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-B19
REFERENCE: .



LEGEND

448	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-8 429.04	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-3 MW-3D 445.36	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 240, REPORT 98-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1986. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO 502, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/98.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
3F

JULY 2, 2007 UPPER MIGRATION ZONE FLOW CONTOURS

EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

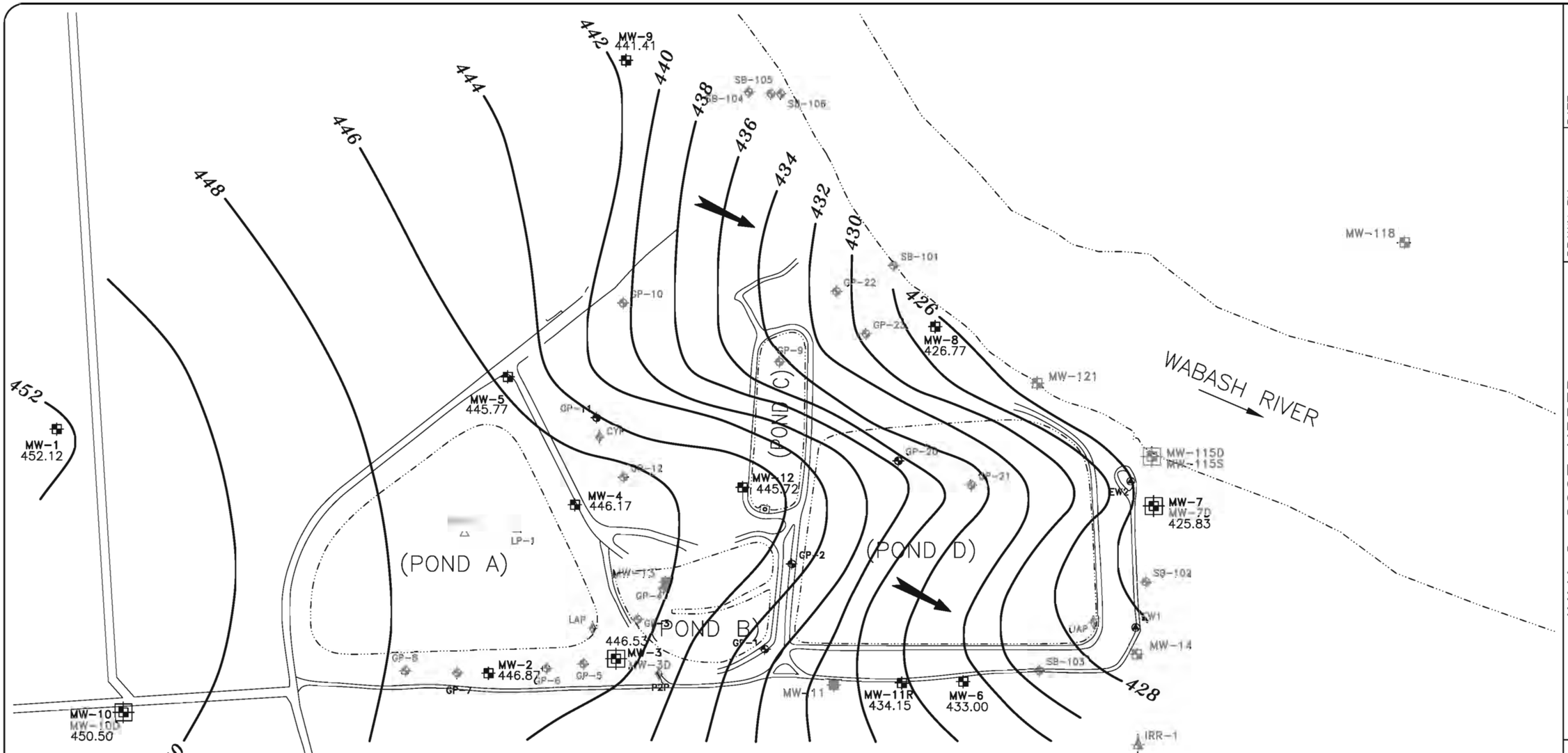
DRAWN BY:	BJK	DATE: 03/05/08
CHECKED BY:	BGH	DATE: 03/05/08
APPROVED BY:	BRH	DATE: 03/05/08

DRAWING NO: 1375-62-B17
REFERENCE: .

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1375/6.2

FIGURE NO. 3G



LEGEND

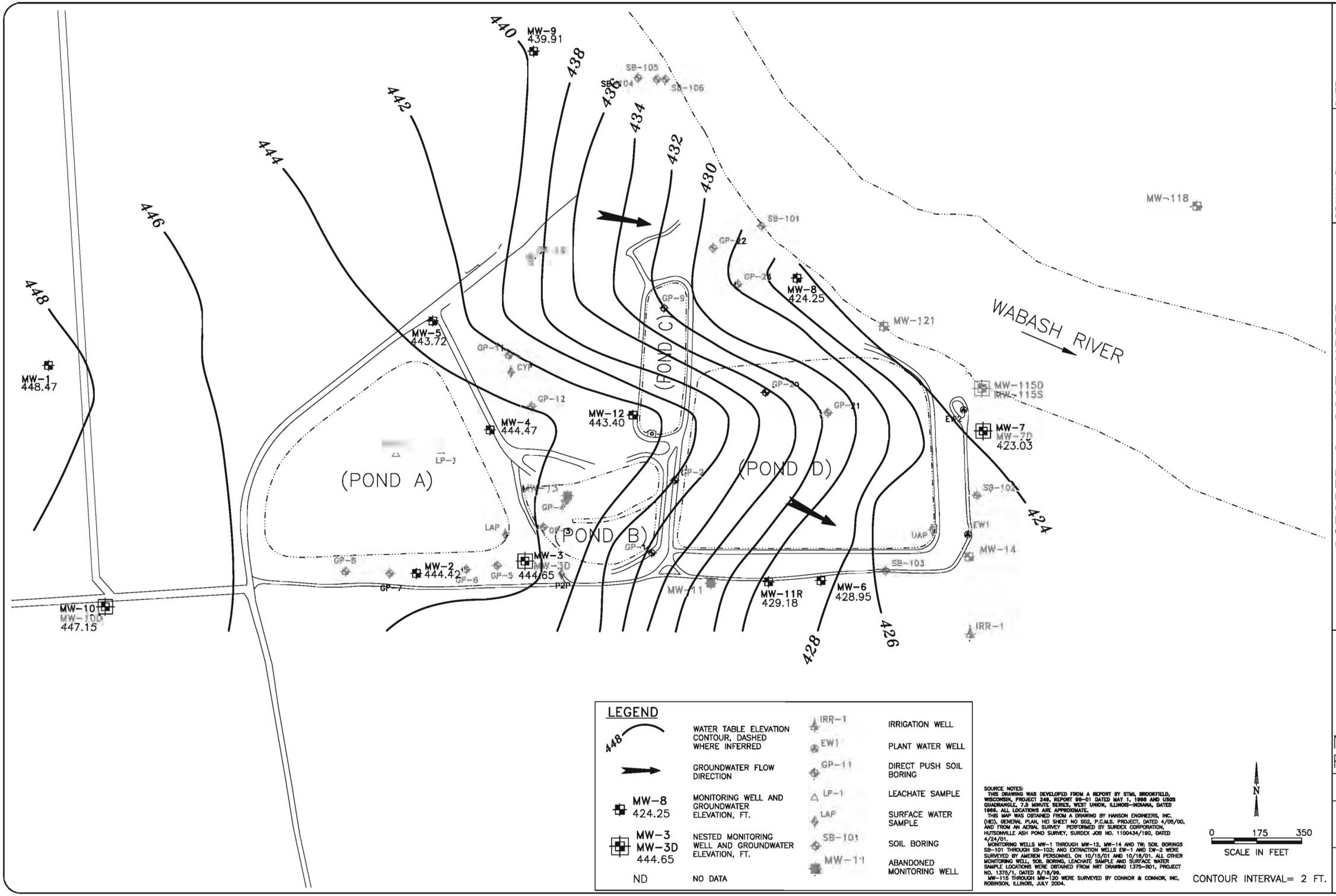
448	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-8 426.77	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-3 MW-3D 446.53	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 249, REPORT SR-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1968. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.



LEGEND

448	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-8 424.25	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-3 MW-3D 444.65	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 240, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1995. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

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-B18		
REFERENCE:.		

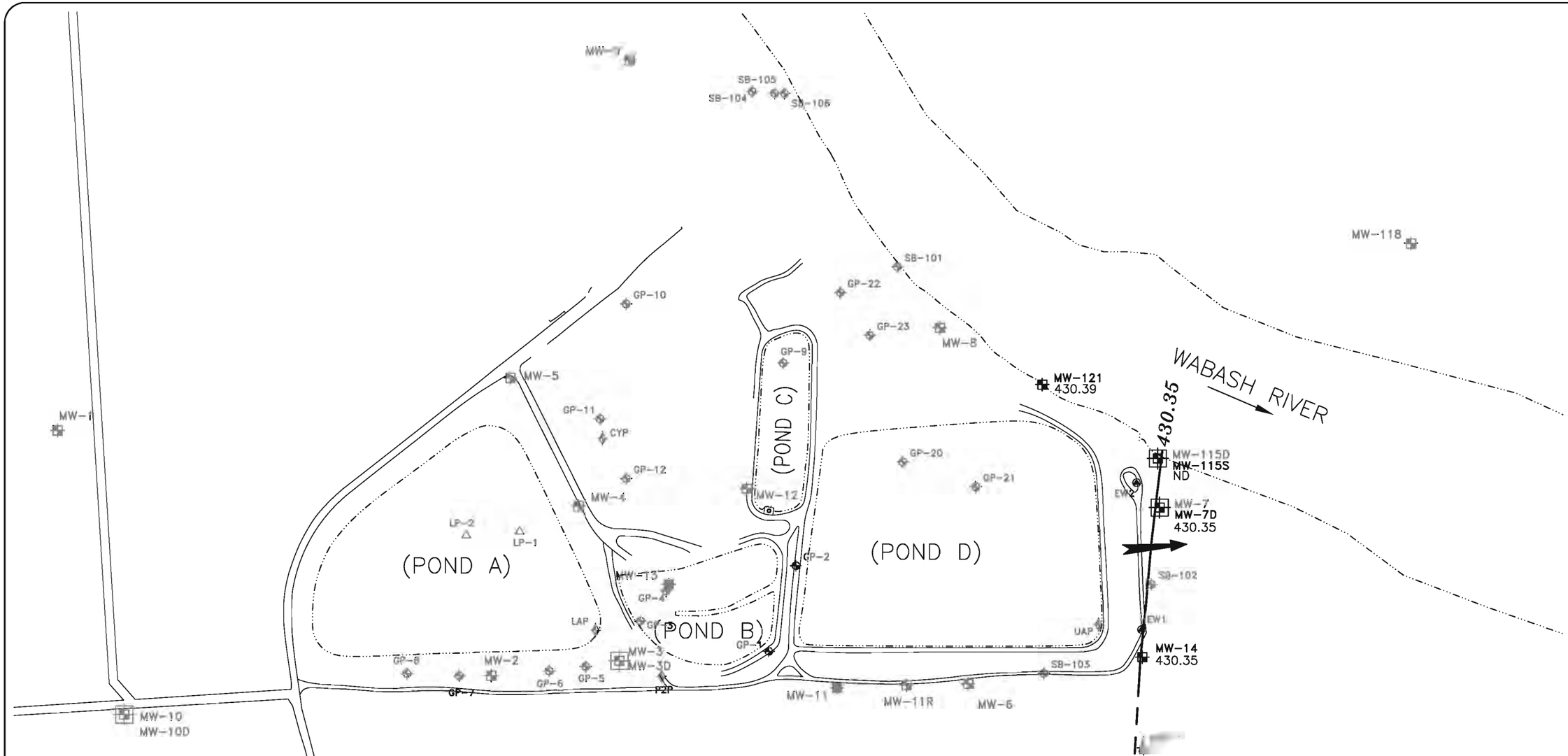
OCTOBER 2, 2007 UPPER MIGRATION ZONE FLOW CONTOURS

EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
3H



LEGEND

430.35	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-14 430.35	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-7 MW-7D 430.35	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 248, REPORT SR-01 DATED MAY 1, 1995 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1994. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-113 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

NO CONTOUR INTERVAL

THIRD QUARTER, 2003 DEEP ALLUVIAL AQUIFER FLOW

EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

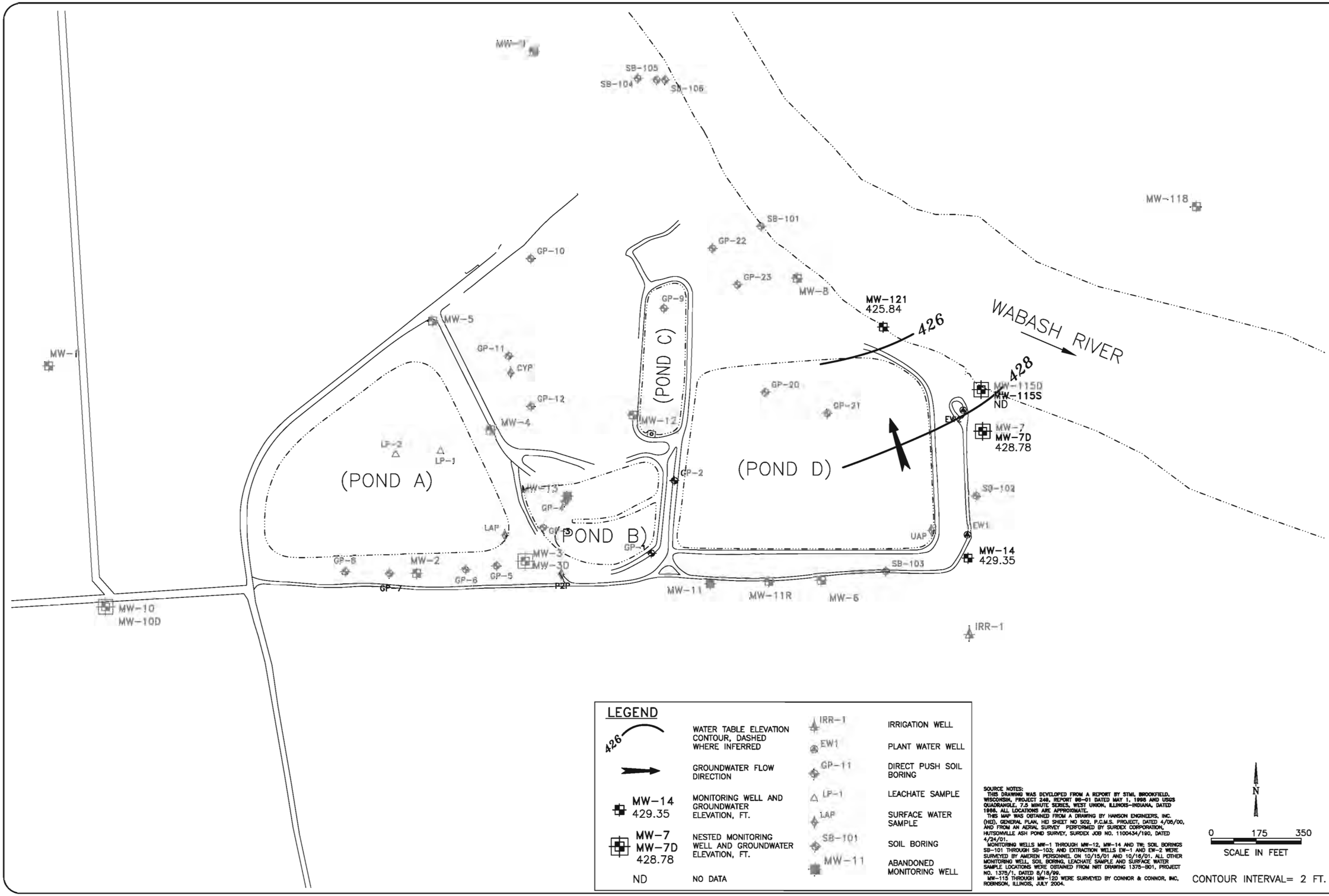
DRAWN BY:	BJK	DATE: 03/04/08
CHECKED BY:	BGH	DATE: 03/04/08
APPROVED BY:	BRH	DATE: 03/04/08

DRAWING NO: 1375-62-B04
REFERENCE: .

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1375/6.2

FIGURE NO. 4A



LEGEND

426	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-14 429.35	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-7 MW-7D 428.78	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 249, REPORT 98-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1994. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

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

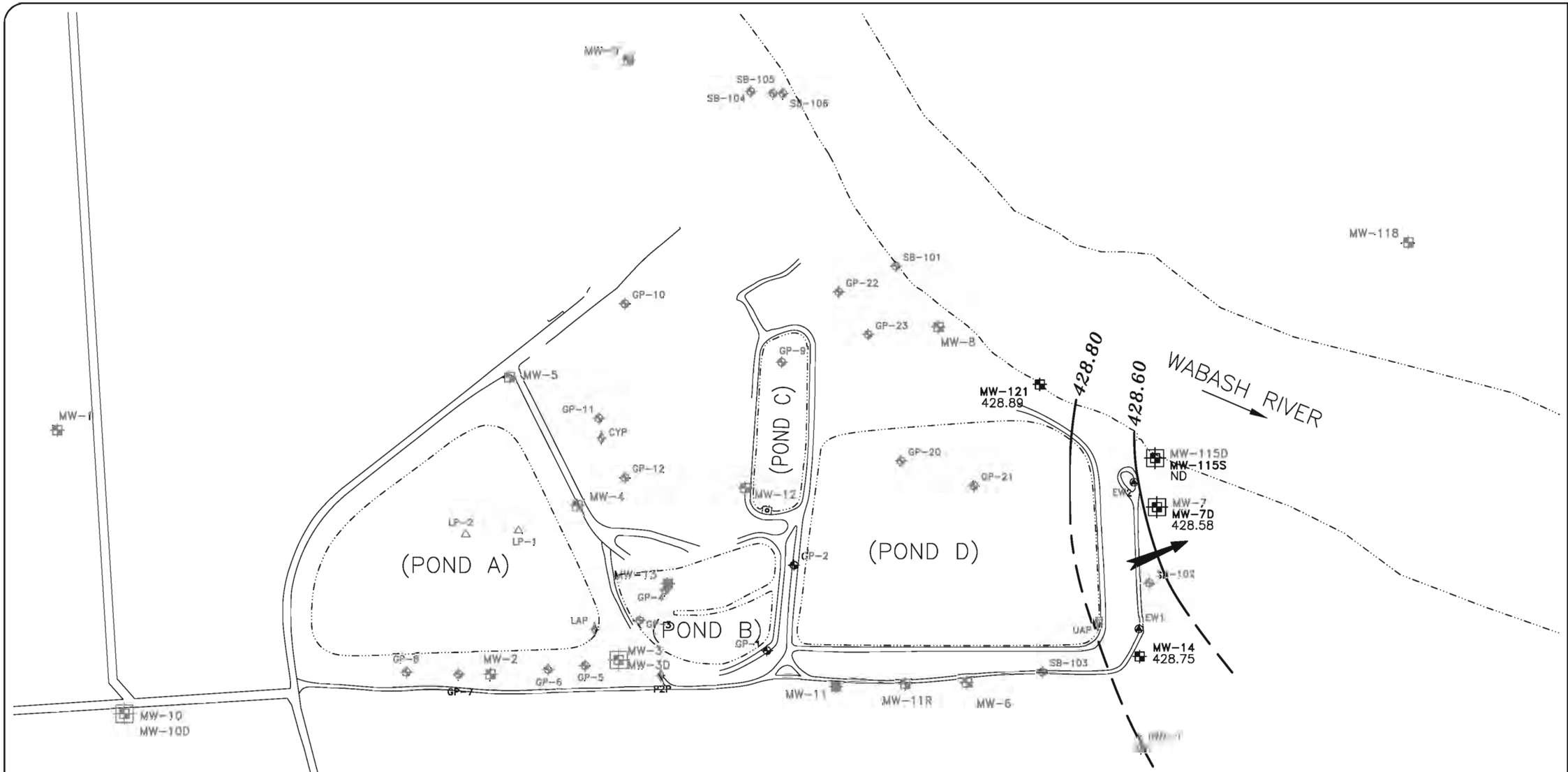
DRAWN BY:	BJK	DATE: 03/04/08
CHECKED BY:	BGH	DATE: 03/04/08
APPROVED BY:	BRH	DATE: 03/04/08

DRAWING NO: 1375-62-B05
REFERENCE:.

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
4B



LEGEND

428.80	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-14 428.75	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-7 MW-7D 428.58	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI BROOKFIELD, WISCONSIN, PROJECT 248, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1998. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 0.2 FT.

FIRST QUARTER, 2004 DEEP ALLUVIAL AQUIFER FLOW

EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

DRAWN BY:	BJK	DATE: 03/04/08
CHECKED BY:	BGH	DATE: 03/04/08
APPROVED BY:	BRH	DATE: 03/04/08

DRAWING NO: 1375-62-B06
REFERENCE:.

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
4C

MW-7
SB-105
SB-104
SB-106
MW-118
SB-101
GP-22
GP-10
GP-23
MW-8
GP-9
MW-5
MW-121
426.64
WABASH RIVER
MW-1
GP-11
CYP
GP-20
MW-115D
MW-115S
ND
GP-12
GP-21
MW-12
EW2
MW-4
MW-7
MW-7D
426.72
LP-2
LP-1
(POND A)
(POND D)
428
GP-2
MW-13
GP-4
SB-102
430
LAP
GP-3
(POND B)
UAP
EW1
MW-3
MW-3D
GP-8
MW-2
GP-1
MW-14
433.37
SB-103
GP-7
GP-6
GP-5
P2P
MW-11
MW-11R
MW-6
432
MW-10
MW-10D
IRR-1

LEGEND

428	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-14 433.37	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-7 MW-7D 426.72	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 248, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1998. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N
0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

DRAWN BY:	BJK	DATE: 03/04/08
CHECKED BY:	BGH	DATE: 03/04/08
APPROVED BY:	BRH	DATE: 03/04/08
DRAWING NO: 1375-62-B07		
REFERENCE:.		

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

MW-7
SB-105
SB-104
SB-106
MW-118
SB-101
GP-22
GP-23
MW-8
GP-10
GP-9
MW-9
MW-1
GP-11
CYP
GP-12
MW-4
(POND C)
MW-12
GP-20
GP-21
MW-121
428.59
WABASH RIVER
MW-115D
MW-115S
426.32
EW2
MW-7
MW-7D
428.58
427
429
431
433
LP-2
LP-1
(POND A)
GP-2
(POND D)
SB-102
MW-13
GP-4
LAP
(POND B)
UAP
EW1
GP-8
MW-2
MW-3
MW-3D
GP-6
GP-5
GP-7
P2P
GP-1
SB-103
MW-14
434.60
MW-11
MW-11R
MW-5
MW-10
MW-10D
IRR-1

LEGEND

429	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED	IRR-1	IRRIGATION WELL
	GROUNDWATER FLOW DIRECTION	EW1	PLANT WATER WELL
MW-14 434.60	MONITORING WELL AND GROUNDWATER ELEVATION, FT.	GP-11	DIRECT PUSH SOIL BORING
MW-7 MW-7D 428.58	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.	LP-1	LEACHATE SAMPLE
ND	NO DATA	LAP	SURFACE WATER SAMPLE
		SB-101	SOIL BORING
		MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI, BROOKFIELD, WISCONSIN, PROJECT 248, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1968. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N
0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

FEBRUARY 12, 2007
DEEP ALLUVIAL AQUIFER FLOW
EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

DRAWN BY:	BJK	DATE: 03/04/08
CHECKED BY:	BGH	DATE: 03/04/08
APPROVED BY:	BRH	DATE: 03/04/08

DRAWING NO: 1375-62-B08
REFERENCE:.

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
4E

MAY 13, 2007
DEEP ALLUVIAL AQUIFER FLOW
EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

DRAWN BY:	BJK	DATE: 03/04/08
CHECKED BY:	BGH	DATE: 03/04/08
APPROVED BY:	BRH	DATE: 03/04/08
DRAWING NO: 1375-62-B09		
REFERENCE:.		

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1375/6.2

FIGURE NO. 4F

MW-1
MW-10
MW-10D
MW-5
MW-4
MW-7
SB-105
SB-104
SB-106
GP-10
GP-11
CYP
GP-12
LP-2
LP-1
(POND A)
(POND C)
MW-12
GP-9
SB-101
GP-22
GP-23
MW-8
MW-118
MW-121
425.84
WABASH RIVER
GP-20
GP-21
MW-115D
MW-115S
424.14
EW2
MW-7
MW-7D
424.06
(POND D)
GP-2
MW-13
GP-4
LAP
EW-3
(POND B)
GP-1
MW-3
MW-3D
GP-8
MW-2
GP-6
GP-5
GP-7
P2P
SB-102
EW1
UAP
SB-103
MW-14
432.50
MW-11
MW-11R
MW-6
IRR-1
424
426
428
430
432

LEGEND

424	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED
	GROUNDWATER FLOW DIRECTION
MW-14 432.50	MONITORING WELL AND GROUNDWATER ELEVATION, FT.
MW-7 MW-7D 424.06	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.
ND	NO DATA
IRR-1	IRRIGATION WELL
EW1	PLANT WATER WELL
GP-11	DIRECT PUSH SOIL BORING
LP-1	LEACHATE SAMPLE
LAP	SURFACE WATER SAMPLE
SB-101	SOIL BORING
MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI BROOKFIELD, WISCONSIN, PROJECT 249, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1998. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

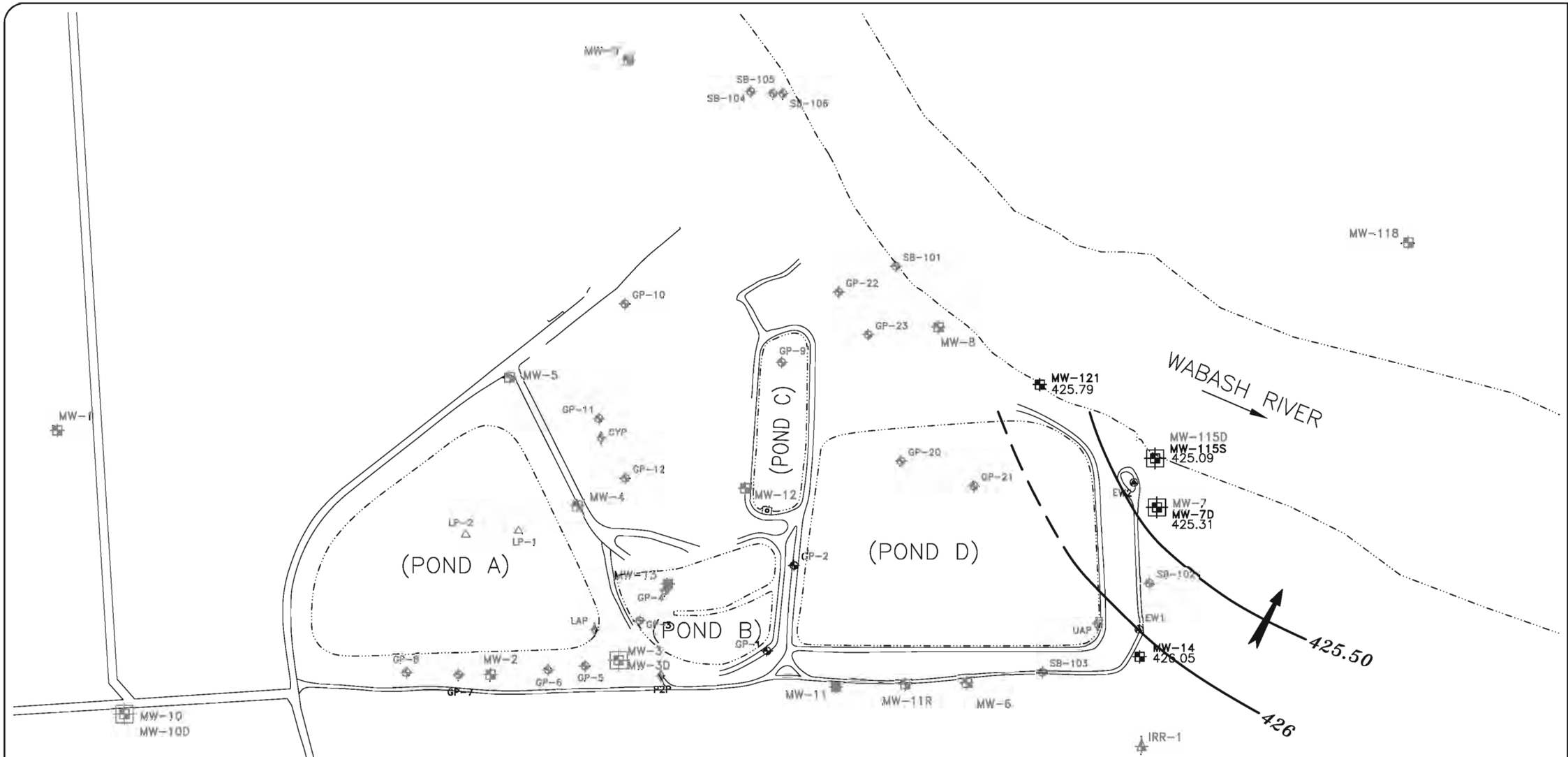
0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 2 FT.

JULY 2, 2007
DEEP ALLUVIAL AQUIFER FLOW
EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

DRAWN BY:	BJK	DATE: 03/04/08
CHECKED BY:	BGH	DATE: 03/04/08
APPROVED BY:	BRH	DATE: 03/04/08

DRAWING NO: 1375-62-B10
REFERENCE:.



LEGEND

426	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED	IRR-1	IRRIGATION WELL
	GROUNDWATER FLOW DIRECTION	EW1	PLANT WATER WELL
MW-14 426.05	MONITORING WELL AND GROUNDWATER ELEVATION, FT.	GP-11	DIRECT PUSH SOIL BORING
MW-7 MW-7D 425.31	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.	LP-1	LEACHATE SAMPLE
ND	NO DATA	LAP	SURFACE WATER SAMPLE
		SB-101	SOIL BORING
		MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI BROOKFIELD, WISCONSIN, PROJECT 249, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1998. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 0.5 FT.

NATURAL RESOURCE TECHNOLOGY

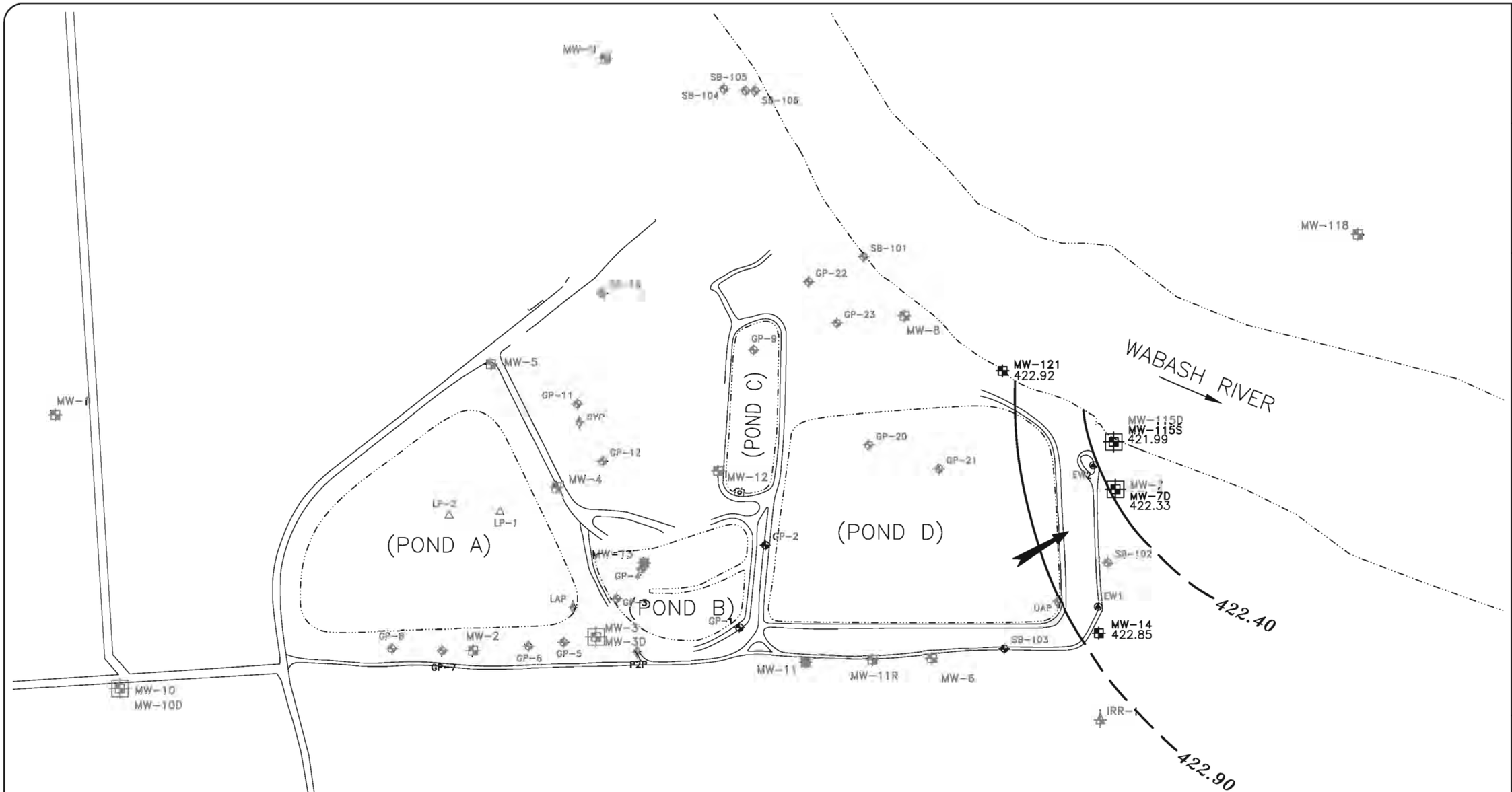
PROJECT NO.
1375/6.2

FIGURE NO.
4G

OCTOBER 2, 2007
DEEP ALLUVIAL AQUIFER FLOW
EXHIBIT 13 MONITORING PLAN
HUTSONVILLE POWER STATION
AMEREN
HUTSONVILLE, ILLINOIS

DRAWN BY:	BJK	DATE: 03/04/08
CHECKED BY:	BGH	DATE: 03/04/08
APPROVED BY:	BRH	DATE: 03/04/08

DRAWING NO: 1375-62-B11
REFERENCE:.



LEGEND

422.40	WATER TABLE ELEVATION CONTOUR, DASHED WHERE INFERRED	IRR-1	IRRIGATION WELL
	GROUNDWATER FLOW DIRECTION	EW1	PLANT WATER WELL
MW-14 422.85	MONITORING WELL AND GROUNDWATER ELEVATION, FT.	GP-11	DIRECT PUSH SOIL BORING
MW-7 MW-7D 422.33	NESTED MONITORING WELL AND GROUNDWATER ELEVATION, FT.	LP-1	LEACHATE SAMPLE
ND	NO DATA	LAP	SURFACE WATER SAMPLE
		SB-101	SOIL BORING
		MW-11	ABANDONED MONITORING WELL

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A REPORT BY STMI BROOKFIELD, WISCONSIN, PROJECT 249, REPORT SB-01 DATED MAY 1, 1998 AND USGS QUADRANGLE, 7.5 MINUTE SERIES, WEST UNION, ILLINOIS-INDIANA, DATED 1998. ALL LOCATIONS ARE APPROXIMATE.
THIS MAP WAS OBTAINED FROM A DRAWING BY HANSON ENGINEERS, INC. (HEI), GENERAL PLAN, HEI SHEET NO S02, P.C.M.S. PROJECT, DATED 4/05/00, AND FROM AN AERIAL SURVEY PERFORMED BY SURDEX CORPORATION, HUTSONVILLE ASH POND SURVEY, SURDEX JOB NO. 1100434/190, DATED 4/24/01.
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 AMEREN PERSONNEL ON 10/15/01 AND 10/16/01. ALL OTHER MONITORING WELL, SOIL BORING, LEACHATE SAMPLE AND SURFACE WATER SAMPLE LOCATIONS WERE OBTAINED FROM NRT DRAWING 1375-B01, PROJECT NO. 1375/1, DATED 8/18/99.
MW-115 THROUGH MW-120 WERE SURVEYED BY CONNOR & CONNOR, INC, ROBINSON, ILLINOIS, JULY 2004.

N

0 175 350
SCALE IN FEET

CONTOUR INTERVAL= 0.5 FT.

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1375/6.2

FIGURE NO.
4H

Figure 5a. Box-whisker plot showing boron concentrations from September 2002 through March 2005. MW1 and MW10 are background wells.

Figure 5b. Box-whisker plot showing sulfate concentrations from September 2002 through March 2005. MW1 and MW10 are background wells.

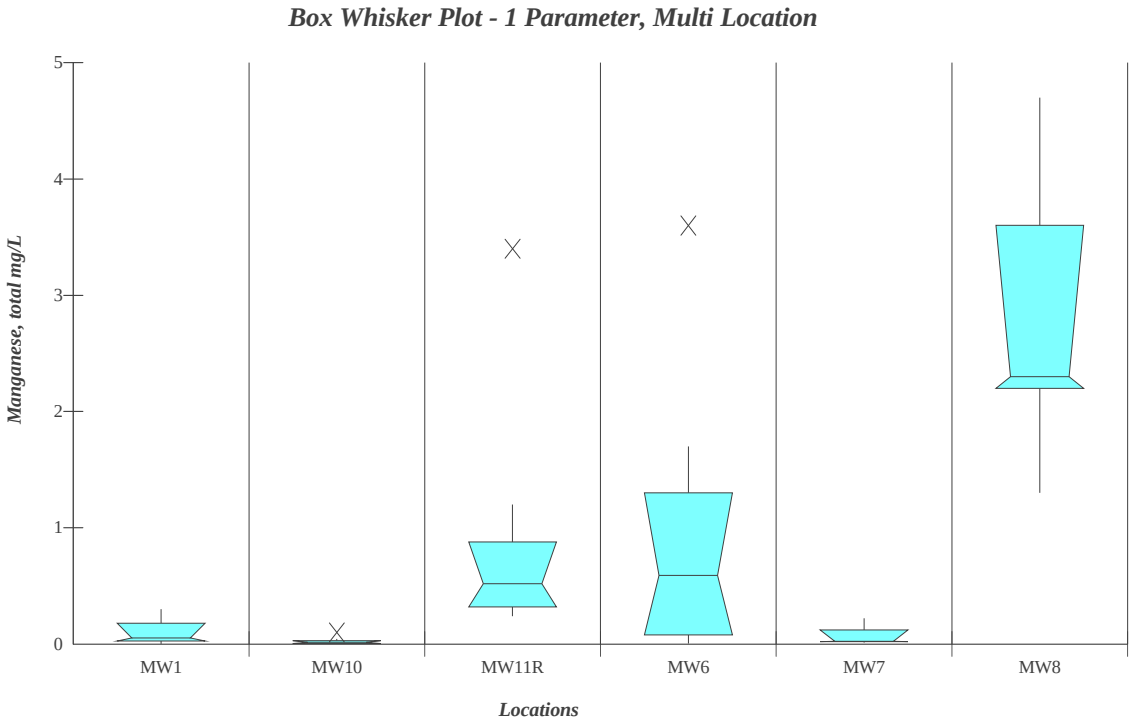


Figure 5e. Box-whisker plot showing manganese concentrations from September 2002 through March 2005. MW1 and MW10 are background wells.

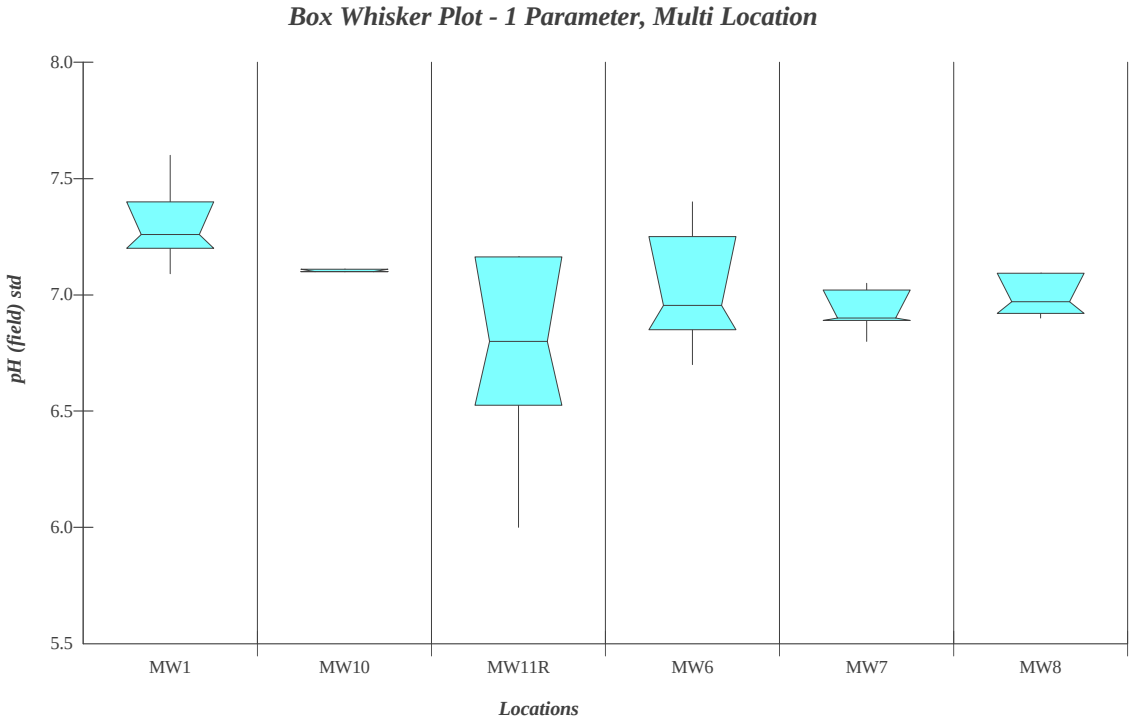


Figure 5f. Box-whisker plot showing pH values from September 2002 through March 2005. MW1 and MW10 are background wells.

Figure 5g. Box-whisker plot showing TDS concentrations from September 2002 through March 2005. MW1 and MW10 are background wells.

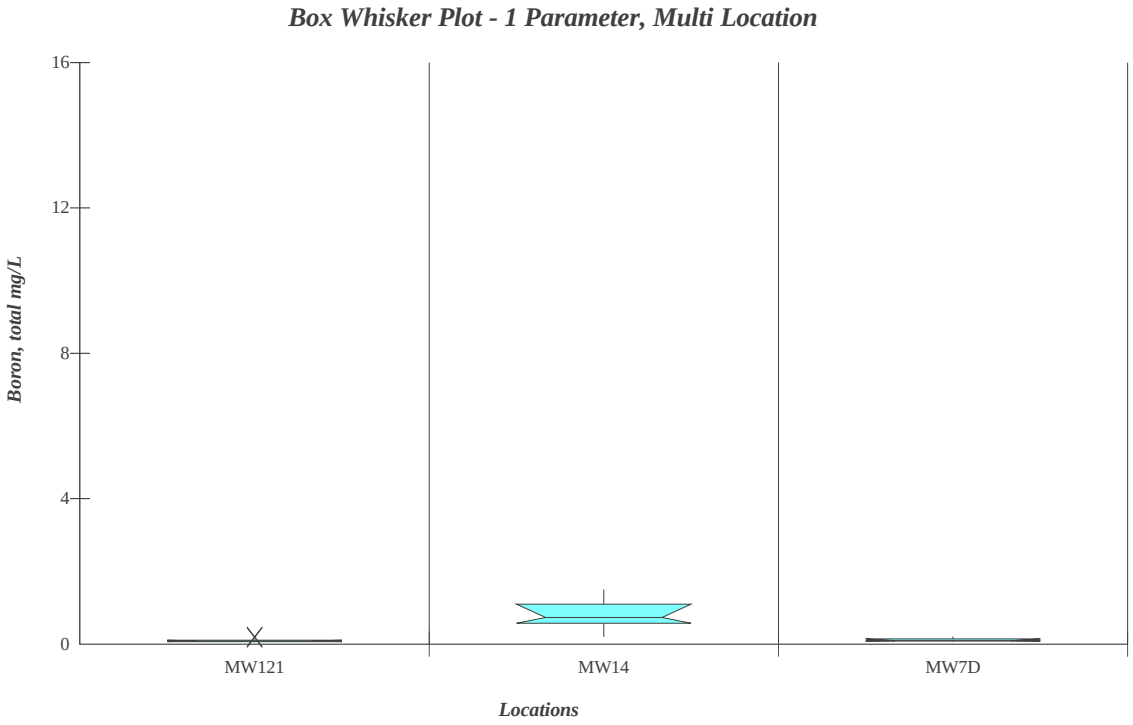


Figure 6a. Box-whisker plot showing boron concentrations from September 2002 through March 2005. MW121 and MW7D are background wells.

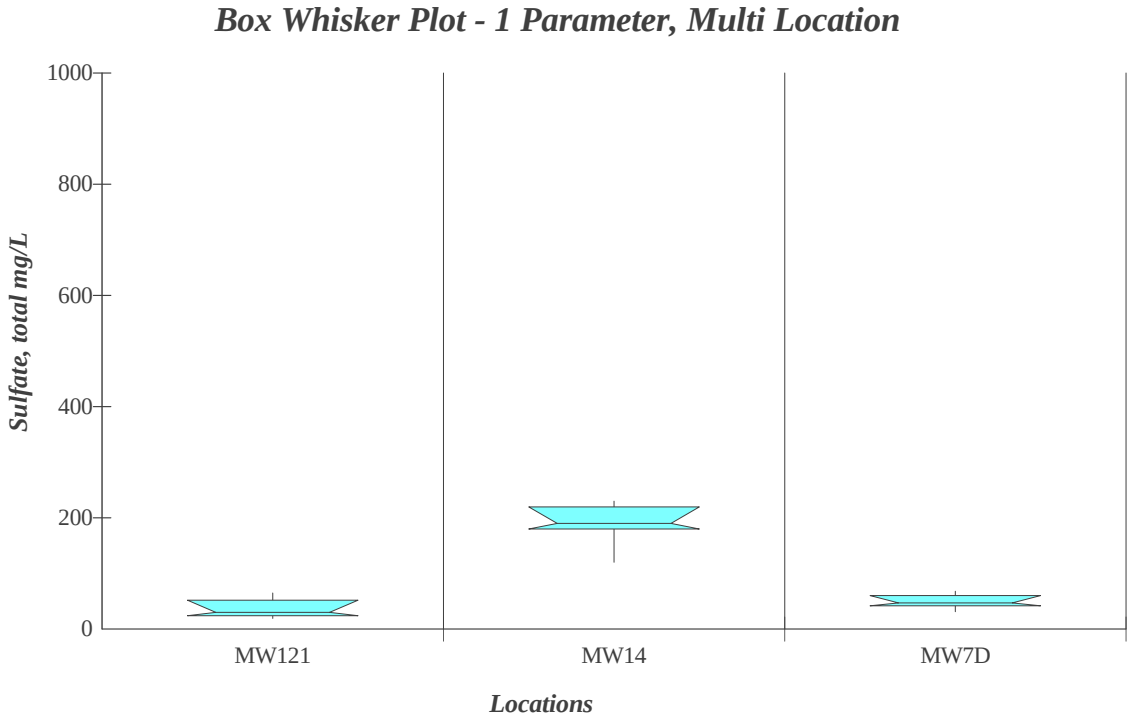


Figure 6b. Box-whisker plot showing sulfate concentrations from September 2002 through March 2005. MW121 and MW7D are background wells.

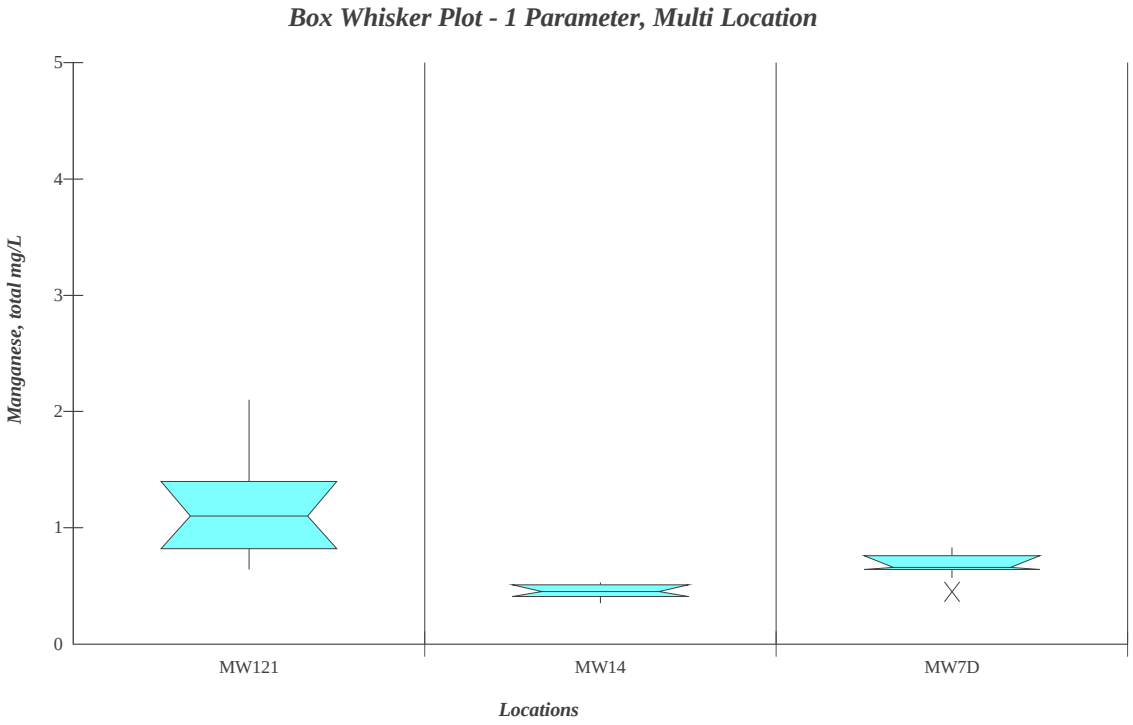


Figure 6e. Box-whisker plot showing manganese concentrations from September 2002 through March 2005. MW121 and MW7D are background wells.

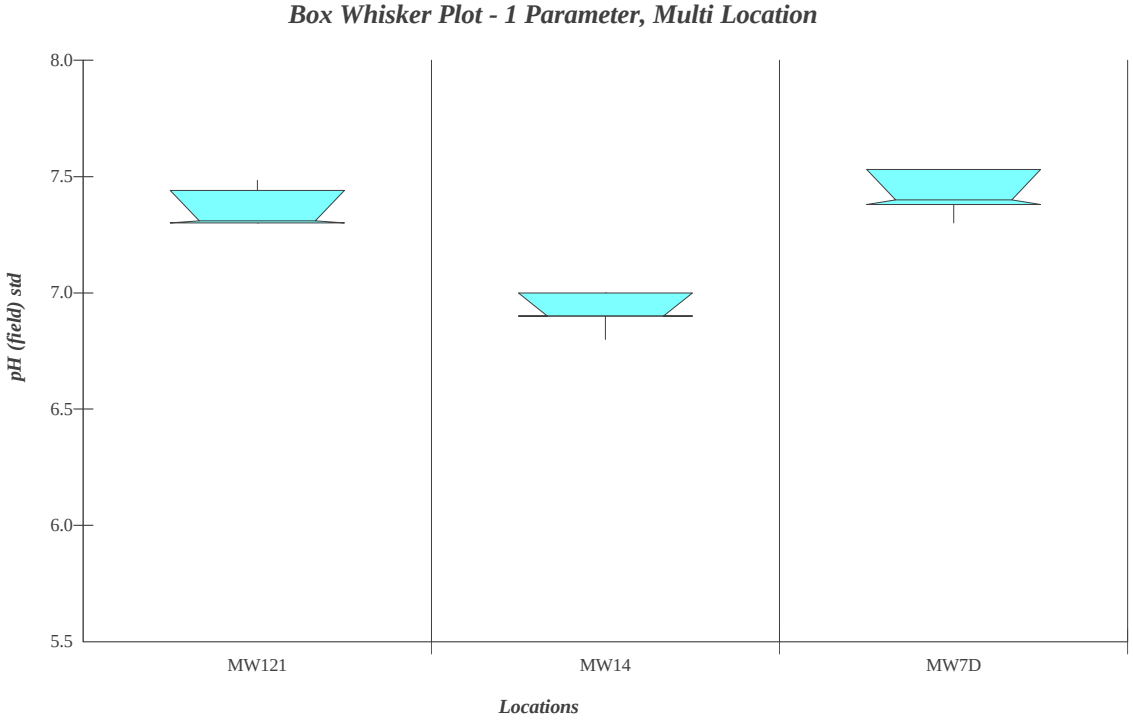


Figure 6f. Box-whisker plot showing pH values from September 2002 through March 2005. MW121 and MW7D are background wells.

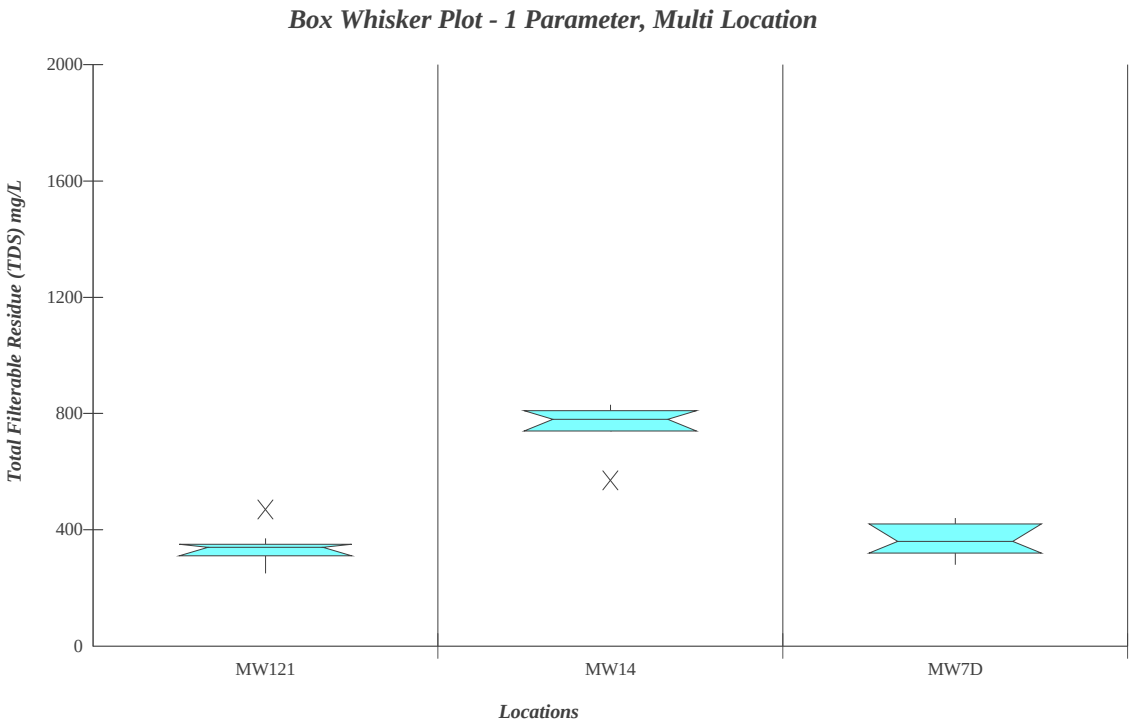


Figure 6g. Box-whisker plot showing TDS concentrations from September 2002 through March 2005. MW121 and MW7D are background wells.

Figure 7a. Box-whisker plot showing background boron concentrations from September 2002 through March 2005. MW1 and MW10 are upper migration zone background wells, and MW121 and MW7D are deep alluvial aquifer background wells.

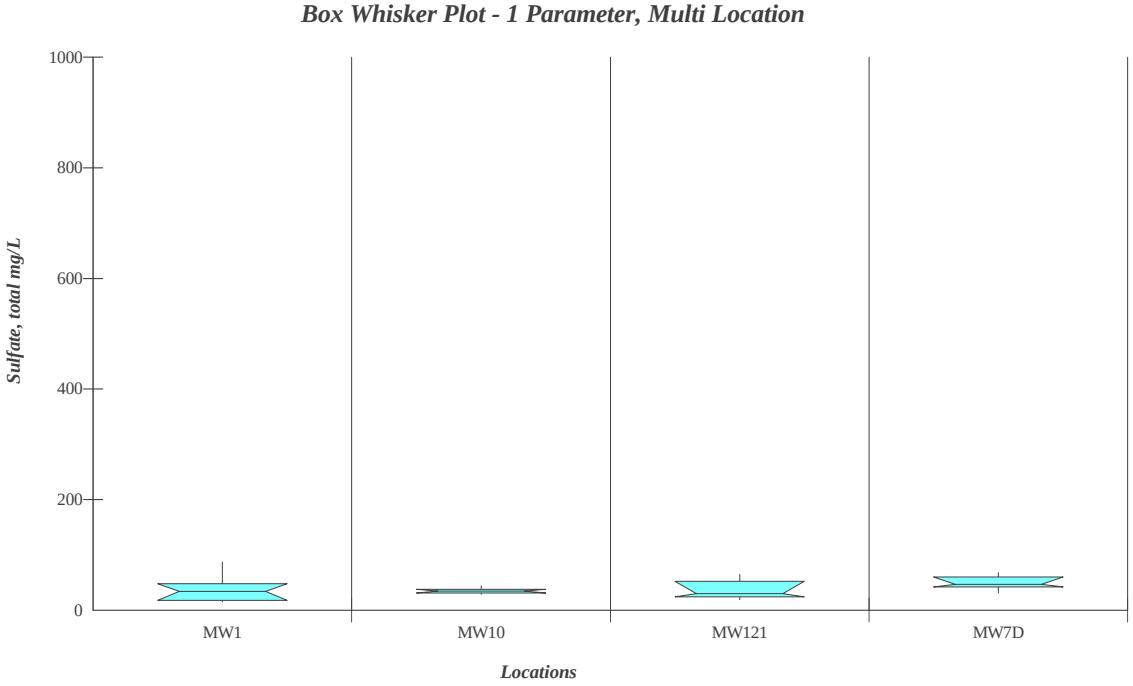


Figure 7b. Box-whisker plot showing background sulfate concentrations from September 2002 through March 2005. MW1 and MW10 are upper migration zone background wells, and MW121 and MW7D are deep alluvial aquifer background wells.

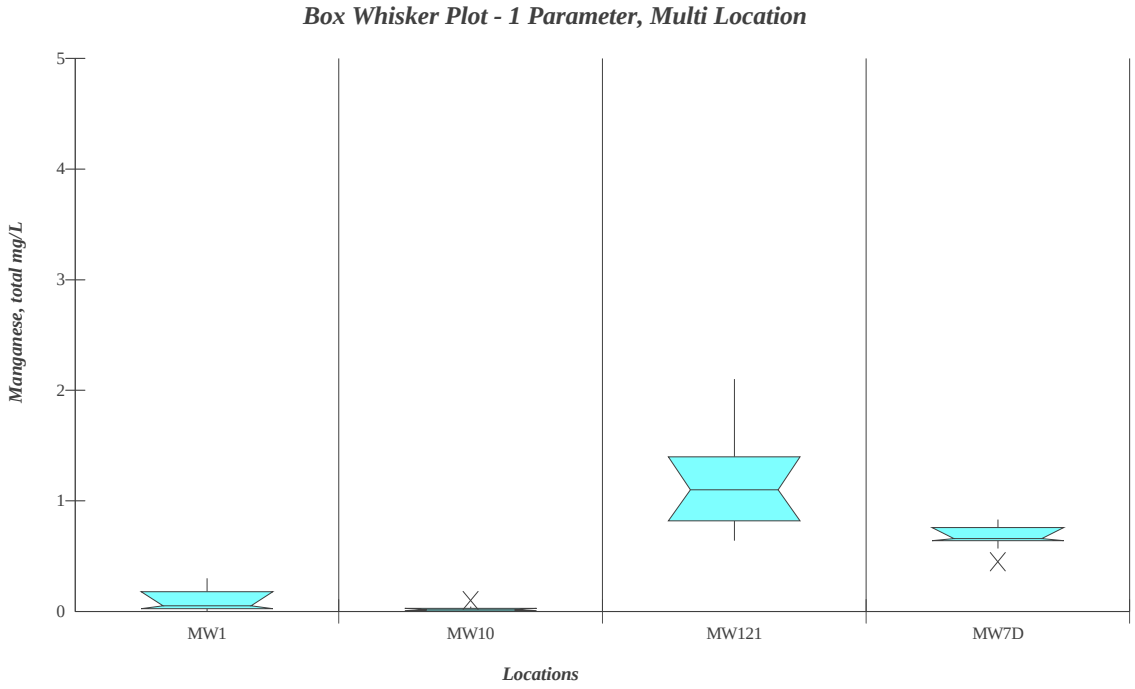


Figure 7e. Box-whisker plot showing background manganese concentrations from September 2002 through March 2005. MW1 and MW10 are upper migration zone background wells, and MW121 and MW7D are deep alluvial aquifer background wells.

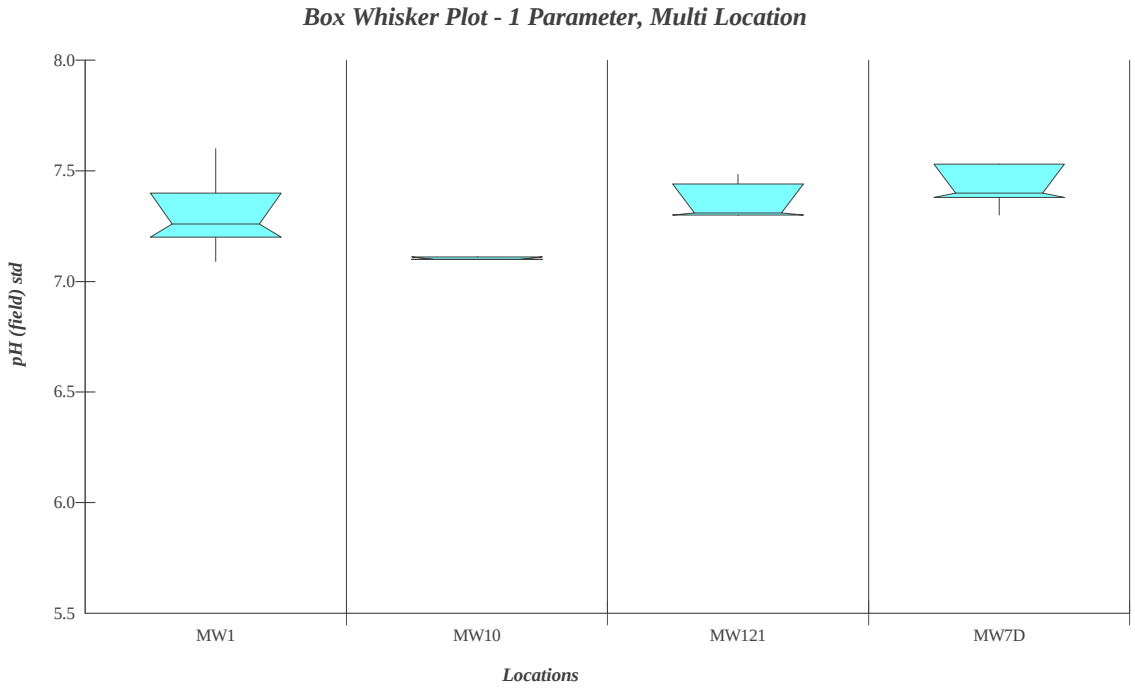


Figure 7f. Box-whisker plot showing background pH values from September 2002 through March 2005. MW1 and MW10 are upper migration zone background wells, and MW121 and MW7D are deep alluvial aquifer background wells.

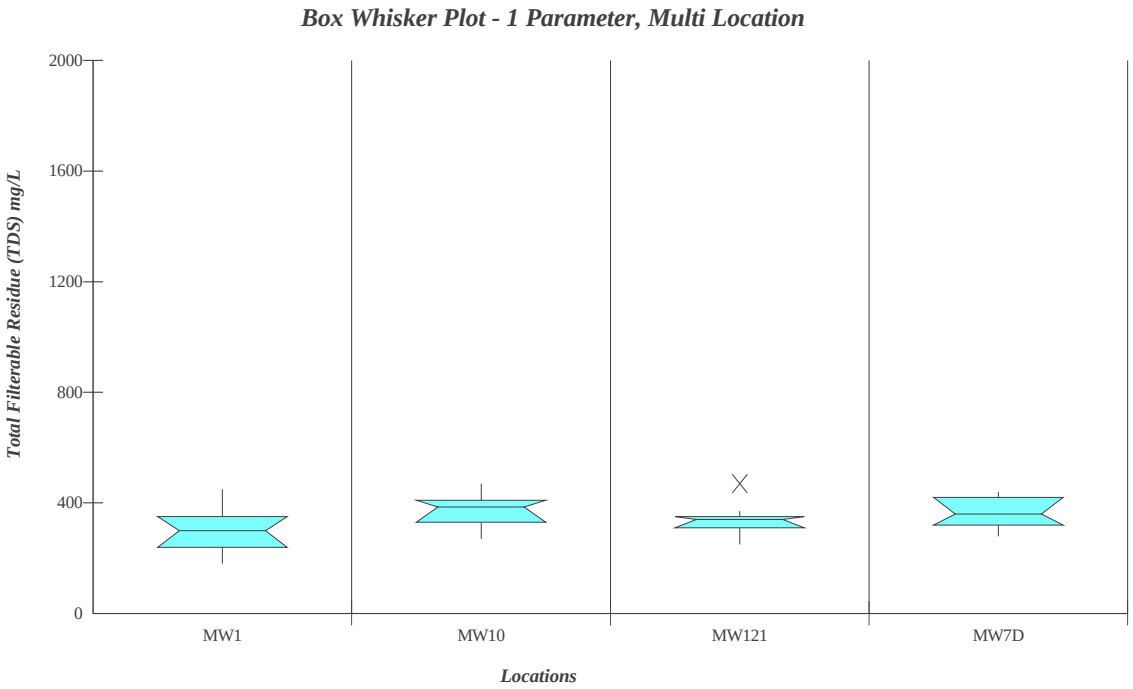


Figure 7g. Box-whisker plot showing background TDS concentrations from September 2002 through March 2005. MW1 and MW10 are upper migration zone background wells, and MW121 and MW7D are deep alluvial aquifer background wells.

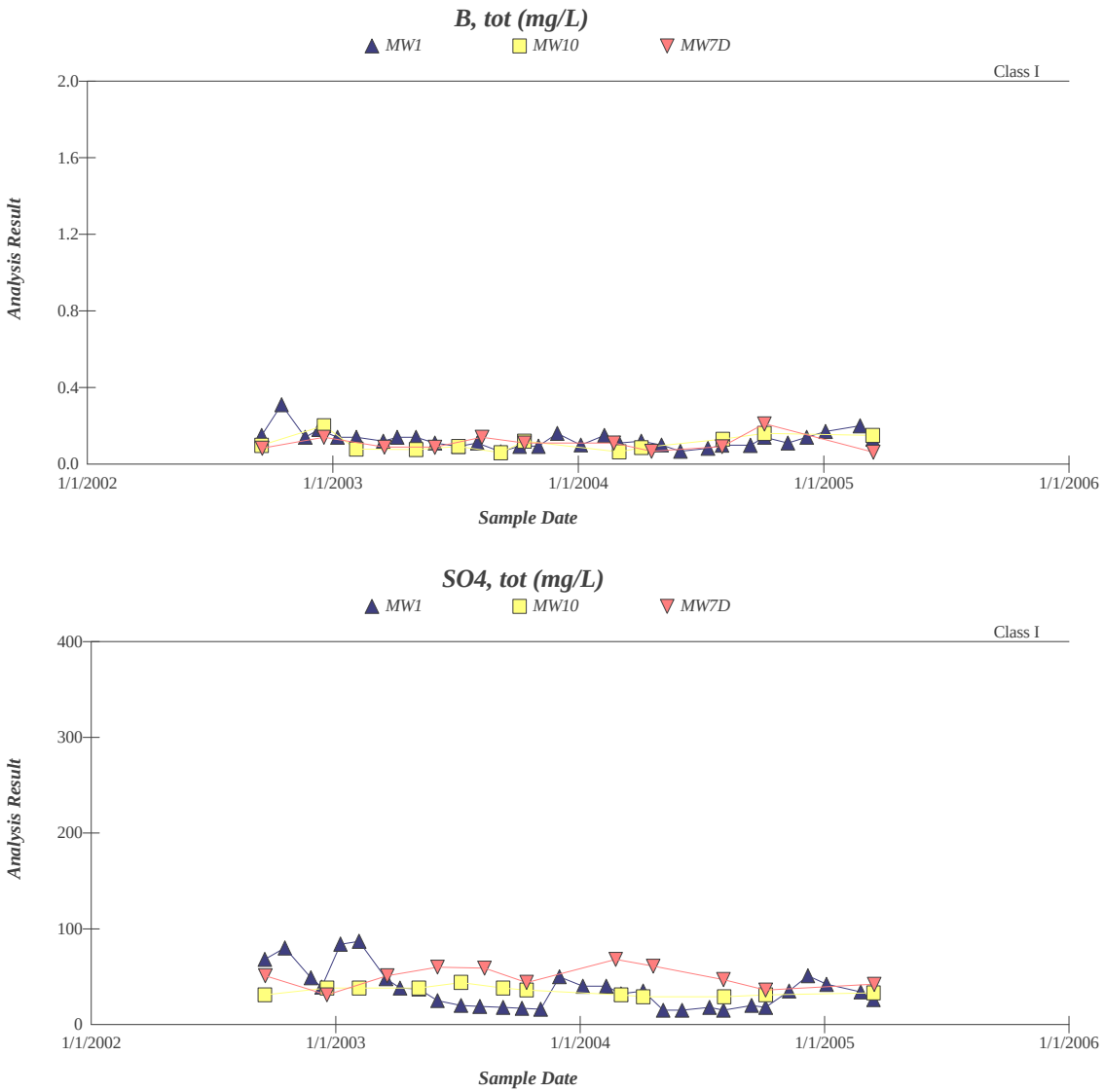


Figure 8a. Time series plots comparing boron (top) and sulfate (bottom) concentrations in deep alluvial aquifer background well MW7D to upper migration zone background wells MW1 and MW10.

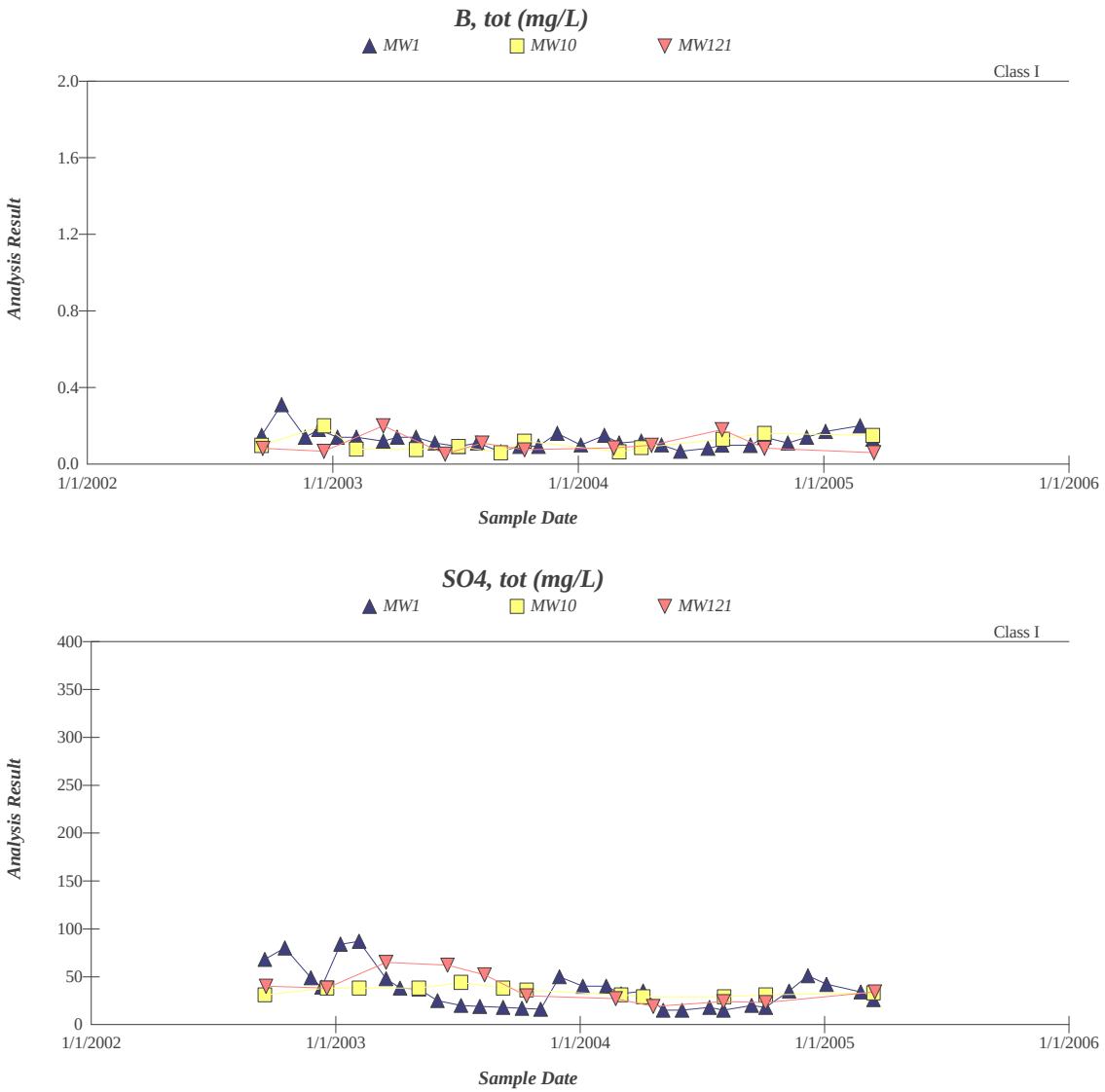


Figure 8b. Time series plots comparing boron (top) and sulfate (bottom) concentrations in deep alluvial aquifer background well MW121 to upper migration zone background wells MW1 and MW10.

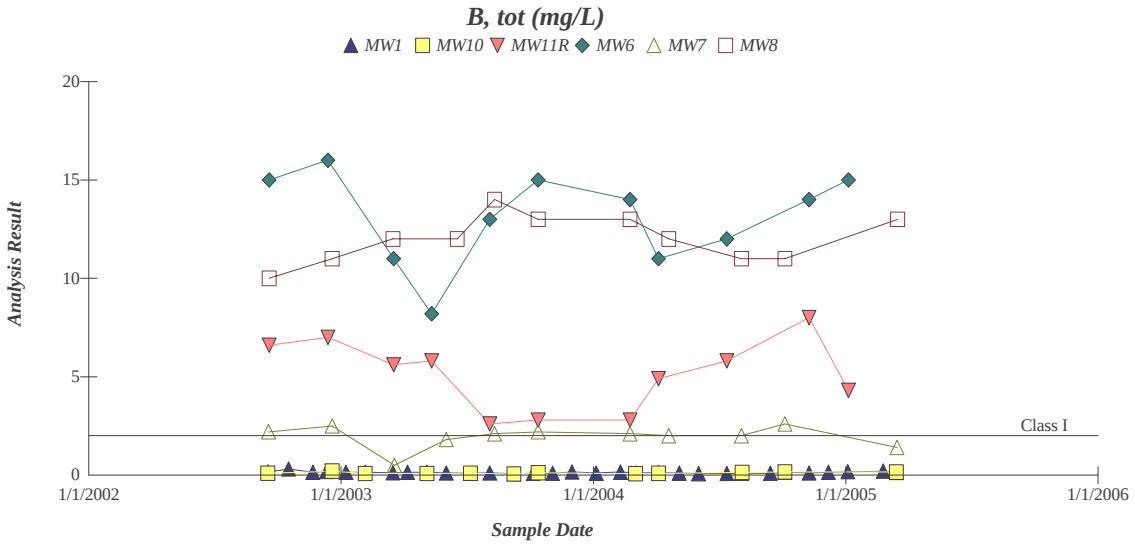


Figure 9a. Time series plots showing boron concentrations in upper migration zone monitoring wells

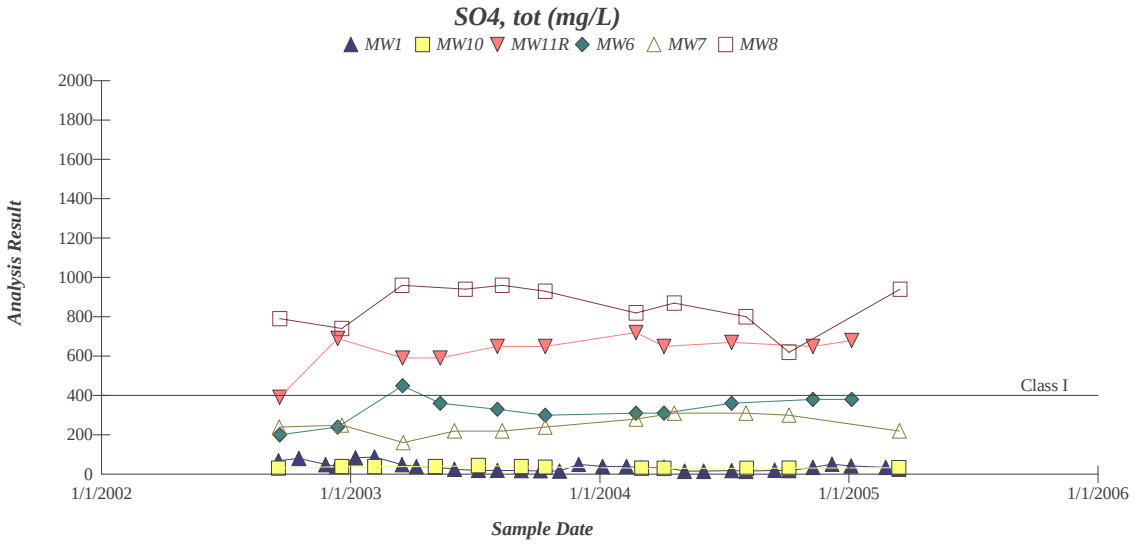


Figure 9b. Time series plots showing sulfate concentrations in upper migration zone monitoring wells

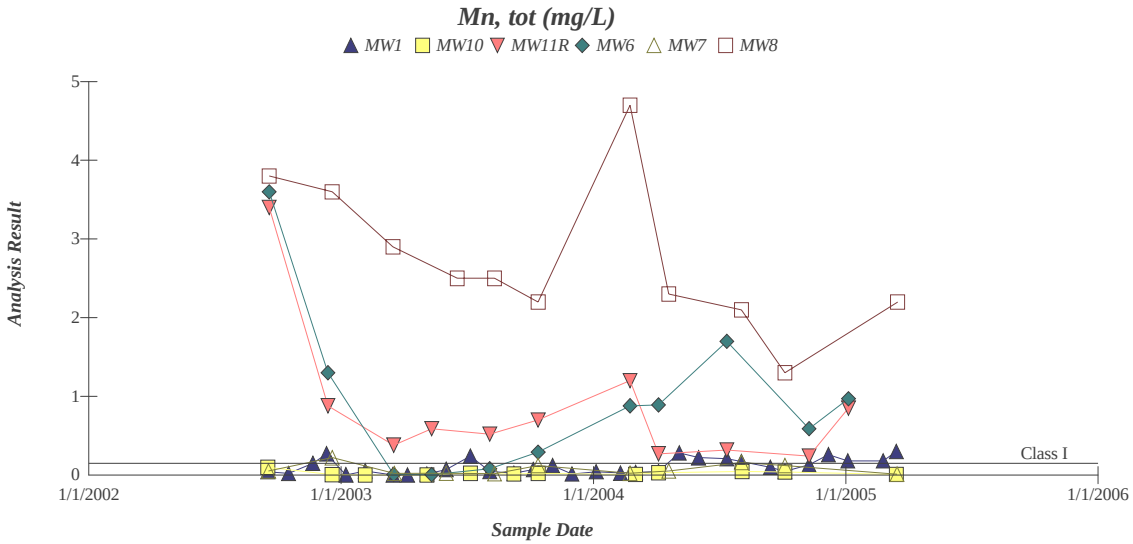


Figure 9c. Time series plots showing manganese concentrations in upper migration zone monitoring wells

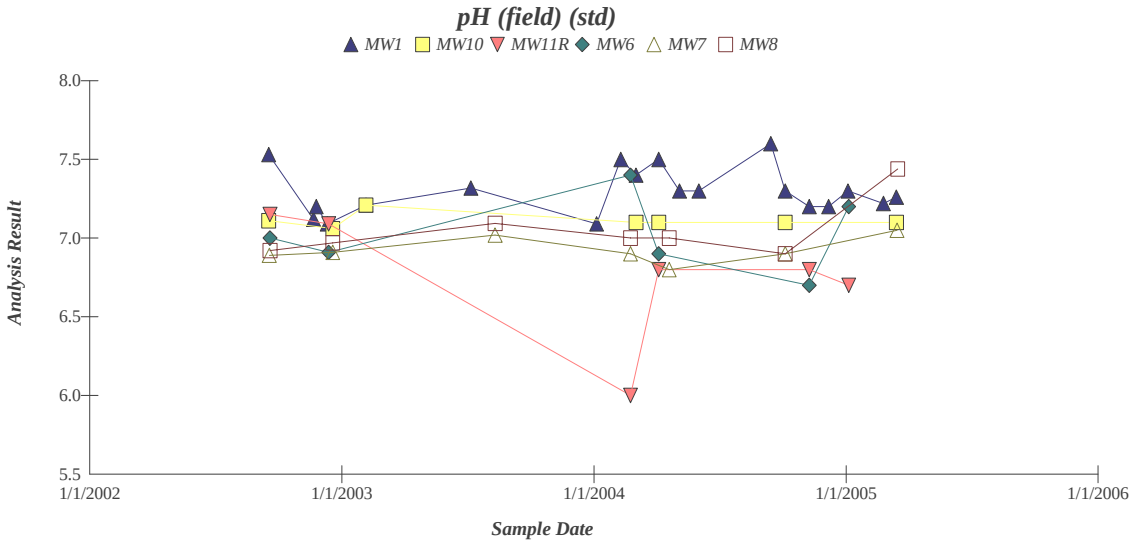


Figure 9d. Time series plots showing pH values in upper migration zone monitoring wells

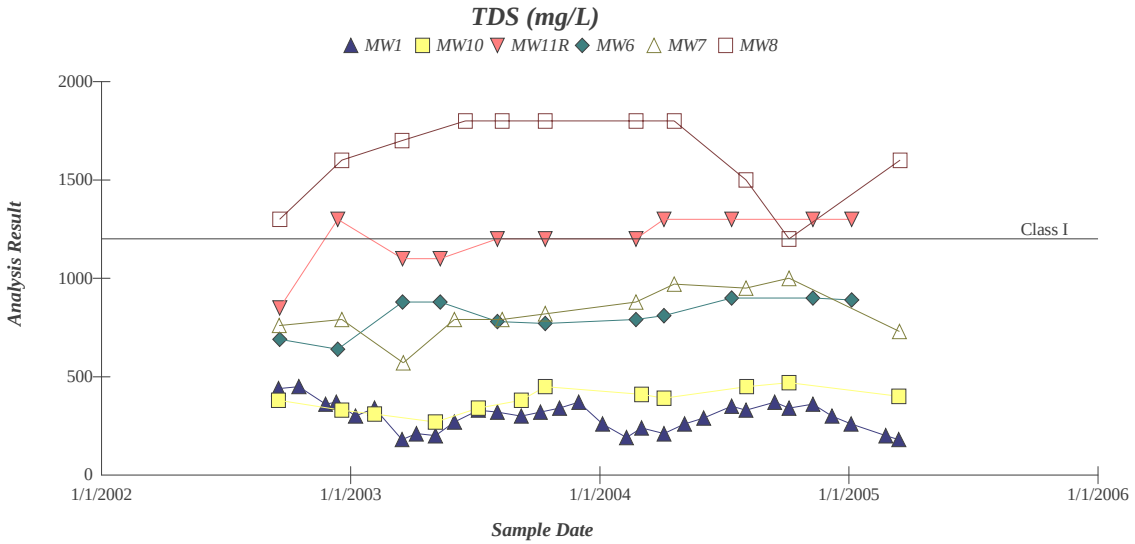


Figure 9e. Time series plots showing TDS concentrations in upper migration zone monitoring wells

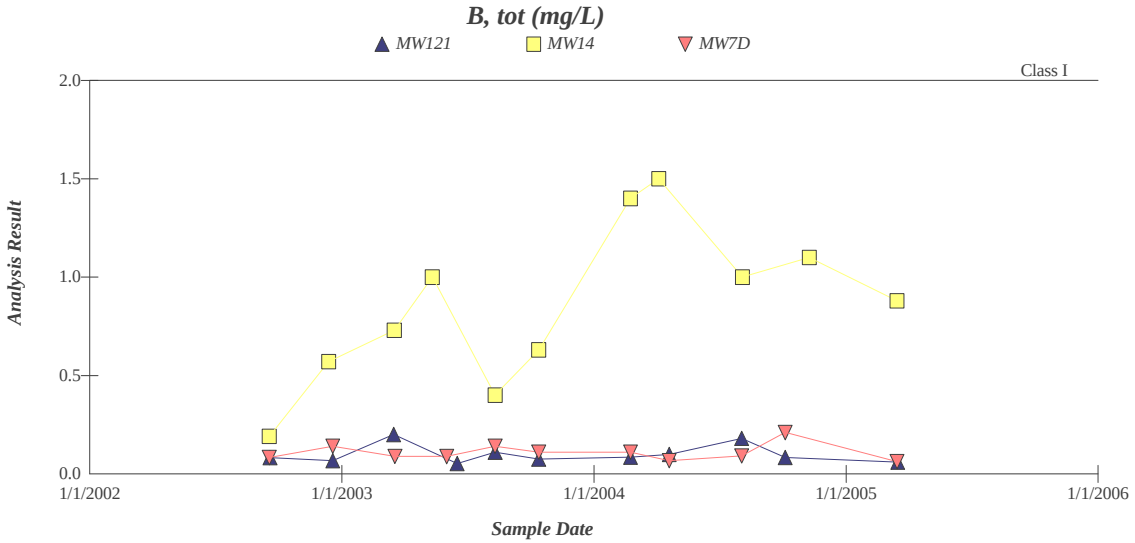


Figure 10a. Time series plots showing boron concentrations in deep alluvial aquifer monitoring wells (MW115s and MW115d not monitored during this period)

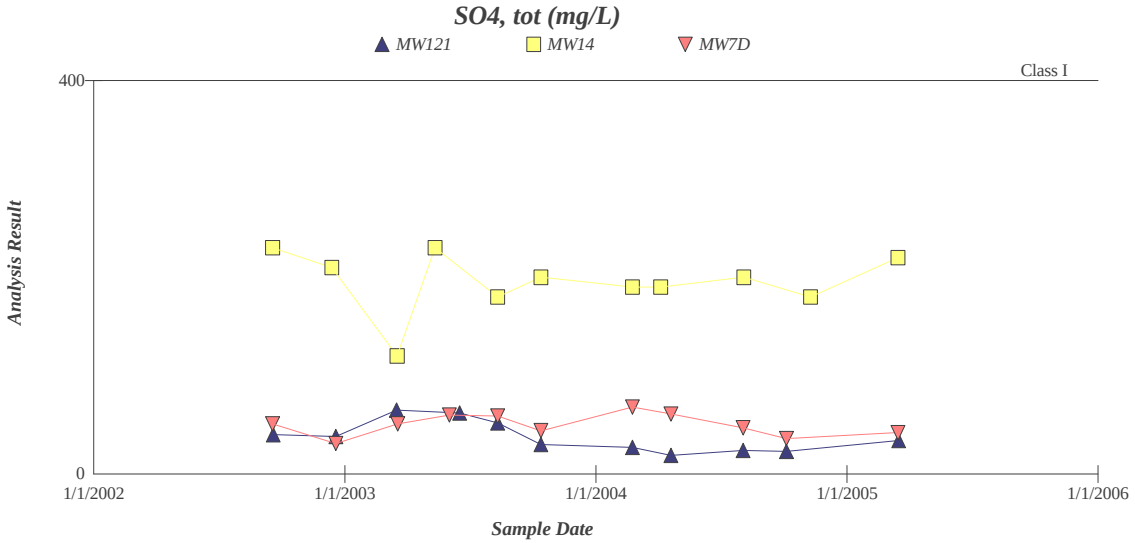


Figure 10b. Time series plots showing sulfate concentrations in deep alluvial aquifer monitoring wells (MW115s and MW115d not monitored during this period)

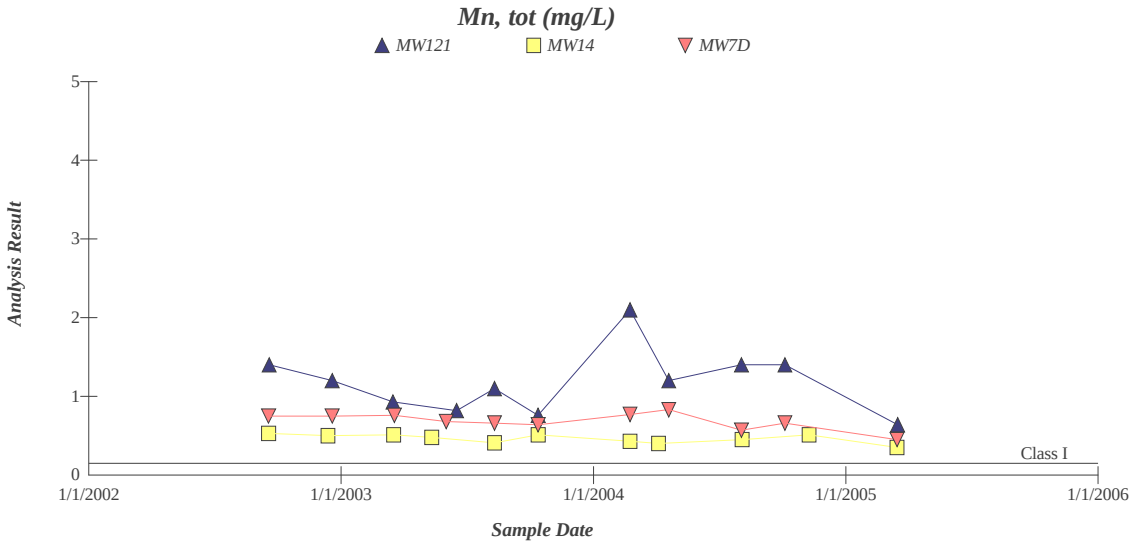


Figure 10c. Time series plots showing manganese concentrations in deep alluvial aquifer monitoring wells (MW115s and MW115d not monitored during this period)

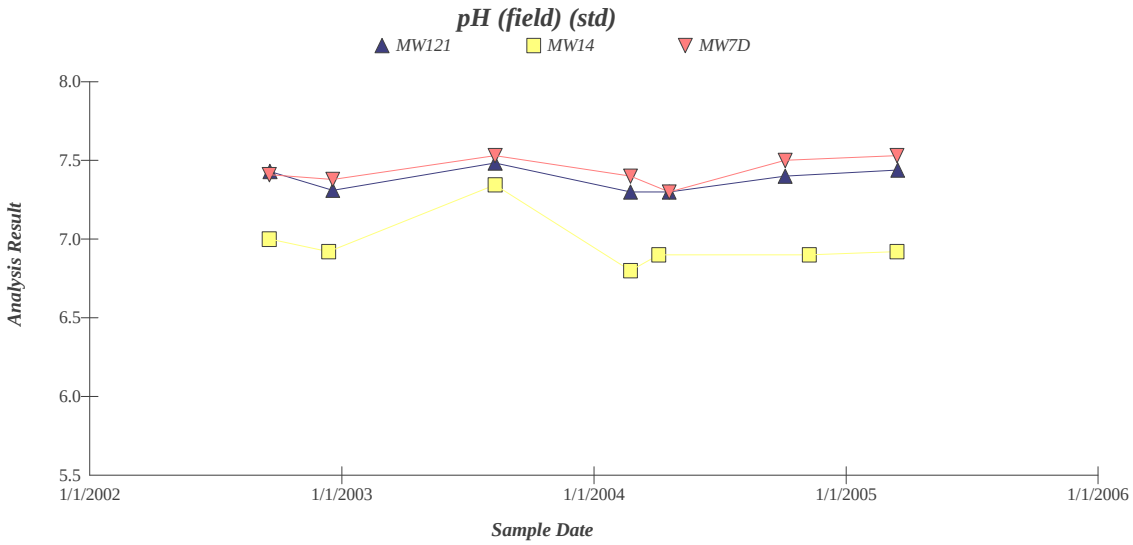


Figure 10d. Time series plots showing pH values in deep alluvial aquifer monitoring wells (MW115s and MW115d not monitored during this period)

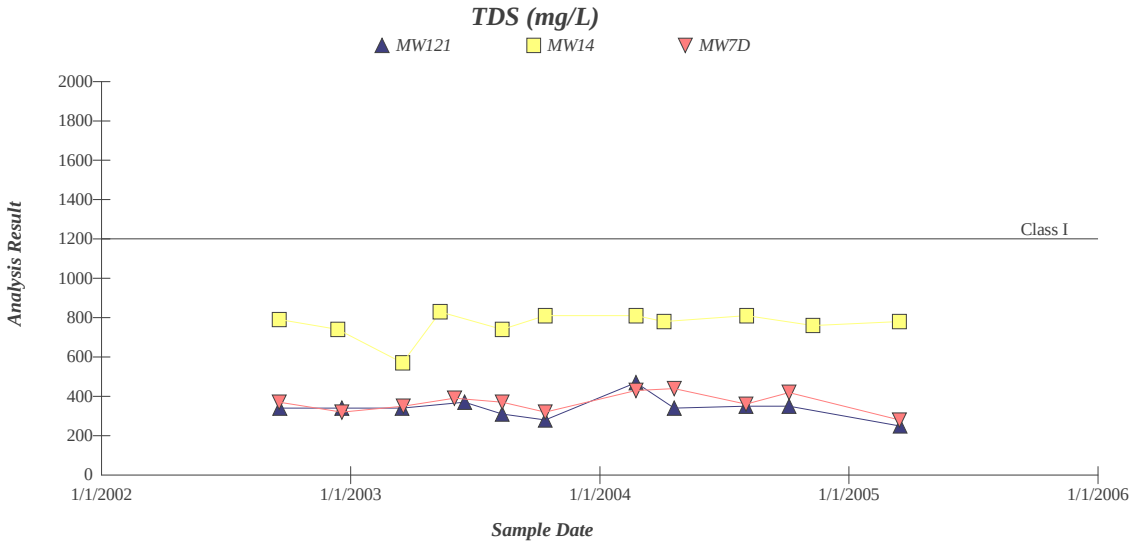


Figure 10e. Time series plots showing TDS concentrations in deep alluvial aquifer monitoring wells (MW115s and MW115d not monitored during this period)

Hutsonville Ash Impoundment
Attachment A
Wilcoxon Rank Sum Test for Two Group Comparison

User Supplied Information

Data Deseasonalization:	**No**	**Option for LT Pts:**	**x 0.5**
Confidence level:	**99.00%**	**Period Length, mn:**	**3**
Data Averaged?	**No**	**Background Date Range:**	**09/01/2002 to 03/31/2005**
		Compliance Date Range:	**09/01/2002 to 03/31/2005**
Compliance Locations:	**MW1**		
Background Locations:	**MW1(Monthly)**		

Parameter:	Code	Name	Units
	00400	pH (field)	std

Compliance Location:	Location ID	Location Type
	MW1	Upper Zone

Background Location(s):		
	MW1(Monthly)	Upper Zone

W test (background): Data is Normal
(At a significance level of 0.010)
W test (Compliance) : Data is Normal
(At a significance level of 0.010)

Compliance Statistics (One-Sided Test):

				Test Statistic	
Avg Pts.	Less Than Pts.	Expected Value	Std Dev	Z-Value	Z-Critical
11	0	231.000	33.800	0.370	2.326

Null Hypothesis, Ho: All locations are from the same population.

Accept the Null Hypothesis, Ho.

Hutsonville Ash Impoundment
Attachment A
Wilcoxon Rank Sum Test for Two Group Comparison

User Supplied Information

Data Deseasonalization:	**No**	**Option for LT Pts:**	**x 0.5**
Confidence level:	**99.00%**	**Period Length, mn:**	**3**
Data Averaged?	**No**	**Background Date Range:**	**09/01/2002 to 03/31/2005**
		Compliance Date Range:	**09/01/2002 to 03/31/2005**
Compliance Locations:	**MW1**		
Background Locations:	**MW1(Monthly)**		

Parameter:	Code	Name	Units
	00945	Sulfate, total	mg/L

Compliance Location:	Location ID	Location Type
	MW1	Upper Zone

Background Location(s):		
	MW1(Monthly)	Upper Zone

W test (background): Data is Not Normal
(At a significance level of 0.010)
W test (Compliance) : Data is Normal
(At a significance level of 0.010)

Compliance Statistics (One-Sided Test):

				Test Statistic	
Avg Pts.	Less Than Pts.	Expected Value	Std Dev	Z-Value	Z-Critical
11	0	231.000	33.941	-0.412	2.326

Null Hypothesis, Ho: All locations are from the same population.

Accept the Null Hypothesis, Ho.

Hutsonville Ash Impoundment
Attachment A
Wilcoxon Rank Sum Test for Two Group Comparison

User Supplied Information

Data Deseasonalization:	**No**	**Option for LT Pts:**	**x 0.5**
Confidence level:	**99.00%**	**Period Length, mn:**	**3**
Data Averaged?	**No**	**Background Date Range:**	**09/01/2002 to 03/31/2005**
		Compliance Date Range:	**09/01/2002 to 03/31/2005**
Compliance Locations:	**MW1**		
Background Locations:	**MW1(Monthly)**		

Parameter:	Code	Name	Units
	01022	Boron, total	mg/L

Compliance Location:	Location ID	Location Type
	MW1	Upper Zone

Background Location(s):		
	MW1(Monthly)	Upper Zone

W test (background): Data is Not Normal
(At a significance level of 0.010)
W test (Compliance) : Data is Normal
(At a significance level of 0.010)

Compliance Statistics (One-Sided Test):

				Test Statistic	
Avg Pts.	Less Than Pts.	Expected Value	Std Dev	Z-Value	Z-Critical
11	0	231.000	33.685	-0.045	2.326

Null Hypothesis, Ho: All locations are from the same population.

Accept the Null Hypothesis, Ho.

Hutsonville Ash Impoundment
Attachment A
Wilcoxon Rank Sum Test for Two Group Comparison

User Supplied Information

Data Deseasonalization:	**No**	**Option for LT Pts:**	**x 0.5**
Confidence level:	**99.00%**	**Period Length, mn:**	**3**
Data Averaged?	**No**	**Background Date Range:**	**09/01/2002 to 03/31/2005**
		Compliance Date Range:	**09/01/2002 to 03/31/2005**
Compliance Locations:	**MW1**		
Background Locations:	**MW1(Monthly)**		

Parameter:	Code	Name	Units
	01055	Manganese, total	mg/L

Compliance Location:	Location ID	Location Type
	MW1	Upper Zone

Background Location(s):		
	MW1(Monthly)	Upper Zone

W test (background): Data is Not Normal
(At a significance level of 0.010)
W test (Compliance) : Data is Normal
(At a significance level of 0.010)

Compliance Statistics (One-Sided Test):

				Test Statistic	
Avg Pts.	Less Than Pts.	Expected Value	Std Dev	Z-Value	Z-Critical
11	0	231.000	33.963	0.294	2.326

Null Hypothesis, Ho: All locations are from the same population.

Accept the Null Hypothesis, Ho.

Hutsonville Ash Impoundment
Attachment A
Wilcoxon Rank Sum Test for Two Group Comparison

User Supplied Information

Data Deseasonalization:	**No**	**Option for LT Pts:**	**x 0.5**
Confidence level:	**99.00%**	**Period Length, mn:**	**3**
Data Averaged?	**No**	**Background Date Range:**	**09/01/2002 to 03/31/2005**
		Compliance Date Range:	**09/01/2002 to 03/31/2005**
Compliance Locations:	**MW1**		
Background Locations:	**MW1(Monthly)**		

Parameter:	Code	Name	Units
	70300	Total Filterable Residue (TDS)	mg/L

Compliance Location:	Location ID	Location Type
	MW1	Upper Zone

Background Location(s):		
	MW1(Monthly)	Upper Zone

W test (background): Data is Normal
(At a significance level of 0.010)
W test (Compliance) : Data is Normal
(At a significance level of 0.010)

Compliance Statistics (One-Sided Test):

				Test Statistic	
Avg Pts.	Less Than Pts.	Expected Value	Std Dev	Z-Value	Z-Critical
11	0	231.000	33.890	0.044	2.326

Null Hypothesis, Ho: All locations are from the same population.

Accept the Null Hypothesis, Ho.

Hutsonville Ash Impoundment

Attachment B1

Dixons Outlier Analysis Results - Background Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

pH (field), std

Location: MW1

Test Statistic, low extreme of all data: T1 = 0.268

Test Statistic, high extreme of all data: Tn = 0.182

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

pH (field), std

Location: MW10

Test Statistic, low extreme of all data: T1 = 0.300

Test Statistic, high extreme of all data: Tn = 0.048

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

pH (field), std

Location: MW121

Test Statistic, low extreme of all data: T1 = 0.000

Test Statistic, high extreme of all data: Tn = 0.387

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Attachment B1

Dixons Outlier Analysis Results - Background Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 **LT Multiplier: x 1.0**

Confidence Level: 99% **Number of Outliers: First 10% Outliers**

pH (field), std

Location: MW7D

Test Statistic, low extreme of all data: T1 = 0.566

Test Statistic, high extreme of all data: Tn = 0.425

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Sulfate, total, mg/L

Location: MW1

Test Statistic, low extreme of all data: T1 = 0.057

Test Statistic, high extreme of all data: Tn = 0.686

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
02/05/2003	87.000	False		1

Sulfate, total, mg/L

Location: MW10

Test Statistic, low extreme of all data: T1 = 0.222

Test Statistic, high extreme of all data: Tn = 0.400

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Hutsonville Ash Impoundment

Attachment B1

Dixons Outlier Analysis Results - Background Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

Sulfate, total, mg/L

Location: MW121

Test Statistic, low extreme of all data: T1 = 0.116

Test Statistic, high extreme of all data: Tn = 0.310

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Sulfate, total, mg/L

Location: MW7D

Test Statistic, low extreme of all data: T1 = 0.367

Test Statistic, high extreme of all data: Tn = 0.250

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Boron, total, mg/L

Location: MW1

Test Statistic, low extreme of all data: T1 = 0.121

Test Statistic, high extreme of all data: Tn = 0.460

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Hutsonville Ash Impoundment

Attachment B1

Dixons Outlier Analysis Results - Background Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

Boron, total, mg/L

Location: MW10

Test Statistic, low extreme of all data: T1 = 0.156

Test Statistic, high extreme of all data: Tn = 0.403

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Boron, total, mg/L

Location: MW121

Test Statistic, low extreme of all data: T1 = 0.204

Test Statistic, high extreme of all data: Tn = 0.497

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Boron, total, mg/L

Location: MW7D

Test Statistic, low extreme of all data: T1 = 0.269

Test Statistic, high extreme of all data: Tn = 0.490

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Hutsonville Ash Impoundment

Attachment B1

Dixons Outlier Analysis Results - Background Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

Manganese, total, mg/L

Location: MW1

Test Statistic, low extreme of all data: T1 = 0.371

Test Statistic, high extreme of all data: Tn = 0.100

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Manganese, total, mg/L

Location: MW10

Test Statistic, low extreme of all data: T1 = 0.061

Test Statistic, high extreme of all data: Tn = 0.614

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Manganese, total, mg/L

Location: MW121

Test Statistic, low extreme of all data: T1 = 0.237

Test Statistic, high extreme of all data: Tn = 0.522

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Attachment B1

Dixons Outlier Analysis Results - Background Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 **LT Multiplier: x 1.0**

Confidence Level: 99% **Number of Outliers: First 10% Outliers**

Manganese, total, mg/L

Location: MW7D

Test Statistic, low extreme of all data: T1 = 0.594

Test Statistic, high extreme of all data: Tn = 0.269

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Total Filterable Residue (TDS), mg/L

Location: MW1

Test Statistic, low extreme of all data: T1 = 0.158

Test Statistic, high extreme of all data: Tn = 0.417

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Total Filterable Residue (TDS), mg/L

Location: MW10

Test Statistic, low extreme of all data: T1 = 0.333

Test Statistic, high extreme of all data: Tn = 0.125

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Attachment B1

Dixons Outlier Analysis Results - Background Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

Total Filterable Residue (TDS), mg/L

Location: MW121

Test Statistic, low extreme of all data: T1 = 0.549

Test Statistic, high extreme of all data: Tn = 0.569

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Total Filterable Residue (TDS), mg/L

Location: MW7D

Test Statistic, low extreme of all data: T1 = 0.267

Test Statistic, high extreme of all data: Tn = 0.167

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Appendix B2: Tolerance Interval Calculation Background (Upper)

Background Date Range: 09/01/2002 to 03/31/2005
Background Locations: MW1,MW10

Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: Null

Comparison Method if all Background Results are Non-Detect:	STmdl = Last MDL
Statistical Test for Parametric Background Data Distributions:	STpar = Parametric Tolerance Interval on Background
Statistical Test for Cases with High Percentage of Non-Detect Background Data:	STlow1 = Non-Parametric Tolerance Interval on background (ND Frequency > 50%)
Statistical Test for Cases with High Percentage of Non-Detect Background Data:	STlow2 = Non-Parametric Tolerance Interval on background (ND Frequency > 50%)
Statistical Test for Non-Parametric Background Data Distributions:	STnon = Non-Parametric Tolerance Interval on background
Background Comparison:	Interwell
Number of Verification Samples:	0
Default Type 1 Individual Comparison Error Level (False Positive Rate) for tests other than Prediction Interval	0.01
Non-Detect Processing (Parametric Tests):	<=15% using 1/2 PQL (MDL * 10/3) >15% using Cohen's Adj.
Non-Detect Processing (All Other):	<=50% using MDL * 1.0 >50% using MDL * 1.0
Tolerance Interval Coverage:	95%

Compliance Location	Parameter	Sample Date	Count Of Bkg Results	Percent of Non detects	Normal / Lognormal	Test	Confidence Level	Upper Limit	Lower Limit	Analysis Result	Exceedance	Trend
Null	Boron, Tot, mg/L	01/01/2008	22	0.00	Yes/Yes	STpar	99.00	0.216		0.000	No	
Null	Manganese, Tot, mg/L	01/01/2008	22	0.00	No/Yes	STpar	99.00	1.869		0.000	No	
Null	pH (field), std	01/01/2008	22	0.00	Yes/Yes	STpar	99.00	7.685	6.739	0.000	Yes	
Null	Sulfate, Tot, mg/L	01/01/2008	22	0.00	No/Yes	STpar	99.00	97.460		0.000	No	
Null	TDS, mg/L	01/01/2008	22	0.00	Yes/No	STpar	99.00	566.259		0.000	No	

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: Null
Background Locations: MW1,MW10
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Location	Type	Class
Null		

Parameter Code: 00400 — **Data Transformation:** None
Parameter Name: pH (field) — **Confidence Level:** 0.99%
Units: std — **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

TL (Upper) Value	TL (Lower) Value
7.7	6.7

Sample Date	Sample Result	Greater than TL (Upper)	Lower than TL (Lower)
1/1/2008	0.000	N	Y

Parameter Code: 00945 — **Data Transformation:** Natural Log
Parameter Name: Sulfate, Tot — **Confidence Level:** 0.99%
Units: mg/L — **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

TL (Upper) Value
97.5

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 01022 — **Data Transformation:** None
Parameter Name: Boron, Tot — **Confidence Level:** 0.99%
Units: mg/L — **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

TL (Upper) Value
0.2

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: Null
Background Locations: MW1,MW10
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Parameter Code: 01055
Parameter Name: Manganese, Tot
Units: mg/L
Data Transformation: Natural Log
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
1.9

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 70300
Parameter Name: TDS
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
566.3

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range:	**09/01/2002 to 03/31/2005**	**Tolerance Coverage (Gamma):**	**95%**
Compliance Date Range:	**01/01/2008 to 01/01/2008**	**Option for LT Pts:**	**1/2 PQL (MDL * 10/3)**
Compliance Locations:	**Null**		
Background Locations:	**MW1,MW10**		

BACKGROUND

Location	Type	Total Pts	LT Pts	% LT Pts
Pooled	Upper Zone	22	0	0

Parameter Code: 00400 — **Data Transformation:** None
Parameter Name: pH (field) — **Confidence Level:** 0.99%
Units: std

Pooled Results:

Normal	Mean	StdDev	K Value	TL (Lower)	TU (Upper)
Yes	7.212	0.154	3.078	6.739	7.685

Parameter Code: 00945 — **Data Transformation:** Natural Log
Parameter Name: Sulfate, Tot — **Confidence Level:** 0.99%
Units: mg/L

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)
Yes	35.091	15.997	2.729	97.460

Parameter Code: 01022 — **Data Transformation:** None
Parameter Name: Boron, Tot — **Confidence Level:** 0.99%
Units: mg/L

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)
Yes	0.120	0.035	2.729	0.216

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range:	**09/01/2002 to 03/31/2005**	**Tolerance Coverage (Gamma):**	**95%**
Compliance Date Range:	**01/01/2008 to 01/01/2008**	**Option for LT Pts:**	**1/2 PQL (MDL * 10/3)**
Compliance Locations:	**Null**		
Background Locations:	**MW1,MW10**		

BACKGROUND

Parameter Code: 01055 — **Data Transformation:** Natural Log

Parameter Name: Manganese, Tot — **Confidence Level:** 0.99%

Units: mg/L

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)
Yes	0.071	0.090	2.729	1.869

Parameter Code: 70300 — **Data Transformation:** None

Parameter Name: TDS — **Confidence Level:** 0.99%

Units: mg/L

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)
Yes	340.909	82.572	2.729	566.259

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range:	**09/01/2002 to 03/31/2005**	**Tolerance Coverage (Gamma):**	**95%**
Compliance Date Range:	**01/01/2008 to 01/01/2008**	**Option for LT Pts:**	**1/2 PQL (MDL * 10/3)**
Compliance Locations:	**Null**		
Background Locations:	**MW1,MW10**		

BACKGROUND

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment

Appendix B3: Tolerance Interval Calculation Background (Deep)

Background Date Range: 09/01/2002 to 03/31/2005
Background Locations: MW121,MW7D

Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: Null

Comparison Method if all Background Results are Non-Detect:	STmdl = Last MDL
Statistical Test for Parametric Background Data Distributions:	STpar = Parametric Tolerance Interval on Background
Statistical Test for Cases with High Percentage of Non-Detect Background Data:	STlow1 = Non-Parametric Tolerance Interval on background (ND Frequency > 50%)
Statistical Test for Cases with High Percentage of Non-Detect Background Data:	STlow2 = Non-Parametric Tolerance Interval on background (ND Frequency > 50%)
Statistical Test for Non-Parametric Background Data Distributions:	STnon = Non-Parametric Tolerance Interval on background
Background Comparison:	Interwell
Number of Verification Samples:	0
Default Type 1 Individual Comparison Error Level (False Positive Rate) for tests other than Prediction Interval	0.01
Non-Detect Processing (Parametric Tests):	<=15% using 1/2 PQL (MDL * 10/3) >15% using Cohen's Adj.
Non-Detect Processing (All Other):	<=50% using MDL * 1.0 >50% using MDL * 1.0
Tolerance Interval Coverage:	95%

Compliance Location	Parameter	Sample Date	Count Of Bkg Results	Percent of Non detects	Normal / Lognormal	Test	Confidence Level	Upper Limit	Lower Limit	Analysis Result	Exceedance	Trend
Null	Boron, Tot, mg/L	01/01/2008	22	0.00	No/Yes	STpar	99.00	0.274		0.000	No	
Null	Manganese, Tot, mg/L	01/01/2008	22	0.00	No/Yes	STpar	99.00	2.369		0.000	No	
Null	pH (field), std	01/01/2008	22	0.00	Yes/Yes	STpar	99.00	7.845	6.974	0.000	Yes	
Null	Sulfate, Tot, mg/L	01/01/2008	22	0.00	Yes/Yes	STpar	99.00	84.303		0.000	No	
Null	TDS, mg/L	01/01/2008	22	0.00	Yes/Yes	STpar	99.00	499.886		0.000	No	

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: Null
Background Locations: MW121,MW7D
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Location **Type** **Class**
Null

Parameter Code: 00400 **Data Transformation:** None
Parameter Name: pH (field) **Confidence Level:** 0.99%
Units: std **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

TL (Upper) Value	TL (Lower) Value
7.8	7.0

Sample Date	Sample Result	Greater than TL (Upper)	Lower than TL (Lower)
1/1/2008	0.000	N	Y

Parameter Code: 00945 **Data Transformation:** None
Parameter Name: Sulfate, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

TL (Upper) Value
84.3

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 01022 **Data Transformation:** Natural Log
Parameter Name: Boron, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

TL (Upper) Value
0.3

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: Null
Background Locations: MW121,MW7D
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Parameter Code: 01055
Parameter Name: Manganese, Tot
Units: mg/L
Data Transformation: Natural Log
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
2.4

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 70300
Parameter Name: TDS
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
499.9

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range:	**09/01/2002 to 03/31/2005**	**Tolerance Coverage (Gamma):**	**95%**
Compliance Date Range:	**01/01/2008 to 01/01/2008**	**Option for LT Pts:**	**1/2 PQL (MDL * 10/3)**
Compliance Locations:	**Null**		
Background Locations:	**MW121,MW7D**		

BACKGROUND

Location	Type	Total Pts	LT Pts	% LT Pts
Pooled	Alluvial Aq.	22	0	0

Parameter Code: **00400** **Data Transformation:** **None**

Parameter Name: **pH (field)** **Confidence Level:** **0.99%**

Units: **std**

Pooled Results:

Normal	Mean	StdDev	K Value	TL (Lower)	TU (Upper)
Yes	7.410	0.141	3.078	6.974	7.845

Parameter Code: **00945** **Data Transformation:** **None**

Parameter Name: **Sulfate, Tot** **Confidence Level:** **0.99%**

Units: **mg/L**

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)
Yes	43.818	14.834	2.729	84.303

Parameter Code: **01022** **Data Transformation:** **Natural Log**

Parameter Name: **Boron, Tot** **Confidence Level:** **0.99%**

Units: **mg/L**

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)
Yes	0.104	0.044	2.729	0.274

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range:	**09/01/2002 to 03/31/2005**	**Tolerance Coverage (Gamma):**	**95%**
Compliance Date Range:	**01/01/2008 to 01/01/2008**	**Option for LT Pts:**	**1/2 PQL (MDL * 10/3)**
Compliance Locations:	**Null**		
Background Locations:	**MW121,MW7D**		

BACKGROUND

Parameter Code: **01055** **Data Transformation:** **Natural Log**

Parameter Name: **Manganese, Tot** **Confidence Level:** **0.99%**

Units: **mg/L**

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)
Yes	0.930	0.385	2.729	2.369

Parameter Code: **70300** **Data Transformation:** **None**

Parameter Name: **TDS** **Confidence Level:** **0.99%**

Units: **mg/L**

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)
Yes	354.091	53.422	2.729	499.886

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range:	**09/01/2002 to 03/31/2005**	**Tolerance Coverage (Gamma):**	**95%**
Compliance Date Range:	**01/01/2008 to 01/01/2008**	**Option for LT Pts:**	**1/2 PQL (MDL * 10/3)**
Compliance Locations:	**Null**		
Background Locations:	**MW121,MW7D**		

BACKGROUND

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment

Attachment C1

Dixons Outlier Analysis Results - Downgradient Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

pH (field), std

Location: MW11R

Test Statistic, low extreme of all data: T1 = 0.583

Test Statistic, high extreme of all data: Tn = 0.000

T Critical of all data: Tcr = 0.597

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

pH (field), std

Location: MW14

Test Statistic, low extreme of all data: T1 = 0.000

Test Statistic, high extreme of all data: Tn = 0.000

T Critical of all data: Tcr = 0.000

Data failed to pass the W-test as either a normal or a lognormally distributed data set
Data is neither normally or lognormally distributed.

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

pH (field), std

Location: MW6

Test Statistic, low extreme of all data: T1 = 0.000

Test Statistic, high extreme of all data: Tn = 0.286

T Critical of all data: Tcr = 0.597

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Hutsonville Ash Impoundment

Attachment C1

Dixons Outlier Analysis Results - Downgradient Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

pH (field), std

Location: MW7

Test Statistic, low extreme of all data: T1 = 0.360

Test Statistic, high extreme of all data: Tn = 0.560

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

pH (field), std

Location: MW8

Test Statistic, low extreme of all data: T1 = 0.000

Test Statistic, high extreme of all data: Tn = 0.000

T Critical of all data: Tcr = 0.000

Data failed to pass the W-test as either a normal or a lognormally distributed data set
Data is neither normally or lognormally distributed.

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Sulfate, total, mg/L

Location: MW11R

Test Statistic, low extreme of all data: T1 = 0.667

Test Statistic, high extreme of all data: Tn = 0.308

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Hutsonville Ash Impoundment

Attachment C1

Dixons Outlier Analysis Results - Downgradient Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

Sulfate, total, mg/L

Location: MW14

Test Statistic, low extreme of all data: T1 = 0.545

Test Statistic, high extreme of all data: Tn = 0.200

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Sulfate, total, mg/L

Location: MW6

Test Statistic, low extreme of all data: T1 = 0.556

Test Statistic, high extreme of all data: Tn = 0.333

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Sulfate, total, mg/L

Location: MW7

Test Statistic, low extreme of all data: T1 = 0.400

Test Statistic, high extreme of all data: Tn = 0.111

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Attachment C1

Dixons Outlier Analysis Results - Downgradient Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 **LT Multiplier: x 1.0**

Confidence Level: 99% **Number of Outliers: First 10% Outliers**

Sulfate, total, mg/L

Location: MW8

Test Statistic, low extreme of all data: T1 = 0.500

Test Statistic, high extreme of all data: Tn = 0.091

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Boron, total, mg/L

Location: MW11R

Test Statistic, low extreme of all data: T1 = 0.045

Test Statistic, high extreme of all data: Tn = 0.269

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Boron, total, mg/L

Location: MW14

Test Statistic, low extreme of all data: T1 = 0.314

Test Statistic, high extreme of all data: Tn = 0.364

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Attachment C1

Dixons Outlier Analysis Results - Downgradient Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

Boron, total, mg/L

Location: MW6

Test Statistic, low extreme of all data: T1 = 0.412

Test Statistic, high extreme of all data: Tn = 0.200

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Boron, total, mg/L

Location: MW7

Test Statistic, low extreme of all data: T1 = 0.650

Test Statistic, high extreme of all data: Tn = 0.333

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Boron, total, mg/L

Location: MW8

Test Statistic, low extreme of all data: T1 = 0.333

Test Statistic, high extreme of all data: Tn = 0.333

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Attachment C1

Dixons Outlier Analysis Results - Downgradient Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 **LT Multiplier: x 1.0**

Confidence Level: 99% **Number of Outliers: First 10% Outliers**

Manganese, total, mg/L

Location: MW11R

Test Statistic, low extreme of all data: T1 = 0.083

Test Statistic, high extreme of all data: Tn = 0.805

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
09/19/2002	3.400	False		1

Manganese, total, mg/L

Location: MW14

Test Statistic, low extreme of all data: T1 = 0.375

Test Statistic, high extreme of all data: Tn = 0.154

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Manganese, total, mg/L

Location: MW6

Test Statistic, low extreme of all data: T1 = 0.045

Test Statistic, high extreme of all data: Tn = 0.640

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Attachment C1

Dixons Outlier Analysis Results - Downgradient Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 | **LT Multiplier: x 1.0**

Confidence Level: 99% | **Number of Outliers: First 10% Outliers**

Manganese, total, mg/L

Location: MW7

Test Statistic, low extreme of all data: T1 = 0.054

Test Statistic, high extreme of all data: Tn = 0.495

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Manganese, total, mg/L

Location: MW8

Test Statistic, low extreme of all data: T1 = 0.360

Test Statistic, high extreme of all data: Tn = 0.423

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Total Filterable Residue (TDS), mg/L

Location: MW11R

Test Statistic, low extreme of all data: T1 = 0.000

Test Statistic, high extreme of all data: Tn = 0.000

T Critical of all data: Tcr = 0.000

Data failed to pass the W-test as either a normal or a lognormally distributed data set
Data is neither normally or lognormally distributed.

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Attachment C1

Dixons Outlier Analysis Results - Downgradient Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 **LT Multiplier: x 1.0**

Confidence Level: 99% **Number of Outliers: First 10% Outliers**

Total Filterable Residue (TDS), mg/L

Location: MW14

Test Statistic, low extreme of all data: T1 = 0.708

Test Statistic, high extreme of all data: Tn = 0.222

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
03/18/2003	570.000	False	-1	

Total Filterable Residue (TDS), mg/L

Location: MW6

Test Statistic, low extreme of all data: T1 = 0.500

Test Statistic, high extreme of all data: Tn = 0.048

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Total Filterable Residue (TDS), mg/L

Location: MW7

Test Statistic, low extreme of all data: T1 = 0.475

Test Statistic, high extreme of all data: Tn = 0.185

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side

No Outliers

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment

Attachment C1

Dixons Outlier Analysis Results - Downgradient Wells

User Supplied Information

Date Range: 09/01/2002 to 03/31/2005 **LT Multiplier: x 1.0**

Confidence Level: 99% **Number of Outliers: First 10% Outliers**

Total Filterable Residue (TDS), mg/L

Location: MW8

Test Statistic, low extreme of all data: T1 = 0.500

Test Statistic, high extreme of all data: Tn = 0.000

T Critical of all data: Tcr = 0.679

Data passed the W-test for normality

Sample Date	Value	LT_Value	Outlier Low Side	Outlier High Side
No Outliers				

Based on Dixons one-sided outlier test

Hutsonville Ash Impoundment
Non-Parametric Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Background Locations: MW11R,MW14,MW6,MW7,MW8
Compliance Locations: MW11R,MW14,MW6,MW7,MW8

COMPLIANCE

Parameter Code: 00400 **Tolerance Coverage Gamma:** 95%
Parameter Name: pH (field) **Background Sample Count:** 10
Units: std **Option for LT Pts.:** MDL * 1.0

One-Sided Confidence Level, %	Two-Sided Interval Confidence Level, %	TU (Upper) Value	TL (Lower) Value
40.13	8.61	7.200	6.000

Location	Type	Class	Sample Date	Sample Result	Greater than TU (Upper)	Lower than TL (Lower)
MW11R	Upper Zone	Downgradient	01/01/2008	7.000	N	N

Parameter Code: 00945 **Tolerance Coverage Gamma:** 95%
Parameter Name: Sulfate, Tot **Background Sample Count:** 11
Units: mg/L **Option for LT Pts.:** MDL * 1.0

One-Sided Confidence Level, %	TU (Upper) Value
43.12	720.000

Location	Type	Class	Sample Date	Sample Result	Greater than TU (Upper)
MW11R	Upper Zone	Downgradient	01/01/2008	0.000	N

Parameter Code: 70300 **Tolerance Coverage Gamma:** 95%
Parameter Name: TDS **Background Sample Count:** 11
Units: mg/L **Option for LT Pts.:** MDL * 1.0

One-Sided Confidence Level, %	TU (Upper) Value
43.12	1,300.000

Location	Type	Class	Sample Date	Sample Result	Greater than TU (Upper)
MW11R	Upper Zone	Downgradient	01/01/2008	0.000	N

Hutsonville Ash Impoundment
Non-Parametric Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Background Locations: MW11R,MW14,MW6,MW7,MW8
Compliance Locations: MW11R,MW14,MW6,MW7,MW8

COMPLIANCE

Parameter Code: 00400 **Tolerance Coverage Gamma:** 95%
Parameter Name: pH (field) **Background Sample Count:** 11
Units: std **Option for LT Pts.:** MDL * 1.0

One-Sided Confidence Level, %	Two-Sided Interval Confidence Level, %	TU (Upper) Value	TL (Lower) Value
43.12	10.19	7.345	6.800

Location	Type	Class	Sample Date	Sample Result	Greater than TU (Upper)	Lower than TL (Lower)
MW14	Alluvial Aq.	Downgradient	01/01/2008	7.000	N	N

Parameter Code: 70300 **Tolerance Coverage Gamma:** 95%
Parameter Name: TDS **Background Sample Count:** 11
Units: mg/L **Option for LT Pts.:** MDL * 1.0

One-Sided Confidence Level, %	TU (Upper) Value
43.12	830.000

Location	Type	Class	Sample Date	Sample Result	Greater than TU (Upper)
MW14	Alluvial Aq.	Downgradient	01/01/2008	0.000	N

Parameter Code: 01055 **Tolerance Coverage Gamma:** 95%
Parameter Name: Manganese, Tot **Background Sample Count:** 11
Units: mg/L **Option for LT Pts.:** MDL * 1.0

One-Sided Confidence Level, %	TU (Upper) Value
43.12	3.600

Location	Type	Class	Sample Date	Sample Result	Greater than TU (Upper)
MW6	Upper Zone	Downgradient	01/01/2008	0.000	N

Hutsonville Ash Impoundment
Non-Parametric Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Background Locations: MW11R,MW14,MW6,MW7,MW8
Compliance Locations: MW11R,MW14,MW6,MW7,MW8

COMPLIANCE

Parameter Code: 01022
Parameter Name: Boron, Tot
Units: mg/L
Tolerance Coverage Gamma: 95%
Background Sample Count: 11
Option for LT Pts.: MDL * 1.0

One-Sided Confidence Level, %	TU (Upper) Value
43.12	2.600

Location	Type	Class	Sample Date	Sample Result	Greater than TU (Upper)
MW7	Upper Zone	Downgradient	01/01/2008	0.000	N

Parameter Code: 00400
Parameter Name: pH (field)
Units: std
Tolerance Coverage Gamma: 95%
Background Sample Count: 11
Option for LT Pts.: MDL * 1.0

One-Sided Confidence Level, %	Two-Sided Interval Confidence Level, %	TU (Upper) Value	TL (Lower) Value
43.12	10.19	7.440	6.900

Location	Type	Class	Sample Date	Sample Result	Greater than TU (Upper)	Lower than TL (Lower)
MW8	Upper Zone	Downgradient	01/01/2008	7.000	N	N

Parameter Code: 70300
Parameter Name: TDS
Units: mg/L
Tolerance Coverage Gamma: 95%
Background Sample Count: 11
Option for LT Pts.: MDL * 1.0

One-Sided Confidence Level, %	TU (Upper) Value
43.12	1,800.000

Location	Type	Class	Sample Date	Sample Result	Greater than TU (Upper)
MW8	Upper Zone	Downgradient	01/01/2008	0.000	N

Hutsonville Ash Impoundment

Appendix C2: Tolerance Interval Calculation

Background Date Range: 09/01/2002 to 03/31/2005
Background Locations: MW11R,MW14,MW6,MW7,MW8

Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8

Comparison Method if all Background Results are Non-Detect:	STmdl = Last MDL
Statistical Test for Parametric Background Data Distributions:	STpar = Parametric Tolerance Interval on Background
Statistical Test for Cases with High Percentage of Non-Detect Background Data:	STlow1 = Non-Parametric Tolerance Interval on background (ND Frequency > 50%)
Statistical Test for Cases with High Percentage of Non-Detect Background Data:	STlow2 = Non-Parametric Tolerance Interval on background (ND Frequency > 50%)
Statistical Test for Non-Parametric Background Data Distributions:	STnon = Non-Parametric Tolerance Interval on background
Background Comparison:	Intrawell
Number of Verification Samples:	0
Default Type 1 Individual Comparison Error Level (False Positive Rate) for tests other than Prediction Interval	0.01
Non-Detect Processing (Parametric Tests):	<=15% using 1/2 PQL (MDL * 10/3) >15% using Cohen's Adj.
Non-Detect Processing (All Other):	<=50% using MDL * 1.0 >50% using MDL * 1.0
Tolerance Interval Coverage:	95%

Compliance Location	Parameter	Sample Date	Count Of Bkg Results	Percent of Non detects	Normal / Lognormal	Test	Confidence Level	Upper Limit	Lower Limit	Analysis Result	Exceedance	Trend
MW11R	Boron, Tot, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	11.582		0.000	No	
MW11R	Manganese, Tot, mg/L	01/01/2008	11	0.00	No/Yes	STpar	99.00	9.499		0.000	No	
MW11R	pH (field), std	01/01/2008	10	0.00	No/No	STnon	40.13	7.200	6.000	7.000	No	
MW11R	Sulfate, Tot, mg/L	01/01/2008	11	0.00	No/No	STnon	43.12	720.000		0.000	No	
MW11R	TDS, mg/L	01/01/2008	11	0.00	No/No	STnon	43.12	1,300.000		0.000	No	

Compliance Location	Parameter	Sample Date	Count Of Bkg Results	Percent of Non detects	Normal / Lognormal	Test	Confidence Level	Upper Limit	Lower Limit	Analysis Result	Exceedance	Trend
MW14	Boron, Tot, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	2.285		0.000	No	
MW14	Manganese, Tot, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	0.668		0.000	No	
MW14	pH (field), std	01/01/2008	11	0.00	No/No	STnon	43.12	7.345	6.800	7.000	No	
MW14	Sulfate, Tot, mg/L	01/01/2008	11	0.00	Yes/No	STpar	99.00	305.104		0.000	No	
MW14	TDS, mg/L	01/01/2008	11	0.00	No/No	STnon	43.12	830.000		0.000	No	

Compliance Location	Parameter	Sample Date	Count Of Bkg Results	Percent of Non detects	Normal / Lognormal	Test	Confidence Level	Upper Limit	Lower Limit	Analysis Result	Exceedance	Trend
MW6	Boron, Tot, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	21.457		0.000	No	
MW6	Manganese, Tot, mg/L	01/01/2008	11	0.00	No/No	STnon	43.12	3.600		0.000	No	
MW6	pH (field), std	01/01/2008	10	0.00	Yes/Yes	STpar	99.00	7.870	6.072	7.000	No	
MW6	Sulfate, Tot, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	575.634		0.000	No	
MW6	TDS, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	1,127.593		0.000	No	

Compliance Location	Parameter	Sample Date	Count Of Bkg Results	Percent of Non detects	Normal / Lognormal	Test	Confidence Level	Upper Limit	Lower Limit	Analysis Result	Exceedance	Trend
MW7	Boron, Tot, mg/L	01/01/2008	11	0.00	No/No	STnon	43.12	2.600		0.000	No	
MW7	Manganese, Tot, mg/L	01/01/2008	11	0.00	No/Yes	STpar	99.00	1.749		0.000	No	
MW7	pH (field), std	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	7.528	6.394	7.000	No	
MW7	Sulfate, Tot, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	415.575		0.000	No	
MW7	TDS, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	1,262.269		0.000	No	

Compliance Location	Parameter	Sample Date	Count Of Bkg Results	Percent of Non detects	Normal / Lognormal	Test	Confidence Level	Upper Limit	Lower Limit	Analysis Result	Exceedance	Trend
MW8	Boron, Tot, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	16.215		0.000	No	
MW8	Manganese, Tot, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	6.136		0.000	No	
MW8	pH (field), std	01/01/2008	11	0.00	No/No	STnon	43.12	7.440	6.900	7.000	No	
MW8	Sulfate, Tot, mg/L	01/01/2008	11	0.00	Yes/Yes	STpar	99.00	1,240.719		0.000	No	
MW8	TDS, mg/L	01/01/2008	11	0.00	No/No	STnon	43.12	1,800.000		0.000	No	

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Location	Type	Class
MW11R	Upper Zone	Downgradient

Parameter Code: 01022
Parameter Name: Boron, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
11.6

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 01055
Parameter Name: Manganese, Tot
Units: mg/L
Data Transformation: Natural Log
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
9.5

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Location	Type	Class
MW14	Alluvial Aq.	Downgradient

Parameter Code: 00945
Parameter Name: Sulfate, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
305.1

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Parameter Code: 01022
Parameter Name: Boron, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
2.3

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 01055
Parameter Name: Manganese, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
0.7

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Location	Type	Class
MW6	Upper Zone	Downgradient

Parameter Code: 00400
Parameter Name: pH (field)
Units: std
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
7.9

TL (Lower) Value
6.1

Sample Date	Sample Result	Greater than TL (Upper)	Lower than TL (Lower)
1/1/2008	7.000	N	N

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Parameter Code: 00945
Parameter Name: Sulfate, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
575.6

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 01022
Parameter Name: Boron, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
21.5

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 70300
Parameter Name: TDS
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
1,127.6

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Location	Type	Class
MW7	Upper Zone	Downgradient

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Parameter Code: 00400
Parameter Name: pH (field)
Units: std
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value	TL (Lower) Value
7.5	6.4

Sample Date	Sample Result	Greater than TL (Upper)	Lower than TL (Lower)
1/1/2008	7.000	N	N

Parameter Code: 00945
Parameter Name: Sulfate, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
415.6

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 01055
Parameter Name: Manganese, Tot
Units: mg/L
Data Transformation: Natural Log
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
1.7

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Parameter Code: 70300
Parameter Name: TDS
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
1,262.3

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Location	Type	Class
MW8	Upper Zone	Downgradient

Parameter Code: 00945
Parameter Name: Sulfate, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
1,240.7

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Parameter Code: 01022
Parameter Name: Boron, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
16.2

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Compliance Analysis

User Supplied Information

Background Date Range: 09/01/2002 to 03/31/2005
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8
Tolerance Coverage (Gamma): 95%

COMPLIANCE

Parameter Code: 01055
Parameter Name: Manganese, Tot
Units: mg/L
Data Transformation: None
Confidence Level: 0.99%
Option for LT Pts.: 1/2 PQL (MDL * 10/3)

TL (Upper) Value
6.1

Sample Date	Sample Result	Greater than TL (Upper)
1/1/2008	0.000	N

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.
When "Greater than TL (Upper)" is Y, this indicates statistical evidence of exceedance of the upper tolerance limit.
Lower Limit only listed for two sided test.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range: 09/01/2002 to 03/31/2005 **Tolerance Coverage (Gamma):** 95%
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8

BACKGROUND

Location	Type
MW11R	Upper Zone

Parameter Code: 01022 **Data Transformation:** None
Parameter Name: Boron, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	5.109	1.817	3.563	11.582	11	0	0

Parameter Code: 01055 **Data Transformation:** Natural Log
Parameter Name: Manganese, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	0.850	0.896	3.563	9.499	11	0	0

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range: 09/01/2002 to 03/31/2005 **Tolerance Coverage (Gamma):** 95%
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8

BACKGROUND

Location	Type
MW14	Alluvial Aq.

Parameter Code: 00945 **Data Transformation:** None
Parameter Name: Sulfate, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	195.455	30.778	3.563	305.104	11	0	0

Parameter Code: 01022 **Data Transformation:** None
Parameter Name: Boron, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	0.855	0.402	3.563	2.285	11	0	0

Parameter Code: 01055 **Data Transformation:** None
Parameter Name: Manganese, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	0.462	0.058	3.563	0.668	11	0	0

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range: 09/01/2002 to 03/31/2005 **Tolerance Coverage (Gamma):** 95%
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8

BACKGROUND

Location	Type
MW6	Upper Zone

Parameter Code: 00400 **Data Transformation:** None
Parameter Name: pH (field) **Confidence Level:** 0.99%
Units: std **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TL (Lower)	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	6.971	0.211	4.267	6.072	7.870	10	0	0

Parameter Code: 00945 **Data Transformation:** None
Parameter Name: Sulfate, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	329.091	69.203	3.563	575.634	11	0	0

Parameter Code: 01022 **Data Transformation:** None
Parameter Name: Boron, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	13.109	2.343	3.563	21.457	11	0	0

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range: 09/01/2002 to 03/31/2005 **Tolerance Coverage (Gamma):** 95%
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8

BACKGROUND

Parameter Code: 70300 **Data Transformation:** None
Parameter Name: TDS **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	811.818	88.636	3.563	1,127.593	11	0	0

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range: 09/01/2002 to 03/31/2005 **Tolerance Coverage (Gamma):** 95%
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8

BACKGROUND

Location	Type
MW7	Upper Zone

Parameter Code: 00400 **Data Transformation:** None
Parameter Name: pH (field) **Confidence Level:** 0.99%
Units: std **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TL (Lower)	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	6.961	0.140	4.046	6.394	7.528	11	0	0

Parameter Code: 00945 **Data Transformation:** None
Parameter Name: Sulfate, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	250.000	46.476	3.563	415.575	11	0	0

Parameter Code: 01055 **Data Transformation:** Natural Log
Parameter Name: Manganese, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	0.074	0.070	3.563	1.749	11	0	0

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range: 09/01/2002 to 03/31/2005 **Tolerance Coverage (Gamma):** 95%
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8

BACKGROUND

Parameter Code: 70300 **Data Transformation:** None
Parameter Name: TDS **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	822.727	123.377	3.563	1,262.269	11	0	0

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range: 09/01/2002 to 03/31/2005 **Tolerance Coverage (Gamma):** 95%
Compliance Date Range: 01/01/2008 to 01/01/2008
Compliance Locations: MW11R,MW14,MW6,MW7,MW8
Background Locations: MW11R,MW14,MW6,MW7,MW8

BACKGROUND

Location	Type
MW8	Upper Zone

Parameter Code: 00945 **Data Transformation:** None
Parameter Name: Sulfate, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	851.818	109.162	3.563	1,240.719	11	0	0

Parameter Code: 01022 **Data Transformation:** None
Parameter Name: Boron, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	12.000	1.183	3.563	16.215	11	0	0

Parameter Code: 01055 **Data Transformation:** None
Parameter Name: Manganese, Tot **Confidence Level:** 0.99%
Units: mg/L **Option for LT Pts.:** 1/2 PQL (MDL * 10/3)

Pooled Results:

Normal	Mean	StdDev	K Value	TU (Upper)	Total Pts	LT Pts	% LT Pts
Yes	2.736	0.954	3.563	6.136	11	0	0

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Normal Tolerance Interval on Background
Background Data Pool

Background Date Range:	**09/01/2002 to 03/31/2005**	**Tolerance Coverage (Gamma):**	**95%**
Compliance Date Range:	**01/01/2008 to 01/01/2008**		
Compliance Locations:	**MW11R,MW14,MW6,MW7,MW8**		
Background Locations:	**MW11R,MW14,MW6,MW7,MW8**		

BACKGROUND

Note: Confidence Level is sometimes referred to as Tolerance Coefficient.

Hutsonville Ash Impoundment
Appendix D: Data Used in Statistical Calculations

Date Range: 09/01/2002 to 03/31/2005

Well Id	Date Sampled	Lab Id	B, tot, mg/L	Mn, tot, mg/L	pH (field), std	SO4, tot, mg/L	TDS, mg/L
MW1	09/17/2002	02092695-1	0.150	0.042	7.530	68.000	440.000
	12/11/2002	02122282-1	0.180	0.270	7.090	39.000	370.000
	02/05/2003	03021653-1	0.140	0.053	7.210	87.000	340.000
	05/05/2003	03051599-1	0.140	0.014	7.470	37.000	200.000
	07/07/2003	03071766-1	0.092	0.240	7.318	20.000	330.000
	10/06/2003	03101729-1	0.093	0.070	7.200	17.000	320.000
	03/02/2004	04031476-1	0.110	0.032	7.400	32.000	240.000
	04/04/2004	04041354-1	0.120	0.044	7.500	35.000	210.000
	08/02/2004	04081328-1	0.099	0.170	7.200	15.000	330.000
	10/04/2004	04101561-1	0.140	0.047	7.300	18.000	340.000
	03/14/2005	05032818-1	0.130	0.300	7.260	26.000	180.000
MW10	09/17/2002	02092695-7	0.098	0.100	7.110	31.000	380.000
	12/19/2002	02123013-5	0.200	0.004	7.060	38.000	330.000
	02/05/2003	03021653-8	0.079	0.001	7.210	38.000	310.000
	05/05/2003	03051599-6	0.076	0.002	7.200	38.000	270.000
	07/07/2003	03071766-7	0.092	0.022	7.200	44.000	340.000
	10/13/2003	03102279-5	0.120	0.019	7.000	36.000	450.000
	03/02/2004	04031476-6	0.064	0.008	7.100	31.000	410.000
	04/04/2004	04041382-3	0.086	0.029	7.100	29.000	390.000
	08/03/2004	04081328-10	0.130	0.045	7.000	29.000	450.000
	10/04/2004	04101561-10	0.160	0.040	7.100	31.000	470.000
	03/14/2005	05032818-9	0.150	0.008	7.100	33.000	400.000
MW11R	09/19/2002	02092792-4	6.600	3.400	7.150	390.000	850.000
	12/13/2002	02122525-3	7.000	0.880	7.090	690.000	1,300.000
	03/18/2003	03032481-4	5.600	0.380	7.000	590.000	1,100.000
	05/12/2003	03052186-4	5.800	0.590	7.200	590.000	1,100.000
	08/04/2003	03081508-8	2.600	0.520	7.200	650.000	1,200.000
	10/13/2003	03102279-6	2.800	0.700	6.700	650.000	1,200.000
	02/23/2004	04022960-4	2.800	1.200	6.000	720.000	1,200.000
	04/04/2004	04041354-8	4.900	0.270	6.800	650.000	1,300.000
	07/12/2004	04072337-9	5.800	0.320		670.000	1,300.000
	11/08/2004	04112264-8	8.000	0.240	6.800	650.000	1,300.000
	01/04/2005	05011545-9	4.300	0.850	6.700	680.000	1,300.000
MW121	09/19/2002	02092792-6	0.082	1.400	7.430	40.000	340.000
	12/19/2002	02123013-8	0.067	1.200	7.310	38.000	340.000
	03/17/2003	03032351-3	0.200	0.930	7.300	65.000	340.000
	06/17/2003	03062509-1	0.052	0.820	7.600	62.000	370.000
	08/11/2003	03082176-5	0.110	1.100	7.484	52.000	310.000

Hutsonville Ash Impoundment
Appendix D: Data Used in Statistical Calculations

Date Range: 09/01/2002 to 03/31/2005

			B, tot, mg/L	Mn, tot, mg/L	pH (field), std	SO4, tot, mg/L	TDS, mg/L
MW121	10/13/2003	03102279-9	0.075	0.760	7.500	30.000	280.000
	02/23/2004	04022960-1	0.085	2.100	7.300	27.000	470.000
	04/19/2004	04042676-5	0.099	1.200	7.300	19.000	340.000
	08/02/2004	04081328-9	0.180	1.400	7.400	24.000	350.000
	10/04/2004	04101561-12	0.084	1.400	7.400	23.000	350.000
	03/16/2005	05032818-13	0.060	0.640	7.440	34.000	250.000
MW14	09/18/2002	02092792-9	0.190	0.530	7.000	230.000	790.000
	12/13/2002	02122525-5	0.570	0.500	6.920	210.000	740.000
	03/18/2003	03032481-5	0.730	0.510	7.000	120.000	570.000
	05/12/2003	03052186-5	1.000	0.480	7.000	230.000	830.000
	08/11/2003	03082176-4	0.400	0.410	7.345	180.000	740.000
	10/13/2003	03102279-8	0.630	0.510	7.300	200.000	810.000
	02/23/2004	04022960-3	1.400	0.430	6.800	190.000	810.000
	04/04/2004	04041354-7	1.500	0.400	6.900	190.000	780.000
	08/03/2004	04081328-12	1.000	0.450	6.900	200.000	810.000
	11/08/2004	04112264-10	1.100	0.510	6.900	180.000	760.000
	03/15/2005	05032818-12	0.880	0.350	6.920	220.000	780.000
MW6	09/19/2002	02092792-1	15.000	3.600	7.000	200.000	690.000
	12/13/2002	02122525-1	16.000	1.300	6.910	240.000	640.000
	03/18/2003	03032481-3	11.000	0.007	6.700	450.000	880.000
	05/12/2003	03052186-3	8.200	0.004	7.000	360.000	880.000
	08/04/2003	03081508-6	13.000	0.080	7.000	330.000	780.000
	10/13/2003	03102279-1	15.000	0.290	6.900	300.000	770.000
	02/23/2004	04022960-7	14.000	0.880	7.400	310.000	790.000
	04/04/2004	04041354-6	11.000	0.890	6.900	310.000	810.000
	07/12/2004	04072337-7	12.000	1.700		360.000	900.000
	11/08/2004	04112264-6	14.000	0.590	6.700	380.000	900.000
	01/04/2005	05011545-7	15.000	0.970	7.200	380.000	890.000
MW7	09/18/2002	02092792-7	2.200	0.052	6.890	240.000	760.000
	12/19/2002	02123013-2	2.500	0.220	6.910	250.000	790.000
	03/19/2003	03032570-1	0.500	0.020	7.000	160.000	570.000
	06/02/2003	03061314-6	1.800	0.024	7.300	220.000	790.000
	08/11/2003	03082176-1	2.100	0.018	7.020	220.000	790.000
	10/13/2003	03102279-2	2.200	0.120	7.000	240.000	820.000
	02/23/2004	04022960-5	2.100	0.022	6.900	280.000	880.000
	04/19/2004	04042676-1	2.000	0.051	6.800	310.000	970.000
	08/02/2004	04081328-6	2.000	0.160	6.800	310.000	950.000
	10/04/2004	04101561-7	2.600	0.120	6.900	300.000	1,000.000

Hutsonville Ash Impoundment
Appendix D: Data Used in Statistical Calculations

Date Range: 09/01/2002 to 03/31/2005

			B, tot, mg/L	Mn, tot, mg/L	pH (field), std	SO4, tot, mg/L	TDS, mg/L
MW7	03/15/2005	05032818-6	1.400	0.012	7.050	220.000	730.000
MW7D	09/18/2002	02092792-8	0.083	0.750	7.410	51.000	370.000
	12/19/2002	02123013-3	0.140	0.750	7.380	31.000	320.000
	03/19/2003	03032570-2	0.089	0.760	7.300	51.000	350.000
	06/02/2003	03061314-7	0.088	0.680	7.700	60.000	390.000
	08/11/2003	03082176-2	0.140	0.660	7.530	59.000	370.000
	10/13/2003	03102279-3	0.110	0.640	7.500	44.000	320.000
	02/23/2004	04022960-6	0.110	0.770	7.400	68.000	430.000
	04/19/2004	04042676-2	0.067	0.830	7.300	61.000	440.000
	08/02/2004	04081328-7	0.091	0.570	7.000	47.000	360.000
	10/04/2004	04101561-9	0.210	0.660	7.500	36.000	420.000
	03/15/2005	05032818-7	0.062	0.450	7.530	42.000	280.000
MW8	09/19/2002	02092792-2	10.000	3.800	6.920	790.000	1,300.000
	12/19/2002	02123013-4	11.000	3.600	6.970	740.000	1,600.000
	03/17/2003	03032351-2	12.000	2.900	7.000	960.000	1,700.000
	06/18/2003	03062696-1	12.000	2.500	7.400	940.000	1,800.000
	08/11/2003	03082176-3	14.000	2.500	7.093	960.000	1,800.000
	10/13/2003	03102279-4	13.000	2.200	7.100	930.000	1,800.000
	02/23/2004	04022960-8	13.000	4.700	7.000	820.000	1,800.000
	04/19/2004	04042676-3	12.000	2.300	7.000	870.000	1,800.000
	08/02/2004	04081328-8	11.000	2.100	6.900	800.000	1,500.000
	10/04/2004	04101561-8	11.000	1.300	6.900	620.000	1,200.000
	03/16/2005	05032818-8	13.000	2.200	7.440	940.000	1,600.000

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

LOG OF BORING

CONTRACTED WITH HANSON ENGINEERS — BORING NO. B-1
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 2-14-84 — COMPLETED 2-14-84 — DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA DEPTH	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.	QP	NOTES
456.5		0.0	30						
455.6	See #A	0.9							
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	
	Lt. br. m-c sand, wf. occas. f-m gravel tr. silt		5	6-5-7	2	ss	17	--	
450.1	wet	6.4							
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	--	WATER 2-14-84 DD 6.0 8:30am BAR 7.0 8:55am AAR-- WL 6.5 9:05am
	END OF BORING 9.1'		10						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'-surfac Water level 4.0 ar 2-
			15						#A Blk. clayey s wf. tr. f. sand occas. organic fibers topsoil moist

HANSON ENGINEERS INCORPORATED

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

CENTRAL ILLINOIS DRILLING COMPA
1909 OAKWOOD AVE.
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 PLT 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	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.	QP	NOTES
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	--	
944.9		8.4		3-3-3	3	ss	16	--	WATER 2-10-84 DD 8.0 8:00am BAR 11.0 10:30 AAR --- WL 7.0 2:10pm
	Brn.-gray m-c sand, wf. m. gravel wet		10	3-4-7	4	ss	14	--	Screen 18.0-5. 2"PVC pipe 5.0 3.0' surfac Gravel 21.5'-1 Bentonite 4.0' Plug 2.0'-surf.
				8-7-9	5	ss	17	--	
939.2		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 fi wet
936.0	wet	17.3		10-13-13	7	ss	17	--	
	Gray silty clay, wf. tr. f. sand, occas. f. gravel till moist		20	5-10-13	8	ss	18	4.2	

LOG OF BORING

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

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

HANSON ENGINEERS INCORPORATED

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

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LOG OF BORING

CONTRACTED WITH HANSON ENGINEERS BORING NO. B-3
PROJECT NAME HUTSONVILLE POWER STATION CONTRACT NO.
LOCATION P&H PLAN
DATUM HAMMER WT. 140# HAMMER DROP 30" HOLE DIA. 8"
SURFACE ELEV. CORE DIA. CASING
DATE STARTED 2-0-84 COMPLETED 2-0-84 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA DEPTH	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.			NOTES
452.1		0.0	30							
451.7	See #A	0.4								
	Rust brn. silty sand, fill v. moist			4-6-8	1	ss	14"	--		
			5	4-3-4	2	ss	16	--		
445.8		6.3								
444.5	Brn. f-c gravel, wf. m-c sand, occas. sandstone wet	7.6		8-19-11	3	ss	18	--		WATER 1-9-84
443.2	F-m sand v. moist	8.0								DD 5.5' 2:30pm
442.7	See #B	0.4		15-85/5"	4	ss	17	--		BAR 6.0' 2:45p
	END OF BORING 9.4'		10							AAR
										WL 5.0' 4:45p
			15							#A Blk. coal refuse, 4" cin wf. silt fill v. moist
										#B Brn. sandst wf. f-m sand w
										Screen 9.4'-4. 2"PVC Pipe 4.4 3. Gravel 9.4'-4. Bentonite 4.0' 2.5' Plug 1.5'-surf Grout 2.5'-1.5 4"standpipe 3. 2.0' st

HANSON ENGINEERS INCORPORATED

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

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LOG OF BORING

CONTRACTED WITH HANSON ENGINEERS BORING NO. M-4
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	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.	QP	NOTES
454.4		0.0	30						
	Blk. asphalt 1.0"								
453.1	F-m gravel 1.0", brn, clayey silt wf, f-m gravel pavement materials moist	1.3		5-5-7	1	SS	16"	--	
451.3	Blk. silt, wf. f-c gravel fill moist	3.1							
	Brn. silty sand, wf. occas. f-m gravel moist		5	4-3-3	2	SS	18	0.9	
448.5		5.9							
	Br. f-m sand wf. silt v. moist			3-3-4	3	SS	18	--	WATER 2-13-84
446.2		8.2							DD 8.0 9:45am
	Br. f-m gravel, wf. c-m sand, silt wet		10	3-3-3	4	SS	17	0.6	BAR 8.0 10:30a AAR --- WL 7.5 11:45a
443.5		10.9							
	Lt.-br. sandstone			23-77/5"	5	SS	11	--	Screen 12.5'-5 2"PVC Pipe 5.0 3.0'
441.0		13.4		100/4"	6	SS	4	4.5t	Gravel 13.4'-4 Bentonite 4.0'. 2.0'
	END OF BORING 13.4'		15						Plug 2.0'-surf

HANSON ENGINEERS
INCORPORATED

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

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LOG OF BORING

CONTRACTED WITH HANSON ENGINEERS BORING NO. B-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	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.	QP	NOTES
952.3		0.0	30						
951.1	1" coal refuse, brn. clayey silt, wf. f-c gravel occas. organic fibers fill moist	1.2							
949.2	See #4	3.1		4-5-5	1	ss	14"	--	
946.4	Brn. f. sand, wf. occas. c. sand, f. gravel moist v. moist	5.9	5	3-2-4	2	ss	17	0.4	WATER 2-13-84 DD 8.0 2:50pm BAR 11.0 3:50pm AAR ------- WL 6.5' 5:45pm
943.9	Br. f-m sand, wf/ c sand wet	8.4		3-3-4	3	ss	18	0.6	
941.7	Brn. m-c sand, wf. f-c gravel occas. blk. coal refuse mottling	10.6	10	3-4-4	4	ss	18	0.9 1.4	Old metal drain pipe 1.0' west boring running from road to [illegible] tion
936.1	Brn.-gray m-c sand, wf. f-m gravel wet	16.2	15	0-3-3	5	ss	16	--	Screen 18.0'-5. 2" PVC pipe 5.(3.0' stick Gravel 18.0'-4. Bentonite 4.0'. Backfilled 19. 18.0' wf. gra Plug 2.0'-surf- 1-4" standpipe
935.4	Brn.-gray sandstone, wf f-c gravel occas. m-c sand v. moist	16.c		16-15- ----27	7A 7B	ss ss	12 6	-- --	#A Brn. gray s m-c sand, wf. f-c gravel, o white rock fi wet
933.1	Gray sandstone	19.2		30-70/2"	8	ss	8	4.5t	
	END OF BORING 19.2'		20						

HANSON ENGINEERS INCORPORATED

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

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LOG OF BORING

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	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.	QP	NOTES
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. stained moist	3.9		3-2-7	1	ss	17"	--	
	Lt. brn.-brn. sandy silt, wf. clay		5	2-3-4	2	ss	14	--	
429.8	moist	8.1		3-3-5	3	ss	16	1.7	WATER 2-8-84
	Brn. sandy silt, wf. tr. clay		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	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 Plug 2.0'-surf Bentonite-clay 12.0'-2.0' Standpipe 3.0' 5.1' stick
	Brn. silt, wf. f. sand		15	2-2-4	6	ss	16	1.7	
410.3	very moist-wet	17.6		2-2-3	7	ss	18	1.4	
			20	0-1-3	8	ss	17	1.2	

LOG OF BORING

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CONTRACTED WITH HANSON ENGINEERS BORING NO. M-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	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.	QP	NOTES
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.								
	m-c sand, tr. silt								
412.9	wet	25.0		7-7-9	9	SS	12"	--	
	END OF BORING 25.0'								

HANSON ENGINEERS INCORPORATED

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

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Project Name/No.		Boring No.	Start Date	Page
AmerenCIPS - Hutsonville	249-3	MW-7D	10/5/98	1

Driller	Logged by:	End Date	Depth to Water
AEC, Indianapolis, IN	Steve Mueller/STMI	10/5/98	~10 Feet

Boring Depth	Boring Diameter	Surface Elevation	Drill Method	Northing
45.0 Feet	8 Inches	437.5 Feet	HSA	3175.915

Well Depth	Well Diameter	TOC Elev.	Sample Method	Easting
44.3 Feet	2-in I.D.	438.45 Feet	2-ft. split-spoon	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					5-ft by 4-in square steel stick-up casing to ~1.3 ft; concrete seal 0-3 ft.
	1, 1, 1, 2	10	100		ML			
	1, 1, 2, 3	15	100					
	0, 0, 1, 2	20	100					
					SP	SILTY SAND, well sorted/rounded, fine-grained, quartz, grades from clayey silt above, loose, medium brown, saturated		
	3, 3, 4, 9	25	75					Bentonite/cement grout 3-35 ft.
						SILTY SAND & GRAVEL, well sorted medium-grained quartz sand, trace coarse sand, fine-grained angular to subangular gravel, medium dense, pale brown, saturated		
	5, 8, 6, 8	30	75					
					SP-GP			

Project Name/No.		Boring No.	Start Date	Page
AmerenCIPS - Hutsonville	249-3	MW-7D	10/5/98	2

Driller	Logged by:	End Date	Depth to Water
AEC, Indianapolis, IN	Steve Mueller/STMI	10/5/98	~10 Feet

Boring Depth	Boring Diameter	Surface Elevation	Drill Method	Northing
45.0 Feet	8 Inches	437.5 Feet	HSA	3175.915
Well Depth	**Well Diameter**	**TOC Elev.**	**Sample Method**	**Easting**
44.3 Feet	2-in I.D.	438.45 Feet	2-ft. split-spoon	5676.110

Sample	Blows/6 inches	Sample Depth (ft)	Recovery (%)	Graphic Log	Classification	Description	Well Completion	Comments
	sand heave		0					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.
	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		
		50						
		55						
		60						
		65						

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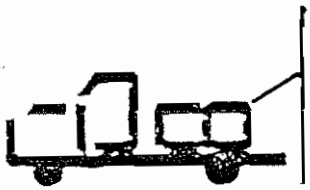

LOG OF BORING

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	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.	QP	NOTES
439.9		0.0	30						
438.1	Brn. clayey silt, wf. tr. f. sand, occas. organic fibers moist	1.3							
	Brn. silty sand			2-5-7	1	ss	18"	1.6	
436.3		3.1							
	Brn. silty sand, wf. tr. f. sand moist		5	2-3-5	2	ss	17	1.4	
				3-5-5	3	ss	18	3.2	WATER 2-7-8
431.0		8.4							
	Brn. clayey silt, wf. tr. f. sand moist		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
428.5		10.9							
	Brn. gray clayey silt, wf. tr. f. sand, sm. gray silt pockets moist			2-2-2	5	ss	18	1.2	Screen 21.5'-1 Gravel 21.5'-1 Bentonite 15.5 13.5
			15	2-2-3	6	ss	18	1.7	Clay & Bentoni 13.5'-4.0' 2" PVC pipe 16 4.9' stick up Bentonite ceme
22.0		17.4		1-2-2	7	ss	18	1.2	grout 4.0'-2.0 Plug 2.0'-surf Standpipe 3.0'
	Brn. sandy silt, wf. occas. f. sand lens								
419.6	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 le

LOG OF BORING

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CONTRACTED WITH HANSON ENGINEERS BORING NO. M-P
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 2-7-84 COMPLETED 2-8-84 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA DEPTH	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.	QP	NOTES
439.9		0.0	30						
417.9	Br. silty sand Wet	21.5		0-0-0	0	SS	18"	1.1	
	END OF BORING 21.5'								

HANSON ENGINEERS
INCORPORATED

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

Project Name/No.		Boring No.	Start Date	Page
AmerenCIPS - Hutsonville	249-3	MW-10	10/7/98	1

Driller	Logged by:	End Date	Depth to Water
AEC, Indianapolis, IN	Steve Mueller/STMI	10/7/98	~2.5 Feet

Boring Depth	Boring Diameter	Surface Elevation	Drill Method	Northing
11 Feet	8 Inches	452.9 Feet	HSA	4730.478
Well Depth	**Well Diameter**	**TOC Elev.**	**Sample Method**	**Easting**
10.7 Feet	2-in I.D.	454.23 Feet	2-ft. split-spoon	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		
	1, 2, 6, 25	5	100					Bentonite/cement grout 0-3 ft; 1/4-in bentonite chips 3-4 ft.
	5, 20, 25, 50		63		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)		
		10			Ss	SANDSTONE, fine-grained, quartz		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.
						END OF BORING - 11 feet		
		15						
		20						
		25						
		30						

Natural Resource Technology, Inc.
Standard Soil Boring Log

SOIL BORING LOG INFORMATION
Form - General Use Rev. 8-2000

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
AMEREN Energy Generating - Hutsonville Power Plant		*MW-11R*

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Boart Longyear *Randy Radke*	*10/03/01*	*10/03/01*	*HSA*

Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	*440.920 Feet MSL*	*8.25 inches*

Boring Location / State Plane			Lat / Long	Local Grid Location (If applicable)
	3217.083	Feet N		☐ N ☐ E
	4654.729	Feet E		☐ S ☐ W

County	Civil Town/City/ or Village
Crawford	*Hutsonville*

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
MW-11R 0-2	18	2 3 4 6	0	0'-5' FILL, gray with orange mottling, coarse sand with clay, dry friable										
			2											
MW-11R 2.5-4.5	18	3 4 6 6		grades to sand with gravel, coarse	FILL									
			4											
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									
			12	11'6"-16' SAND with GRAVEL, brown, poorly graded, rounded, fine gravel/coarse sand										
MW-11R 12.5-14.5	20	2 3 3 3	14		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 to: Watershed/Wastewater ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION

Facility/Project Name: Hutsonville Power Station	Local Grid Location of Well: _____ ft ☐N ☐S _____ ft ☐E ☐W	Well Name: MW-11R
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ° ' " Long. ° ' " or	Unique Well No. _____ DNR Well ID No. _____
Facility ID _____	St. Plane _____ ft N, _____ ft E. S/C/N	Date Well Installed: 10/03/2001 (m m d d y y y y)
Type of Well: Well Code 11 / MW	Section Location of Waste/Source: _____ 1/4 of _____ 1/4 of Sec. _____ T. _____ N. R. _____ ☐E ☐W	Well Installed By: Name (first, last) and Firm: R. Radke; Brent Longyear
Distance from Waste/Source: 80 ft	Enf. Stds. Apply ☐	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

B. Well casing, top elevation 443.55 ft. MSL

C. Land surface elevation 440.92 ft. MSL

D. Surface seal, bottom _____ ft. MSL or 0.5 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 4.0 ft.

F. Fine sand, top _____ ft. MSL or 4.0 ft.

G. Filter pack, top _____ ft. MSL or 4.5 ft.

H. Screen joint, top _____ ft. MSL or 5.5 ft.

I. Well bottom _____ ft. MSL or 15.5 ft.

J. Filter pack, bottom _____ ft. MSL or 16.0 ft.

K. Borehole, bottom _____ ft. MSL or 16.0 ft.

L. Borehole, diameter 8.3 in.

M. O.D. well casing 2.375 in.

N. I.D. well casing 2.150 in.

1. Cap and lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 9.0 in.
b. Length: 7.0 ft.
c. Material: Steel ■ 04; Other ☐ _____
d. Additional protection? ■ Yes ☐ No
If yes, describe: 3" Bumper Post

3. Surface seal: Bentonite ■ 30; Concrete ☐ 01; Other ☐ _____

4. Material between well casing and protective pipe: Bentonite ☐ 30; Other ■ SAND

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
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 MATERIAL
b. Volume added _____ ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. #40 AMERICAN MATERIAL
b. Volume added _____ ft^3

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: 10.0 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 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: 4:13 P.M.	END: 5:13 P.M.

COMMENTS:

SOIL BORING LOG INFORMATION
Form - General Use Rev. 8-2000

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
AMEREN Energy Generating - Hutsonville Power Plant		*MW-14*

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Boart Longyear *Randy Radke*	*10/03/01*	*10/03/01*	*HSA*

Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	*440.930 Feet MSL*	*8.25 inches*

Boring Location / State Plane			Lat / Long	Local Grid Location (if applicable)
	2811.508	Feet N		☐ N ☐ E
	5325.781	Feet E		☐ S ☐ W

County	Civil Town/City/ or Village
Crawford	*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	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0	0'-7'6" SILT, brown (10YR 4/3), moist, non-plastic										
MW-14 2.5-4.5	18	2 3 2 3	2		ML									
MW-14 5-7	18	1 1 2 2	4											
MW-14 7.5-9.5	18	1 2 1 2	6											
MW-14 10-12	24	1 1 1 1	8	7'6"-12'6" SILT with SAND, brown (10YR 4/3), low plasticity, moist										
MW-14 12.5-14.5	18	1 1 1 2	10	yellowish brown (10YR 5/4), increase plasticity to medium	ML									
MW-14 15-17	22	1 1 1 1	12	12'6"-18'6" LEAN CLAY, brown (7.5YR 4/2), 10-15% grey/orange mottling, medium plasicity										
MW-14 17.5-19.5	18	1 1 1 1	14		CL									
MW-14 20-22	18	1 1 1 1	16											
MW-14 22.5-24.5	20	2 2 3 3	18	18'6"-26' SAND with SILT, wet, non-plastic										
			20		SM									
			22	23'6"-24' SAND seam, medium										
					SP SM									

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 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	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	20		24	24'-26' SAND with SILT, as above	SM									
MW-14 25-27	18	1 2 2 3	26	26'-39' SAND with GRAVEL, coarse sand, platy fine gravel, poorly graded										
MW-14 27.5-29.5	18	2 3 3 4	28	gravel becomes rounded	SP									
MW-14 30-32	20	3 3 4 5	30	4" LEAN CLAY with Gravel seam, gray (5Y 5/1), rounded, fine, 2-7% shell fragments	CL									
MW-14 32.5-34.5	18	3 3 5 5	32		SP									
			34											
			36		SP									Advance Hydropunch discrete water sampler
			38											
			40	*EOB @ 39'*										Drillers note: sand and gravel as above
			42											
			44											
			46											
			48											
			50											
			52											
			54											
			56											
			58											
			60											
			62											

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

MONITORING WELL CONSTRUCTIO

Facility/Project Name: Hutsonville Power STATION	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-14
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ° ' " Long. ° ' " or	Unique Well No. _____ DNR Well ID No. _____
Facility ID _____	St. Plane _____ ft. N, _____ ft. E. S/C/N	Date Well Installed: 10/03/2001 (m m d d y y y y)
Type of Well Well Code 12 / PZ	Section Location of Waste/Source: _____ 1/4 of _____ 1/4 of Sec. _____ T. _____ N, R. _____ ☐E ☐W	Well Installed By: Name (first, last) and Firm: R. Radke; BOART LONGYEAR
Distance from Waste/Source 80 ft. | Ent. Stds. Apply ☐	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

B. Well casing, top elevation 443.35 ft. MSL

C. Land surface elevation 440.93 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 24.0 ft.

F. Fine sand, top _____ ft. MSL or 29.0 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: 3.0 ft.
c. Material: Steel ■ 04; Other ☐ _____
d. Additional protection? ■ Yes ☐ No
If yes, describe: 3" Bumper Post

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. _____ Ft^3 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 _____ ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. #40 AMERICAN MATERIAL
b. Volume added _____ ft^3

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): FORMATION COLLAPSE
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 MW-14

JOB NO# 3410-1824

WELL DIAMETER 2"

LOCATION Hutsonville, IL

(MEASUREMENTS BELOW FROM TOP OF CASING)
TOTAL DEPTH 35.27'

DATE 10/3/2001

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

COMMENTS:

Natural Resource Technology

N R T

SOIL BORING LOG

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Ameren Hutsonville Power Station Drilling		TW-115s

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Steve Boart Longyear	5/1/2004	5/1/2004	hollow stem auger

Unique Well No.	Well ID No	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		TW-115s	Feet MSL	438.4 Feet MSL	8.3 inches

Local Grid Origin ☒ (estimated: ☐) or Boring Location ☐ — State Plane N, E S/C/N — 1/4 of 1/4 of Section , T R

Lat ° ' "

Long ° ' "

Local Grid Location ☒ N ☒ E 898046.72 Feet ☐ S 1176886.34 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
			0	0'-36' Drilled without sampling-see log TW-115d for complete description.			CL				
			5				SC				
			10								
			15				CH				
			20								
			25				CL				
			30				GP				
			35				SW				
				END OF BORING AT 36' Well set at 35'			SW				

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

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

Natural Resource Technology

N R T

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: Well Code 12/pz	Section Location: 1/4 of 1/4 of Sec. T. R.	Well Installed By: (Person's Name and Firm): Steve Boart Longyear
Distance from Waste/ Source: 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

B. Well casing, top elevation 440.89 ft. MSL

C. Land surface elevation 438.4 ft. MSL

D. 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 ☐ 5 0
Hollow Stem Auger ☒ 4 1
Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ☒ 9 9

16. Drilling additives used? ☐ Yes ☒ No

Describe

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

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

F. Fine sand, top 410.4 ft. MSL or 28.0 ft.

G. Filter pack, top 409.4 ft. MSL or 29.0 ft.

H. Screen joint, top 408.4 ft. MSL or 30.0 ft.

I. Well bottom 403.4 ft. MSL or 35.0 ft.

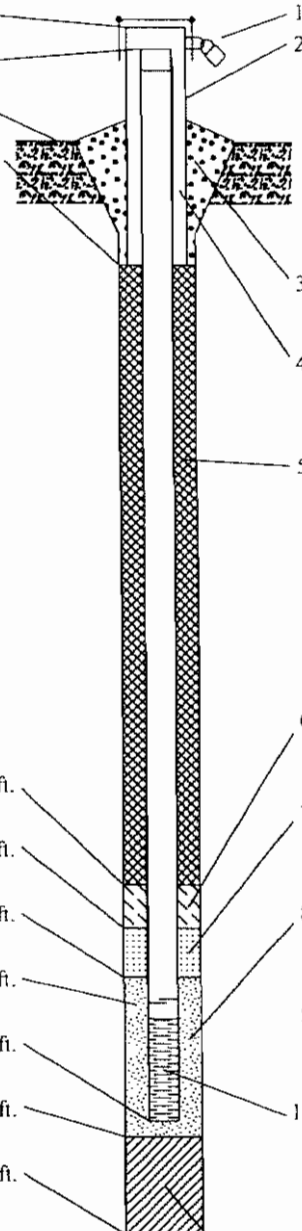
J. Filter pack, bottom 402.4 ft. MSL or 36.0 ft.

K. Borehole, bottom 402.4 ft. MSL or 36.0 ft.

L. Borehole, diameter 8.3 in.

M. O.D. well casing 2.33 in.

N. I.D. well casing 2.00 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 6.0 ft.
c. Material: Steel ☒ 0 4
Other ☒
d. Additional protection? ☐ Yes ☒ No
If yes, describe:

3. Surface seal: Bentonite ☒ 3 0
Concrete ☐ 0 1
Other ☐

4. Material between well casing and protective pipe:
Sand
Bentonite ☐ 3 0
Other ☒

5. Annular space seal: a. Granular/Chipped Bentonite ☒ 3 3
b. Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 3 5
c. Lbs/gal mud weight . . . Bentonite slurry ☐ 3 1
d. % Bentonite . . . Bentonite-cement grout ☐ 5 0
e. Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☐ 0 2
Gravity ☒ 0 8

6. Bentonite seal: a. Bentonite granules ☐ 3 3
b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite chips ☐ 3 2
c. Other ☐

7. Fine sand material: Manufacturer, product name & mesh size
a. #7 Badger
b. Volume added ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. #40 Badger
b. Volume added ft^3

9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3
Flush threaded PVC schedule 80 ☐ 2 4
Other ☐

10. Screen material: PVC
a. Screen Type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
Other ☐
b. Manufacturer Boart Longyear
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.

11. Backfill material (below filter pack): None ☒ 1 4
Other ☒

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

Natural Resource Technology

N R T

SOIL BORING LOG

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Ameren Hutsonville Power Station Drilling		TW-115d

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Steve Boart Longyear	4/29/2004	5/1/2004	hsa, core

Unique Well No.	Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		TW-115d	Feet MSL	438.4 Feet MSL	8.3 inches

Local Grid Origin ☒ (estimated: ☐) or Boring Location ☐

State Plane N, E S/C/N

1/4 of 1/4 of Section , T R

Lat ° ' "

Long ° ' "

Local Grid Location ☒ N ☒ E 898052.56 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' SANDY CLAY, very dark greyish brown (10 YR 3/2), very fine sand, moist			CL				
2 SS	24 / 24										
3 SS	24 / 24		5	3.5'-6' CLAYEY SAND mottled grey-brown to tan, very fine sand, moist			SC				
4 SS	24 / 24			6'-22' FAT CLAY, brown (10 YR 4/3), soft, plastic, moist							
5 SS	24 / 24										
6 SS	24 / 4		10				CH				
7 SS	24 / 24			wet at 13'							
8 SS	24 / 24		15								

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

Natural Resource Technology

N R T

Boring Number TW-115d Page 2 of 5

Sample Number and Type	Sample 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
9 SS	24 24			6'-22' FAT CLAY, brown (10 YR 4/3), soft, plastic, moist at 16' color change to olive grey (5Y 5/2)			CH				
10 SS	24 24										
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' SANDY CLAY			CL				
13 SS	24 0			22.9'-32' POORLY GRADED GRAVEL WITH SAND, olive grey (5Y 5/2), rounded, very fine to fine sand			GP				
14 SS	24 8		25								
15 SS	24 7										
16 SS	24 4		30								
17 SS	24 5			32'-33' WELL GRADED SAND fine to coarse, trace rounded gravel			SW				
18 SS	24 14			33'-36' WELL GRADED SAND WITH GRAVEL, very fine to coarse sand, fine to medium gravel, rounded			SW				
19 SS	24 8		35	36'-39' POORLY GRADED SAND very fine to medium, trace gravel, rounded			SP				
20 SS	24 14										
21 SS	24 11		40	39'-40' WELL GRADED SAND WITH GRAVEL, fine to coarse gravel and sand			SW GW				

Natural Resource Technology

N R T

Boring Number TW-115d Page 3 of 5

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
22 SS	24 12			40'-42' WELL GRADED GRAVEL WITH SAND, fine to coarse sand, fine to coarse gravel, rounded			GW				
				42'-58' WELL GRADED SAND fine to coarse sand, trace gravel, rounded							
23 SS	24 12			2" gravelly sand seam, fine to coarse gravel at 44'							
			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' WELL GRADED GRAVEL WITH SAND, fine to coarse sand, fine to coarse gravel, rounded							
			60								
31 SS	24 7										
32 SS	24 24						GW				
33 SS	24 12										
			65								
34 SS	24 4										

Natural Resource Technology

N R T

Boring Number TW-115d Page 4 of 5

Sample Number and Type	Sample 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	USCS Symbol	Graphic Log	PID/FID (ppm)	Well Diagram	RQD/ Comments/ Lab Test
35 SS	24 0			58'-70' WELL GRADED GRAVEL WITH SAND, fine to coarse sand, fine to coarse gravel, rounded			GW				
36 SS	24 6		70	70'-74' WELL GRADED SAND fine to coarse			SW				
37 SS	24 4										
38 SS	24 0			74'-88' Logged from cuttings, WELL GRADED GRAVEL WITH SAND fine to coarse sand, fine to coarse gravel							Gravel starts coming up in cuttings.
39 SS	24 0		75								
40 SS	24 0										
41 SS	24 0		80				GW				
42 SS	24 0										
43 SS	24 0										
44 SS	24 0		85								
45 SS	24 12			88'-90' WELL GRADED SAND very fine to medium			SW				
46 CORE	180		90	90'-105' SHALE, grey-blue, friable, moist			SHALE				

Natural Resource Technology

N R T

Boring Number TW-115d Page 5 of 5

Sample Number and Type	Sample 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
			90	90'-105' SHALE, grey-blue, friable, moist							
			95								
							SHALE				
			100								
			105	END OF BORING AT 105' Well set at 87'							

Natural Resource Technology

N R T

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 ☐ 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: Well Code 12/pz	Section Location: 1/4 of 1/4 of Sec. T. R.	Well Installed By: (Person's Name and Firm): Steve, Boart Longyear
Distance from Waste/Source: 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

B. Well casing, top elevation 440.80 ft. MSL

C. Land surface elevation 438.4 ft. MSL

D. 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

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.

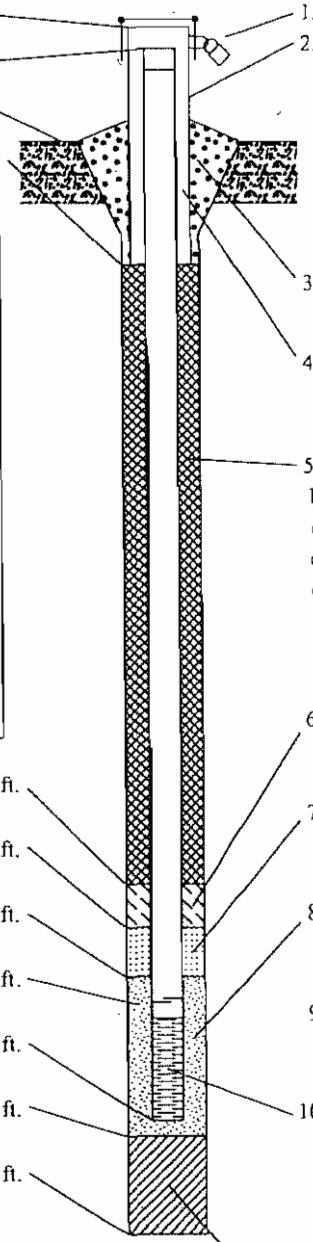
J. Filter pack, bottom 350.4 ft. MSL or 88.0 ft.

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.



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. ____ Ft^3 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 ____ ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. #40 Badger
b. Volume added ____ ft^3

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 ☒

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

SOIL BORING LOG INFORMATION
Form – General Use Rev. 8-2000

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
AMEREN Energy Generating – Hutsonville Power Plant		*TW* MW-121

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Boart Longyear *Randy Radke*	*10/02/01*	*10/02/01*	*HSA*

Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	*437.814 Feet MSL*	*8.25 inches*

Boring Location / State Plane			Lat / Long	Local Grid Location (if applicable)
	3717.203	Feet N		☐ N ☐ E
	5605.471	Feet E		☐ S ☐ W

County	Civil Town/City/ or Village
Crawford	*Hutsonville*

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

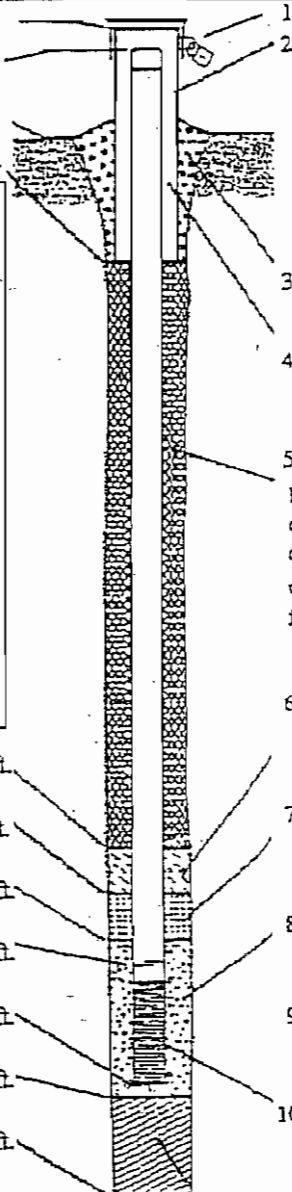
Signature	Firm
	Natural Resource Technology, Inc.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Sample: Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
	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 27.5-29.5	20	3 5 9 10	28	27'6"–31' SAND, gray/black and white, poorly graded, medium to coarse, increased coarsness with depth	SP									
TW 30-32	20	4 6 9 9	30											
			32	31'–32'6" SAND and GRAVEL, coarse sand, poorly graded, fine gravel, rounded	SP									
TW 32.5-34.5	12	1 1 1 1	34	32'6"–39'6" SAND, gray, poorly graded, medium to coarse, 5–15% gravel	SP									
TW 35-37	24	2 2 3 4	36											
TW 37.5-39.5	24	3 6 6 10	38											
			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: Hutsonville Power Station	Local Grid Location of Well: ____ ft ☐N ☐S ____ ft ☐E ☐W	Well Name: TW MW-121
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ____ ° ____ ' ____ " Long. ____ ° ____ ' ____ " or	Unique Well No.	DNR Well ID No.
Facility ID	St. Plane ____ ft. N, ____ ft. E. S/C/N	Date Well Installed: 10/02/2001 (m m d d y y y y)
Type of Well: Well Code 12 / PZ	Section Location of Waste/Source: ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐E ☐W	Well Installed By: Name (first, last) and Firm: R. Radke; Boart Longyear
Distance from Waste/Source: 80 ft	Enf. Stds. Apply ☐	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

B. Well casing, top elevation 440.54 ft. MSL

C. Land surface elevation 437.81 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: 4.0 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; Other ■ SAND

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
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 ____ ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. #40 AMERICAN MATERIAL
b. Volume added ____ ft^3

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: [signature] Firm: Natural Resource Technology Inc.

BOART LONGYEAR
WELL DEVELOPMENT REPORT

WELL NAME TW (MW-121)

WELL DIAMETER 2"

(MEASUREMENTS BELOW FROM TOP OF CASING)
TOTAL DEPTH 41.8'

DEPTH TO WATER BEFORE DEVELOPMENT 16.3'

DEPTH TO WATER AFTER DEVELOPMENT 16.3'

JOB NO# 3410-1824

LOCATION Hutsonville, IL

DATE 10/2/2001

DEVELOPED BY G. Jones

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

COMMENTS: