

**HYDROGEOLOGIC ASSESSMENT REPORT  
WAUKEGAN GENERATING STATION  
WAUKEGAN, ILLINOIS**

**SUBMITTED BY:  
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**SUBMITTED TO:  
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**PREPARED BY:  
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4970 VARSITY DRIVE  
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**PATRICK PROJECT No. 21053.070**

**FEBRUARY 2011**



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## 1.0 INTRODUCTION

### **1.1 Background**

Pursuant to the request of the Illinois Environmental Protection Agency (Illinois EPA), this document presents the Hydrogeologic Assessment Report for the on-site ash pond areas at the Midwest Generation, LLC (MWG) Waukegan Generating Station in Waukegan, Illinois. This hydrogeologic assessment was performed in accordance with the Hydrogeologic Assessment Plan, approved by the Illinois EPA, dated September 3, 2010.

As defined by the Hydrogeologic Assessment Plan, the purpose of this investigation was to: (i) evaluate the potential, if any, for migration of ash-related constituents from the on-site ash ponds and to conduct monitoring for groundwater constituents regulated by the Illinois Part 620 groundwater standards, as requested by the Illinois EPA; (ii) characterize the subsurface hydrogeology; and (iii) identify potable well use within 2,500 feet of the ash ponds. The results of this investigation are described in this Hydrogeologic Assessment Report.

### **1.2 Site Location and Description**

The Waukegan facility (the Site) is located in Section 15, Township 45 North, Range 12 East, in the City of Waukegan, Lake County, Illinois. Figure 1 provides a Site Location Map.

The Site contains two active ash ponds. The ponds are lined with a high-density polyethylene (HDPE); the total area of the two ash ponds is approximately 25 acres. Figure 2 shows the locations of the two ash ponds.

### **1.3 Regional Setting**

The Site is located along the shore of Lake Michigan on the northeast side of Waukegan. The surrounding land use consists of undeveloped land to the north, apparently vacant industrial land to the south, residential properties to the west, and Lake Michigan to the east.

Patrick Engineering Inc. (Patrick) conducted a review of publically available geological information from the Illinois State Geological Survey website. Based upon water well logs from the area, the geology beneath the Site consists of approximately 100 feet of sand deposits, underlain by Silurian Dolomite to approximately 360 feet below ground surface, underlain by the Maquoketa shale. The Maquoketa shale is generally considered to be an aquitard that separates the shallow groundwater in the unconsolidated units and the Silurian dolomite from the underlying aquifers.

Groundwater flow in the shallow, unconsolidated aquifer would be expected to flow towards Lake Michigan, to the east. Groundwater flow in the deeper aquifers is controlled by the regional hydraulic gradient in these aquifers, which is to the northeast.

## **2.0 HYDROGEOLOGIC ASSESSMENT METHODOLOGY**

The following sections present the methodologies used to evaluate the potential for migration of ash-related constituents from the ash ponds and to monitor for all Part 620-regulated constituents, to characterize the subsurface hydrogeology, and to identify potable well use within 2,500 feet of the Site.

### **2.1 Evaluation of Ash-Related Constituents Migration Potential**

The Illinois EPA requested that an evaluation of the potential for migration of ash-related constituents from the ash ponds and that monitoring for all Part 620-regulated constituents be performed in accordance with the groundwater standards included in 35 Illinois Administrative Code (IAC) Part 620, Subparts C and D. Accordingly, groundwater monitoring wells were installed at the Site in locations both upgradient and downgradient of the two ash ponds.

#### **2.1.1 Installation of Groundwater Monitoring Wells**

Patrick installed five (5) groundwater monitoring wells spaced approximately 150 to 300 feet apart around the perimeter of the ash ponds. The well locations were selected so that both upgradient and downgradient wells were represented, based upon available data regarding the expected groundwater flow direction. The spacing of the well locations at the Site along the downgradient edge of the ash ponds was calculated so as to detect a groundwater plume emanating from a point source beneath the ash ponds. Figure 3 shows the location of the five monitoring wells.

One of the installed monitoring wells is located upgradient of the ash ponds; the additional four wells are located downgradient of the ash ponds. The well borings were advanced using hollow-stem augers to depths ranging from 30 to 32 feet below ground surface (bgs). Borings were terminated after the field geologist determined that the boring was installed approximately 10 feet past the first intersection of the groundwater table in order to ensure that a representative

groundwater sample could be obtained. Upon termination of each boring, a 2-inch diameter, PVC well was installed in order to collect samples of the groundwater in the uppermost aquifer. The monitoring wells were completed to approximately 3 feet above grade, with PVC casing, and were covered with a stick-up, steel well protector with a locking cap. Soil lithology was inspected and logged by an experienced geologist during the boring process. Boring logs with well construction information are included as Appendix A.

#### 2.1.2 Initial Groundwater Sampling and Analytical Testing

The groundwater sampling event for the Site took place on October 25, 2010. The groundwater elevation in each of the five wells was measured prior to sampling. Groundwater samples were collected from each well with a peristaltic pump, using established low-flow sampling techniques. Temperature, pH, and conductivity measurements were taken using a portable meter in all wells; refer to Table 1 for these field parameter results. All groundwater samples were filtered in the field using a disposable, 0.45 $\mu$ m, in-line filter to allow for the analytical testing of dissolved compounds. The samples were immediately placed on ice in a cooler and kept at a temperature of no higher than 4° F. The samples were transported to TestAmerica, an Illinois-EPA accredited analytical laboratory, in accordance with chain-of-custody procedures to maintain the integrity of the samples.

The analytical laboratory tested groundwater samples from each of the wells for the compounds listed in Table 2. Analytes tested include the inorganic compounds listed in 35 IAC 620.410(a), excluding both radium and the poly-aromatic hydrocarbons (PAHs) listed in 35 IAC 620.410(b).

#### 2.2 Characterization of Subsurface Hydrogeology

The subsurface hydrogeology beneath the ash ponds was characterized by determining Site lithology and the groundwater flow patterns in the vicinity of the ash ponds as described below.

### 2.2.1 Site Lithology

The Site lithology was determined by logging soil samples collected from the soil borings created during the installation of the groundwater monitoring wells. The soil borings were installed under the direction of an experienced geologist. Each boring was sampled at 2-foot intervals using a 2-inch O.D. split-spoon sampler (ASTM D 1586). Each soil sample was inspected and logged by the geologist during the boring process. Boring logs with well construction information are provided as Appendix A.

### 2.2.2 Topographic and Water Elevation Surveys

A survey crew measured both the top-of-casing and ground surface elevations of all installed monitoring wells and the groundwater elevations within each of the monitoring wells on December 6, 2010. The survey crew concurrently measured the water elevation in the two ash ponds. Lake Michigan was inaccessible the day of the survey.

### 2.2.3 Hydraulic Testing of Selected Wells

Patrick conducted three *in situ* hydraulic conductivity tests on wells MW-1, MW-3, and MW-5 on January 4, 2011. The testing consisted of at least one rising-head and one falling-head slug test performed at each well. Using a data-logging pressure transducer, Patrick measured the rate of groundwater level recovery in the wells after either inserting a slug into, or removing a slug from, each monitoring well.

## 2.3 Identification of Potable Well Use

Natural Resource Technology, Inc. (NRT) has previously completed an investigation of potable water well use within 2,500 feet of the Waukegan ash ponds. MWG submitted the results of this investigation to the Illinois EPA by letter dated July 15, 2009. These results are summarized in Appendix B.

The following databases and sources of information were used in order to identify local community water sources and water well locations in the vicinity of the Site:

- Illinois State Geological Survey (ISGS) -Water Well Database Query;
- Illinois State Water Survey (ISWS) Private Well Database and water well construction report request; and
- Illinois Division of Public Water Supply web-based Geographic System (GIS) files.



## **3.0 HYDROGEOLOGIC ASSESSMENT RESULTS**

### **3.1 Evaluation of Ash-Related Constituents Migration Potential**

The analytical laboratory results for the hydrogeologic assessment are presented in Table 2. Full laboratory data packages from TestAmerica are provided as Appendix C. Antimony, arsenic, boron, sulfate, and total dissolved solids (TDS) were detected in one or more monitoring wells at concentrations exceeding the Part 620 Class I Groundwater Quality Standards. In some cases, the highest concentrations of a given compound were found in the upgradient wells. Beryllium, cadmium, chromium, cobalt, copper, cyanide, lead, mercury, nickel, silver, thallium, zinc, nitrogen/nitrite, and nitrogen/nitrate/nitrite were not detected in any of the groundwater samples.

A determination of the potential for the individual ash ponds to be contributing to the distribution of analytes in the underlying groundwater and the extent, if any, of such contribution cannot be made from the results of this single sampling event alone. To develop a true, statistically-significant upgradient background concentration for the various compounds will require a number of sequential sampling events over time. Based on a statistically developed background value, downgradient concentrations can be compared to the background value over time to determine the likelihood and extent of any constituent migration from the on-site ash ponds. A plan to develop such an analytical database through additional sampling is presented in the last section of this report.

### **3.2 Characterization of Subsurface Hydrogeology**

The lithology of the Site is predominantly fine sand and silt fill underlain by sand and gravel. Refer to Figure 4 for a geologic cross-section of the Site.

The results of the topographic and water elevation surveys are presented in Table 3.

The uppermost groundwater unit at the Site is found at depths ranging from 22.4 to 23 feet bgs. The direction of groundwater flow is to the southeast towards Lake Michigan. The hydraulic

gradient is approximately 0.0017 based upon the groundwater elevation data collected on December 6, 2010. A potentiometric surface map is provided as Figure 5.

Patrick used the hydraulic testing data to calculate the hydraulic conductivity of the uppermost aquifer using the Bouwer and Rice method. Hydraulic conductivity calculations are provided in Appendix D. The hydraulic conductivity of Site soils ranged from  $3.67 \times 10^{-3}$  to  $4.41 \times 10^{-3}$  ft/second. The average hydraulic conductivity was  $4.04 \times 10^{-3}$  ft/second. Using the highest calculated hydraulic conductivity and the measured hydraulic gradient, Patrick calculated the maximum groundwater velocity to be approximately 0.59 ft/day ( $4.04 \times 10^{-3}$  ft/sec  $\times$  0.0017  $\times$  60 sec/min  $\times$  60 min/hour  $\times$  24 hours/day).


### **3.3 Identification of Potable Well Use**

As stated above, NRT has previously completed an investigation of potable water well use within 2,500 feet of the Waukegan ash ponds. MWG submitted the results of this investigation to the Illinois EPA by letter dated July 15, 2009. According to this letter, eight potable/industrial use wells are located within a 2,500-foot radius of the Site's ash ponds (refer to Appendix B.) There are no potable use wells to the east or south of the ash ponds.

## **4.0 LONG-TERM MONITORING PLAN**

In order to properly assess the groundwater monitoring data collected in this single sampling event, MWG will conduct a quarterly groundwater sampling program in which the same monitoring wells described in this report will be sampled for the identical analyte list employed during this investigation. MWG proposes to begin this quarterly monitoring program in March 2011, and will submit the results of the sampling program to the Illinois EPA on an ongoing, quarterly basis. MWG proposes to continue this program until sufficient statistically-significant data is available to properly assess the groundwater data. If the quarterly sampling results continue to show non-detect results for certain of the analytes, as was the case in this single sampling event, MWG may propose to Illinois EPA that these analytes be eliminated from future sampling events.


Table 1  
**GROUNDWATER FIELD PARAMTER DATA**  
Waukegan Station, Waukegan, Illinois  
Midwest Generation  
21053.070  
Feb. 28, 2011

 <b>Groundwater Field Paramter Data - Waukegan Station</b>					
Monitoring Well	Date	Time	Conductance	Temperature °C	pH
MW-01	10/25/2010	16:30	659	17.62	9.82
MW-01	10/25/2010	16:35	669	17.50	10.08
MW-01	10/25/2010	16:40	695	17.38	10.41
MW-01	10/25/2010	16:45	698	17.38	10.41
MW-02	10/25/2010	15:40	630	16.50	10.51
MW-02	10/25/2010	15:45	633	15.79	10.50
MW-02	10/25/2010	15:50	631	15.54	10.44
MW-02	10/25/2010	16:00	600	15.70	10.12
MW-02	10/25/2010	16:15	605	15.27	9.98
MW-02	10/25/2010	16:20	610	15.30	9.98
MW-03	10/25/2010	14:55	466	18.20	9.07
MW-03	10/25/2010	14:05	459	18.08	9.13
MW-03	10/25/2010	14:10	464	17.80	9.18
MW-03	10/25/2010	15:15	454	18.05	9.22
MW-03	10/25/2010	15:20	454	17.99	9.23
MW-03	10/25/2010	15:30	455	17.98	9.21
MW-04	10/25/2010	14:00	653	16.21	8.25
MW-04	10/25/2010	14:15	645	16.25	8.34
MW-04	10/25/2010	14:30	643	16.25	8.22
MW-04	10/25/2010	14:40	638	16.04	7.89
MW-04	10/25/2010	14:45	637	16.00	7.80
MW-05	10/25/2010	12:45	1774	16.60	7.25
MW-05	10/25/2010	12:58	1772	14.79	7.14
MW-05	10/25/2010	12:55	1774	15.40	7.18
MW-05	10/25/2010	13:00	1792	15.27	7.20
MW-05	10/25/2010	13:05	1794	15.18	7.21
MW-05	10/25/2010	13:15	1801	15.23	7.21

Notes:

\* (S/cm) = Specific Conductivity measured in Seconds/Centimeters

Table 2  
**GROUNDWATER ANALYTICAL RESULTS**  
 Waukegan Station, Illinois  
 Midwest Generation  
 21053.070  
 Feb. 28, 2011

 PATRICK ENGINEERING	Sample Analysis Method	Groundwater Quality Standard* (mg/L) Class I	MW-5	MW-1	MW-2	MW-3	MW-4
			mg/L	mg/L	mg/L	mg/L	mg/L
			10/25/10	10/25/10	10/25/10	10/25/10	10/25/10
Chemical Name			upgradient	downgradient			
Antimony	Metals 6020	0.006	ND	0.0052	0.015	0.0051	ND
Arsenic	Metals 6020	0.05	0.0076	0.054	0.025	0.0043	0.006
Barium	Metals 6020	2.0	0.060	0.023	0.0091	0.0057	0.026
Beryllium	Metals 6020	0.004	ND	ND	ND	ND	ND
Cadmium	Metals 6020	0.005	ND	ND	ND	ND	ND
Chromium	Metals 6020	0.1	ND	ND	ND	ND	ND
Cobalt	Metals 6020	1.0	ND	ND	ND	ND	ND
Copper	Metals 6020	0.65	ND	ND	ND	ND	ND
Cyanide	Dissolved 9014	0.2	ND	ND	ND	ND	ND
Iron	Metals 6020	5.0	3.5	ND	ND	ND	ND
Lead	Metals 6020	0.0075	ND	ND	ND	ND	ND
Manganese	Metals 6020	0.15	<b>0.71</b>	ND	0.0034	ND	0.058
Mercury	Mercury 7470A	0.002	ND	ND	ND	ND	ND
Nickel	Metals 6020	0.1	ND	ND	ND	ND	ND
Selenium	Metals 6020	0.05	0.0028	0.031	0.026	0.0094	0.0039
Silver	Metals 6020	0.05	ND	ND	ND	ND	ND
Thallium	Metals 6020	0.002	ND	ND	ND	ND	ND
Zinc	Metals 6020	5.0	ND	ND	ND	ND	ND
Boron	Metals 6020	2	28	2.6	2.2	1.7	2.0
Sulfate	Dissolved 9038	400	920	350	230	120	250
Chloride	Dissolved 9251	200	100	39	42	53	39
Nitrogen/Nitrate	Nitrogen By calc	10	ND	ND	ND	ND	ND
Total Dissolved Solids	Dissolved 2540C	1,200	1,500	460	410	280	430
Fluoride	Dissolved 4500 FC	4	0.29	0.45	0.35	0.27	0.6
Nitrogen/Nitrite	Dissolved 4500 NO2	NA	ND	ND	ND	ND	ND
Nitrogen/Nitrate/Nitrite	Dissolved 4500 NO3	NA	ND	ND	ND	ND	ND

**Notes:**

\*Class I Groundwater Standards from 35 IAC Part 620


Bold values show exceedences of 35 IAC Part 620

ND-non detect

mg/L = milligrams per liter

-Determination of the potential for the individual ash ponds to be contributing to the distribution of analytes in the underlying groundwater cannot be made from the results of this single sampling event alone. To develop a true, statistically-significant upgradient background concentration for the various compounds will require a number of sequential sampling events over time. After a statistically developed background value is available, the downgradient concentrations can be compared to this background value over time to determine the likelihood of contaminant migration from the on-site ash ponds. A plan to develop such an analytical database through additional sampling is discussed in the last section of this report.

Table 3  
 WATER ELEVATION SURVEY DATA  
 Waukegan Station, Waukegan, Illinois  
 Midwest Generation  
 21053.070  
 Feb. 28, 2011

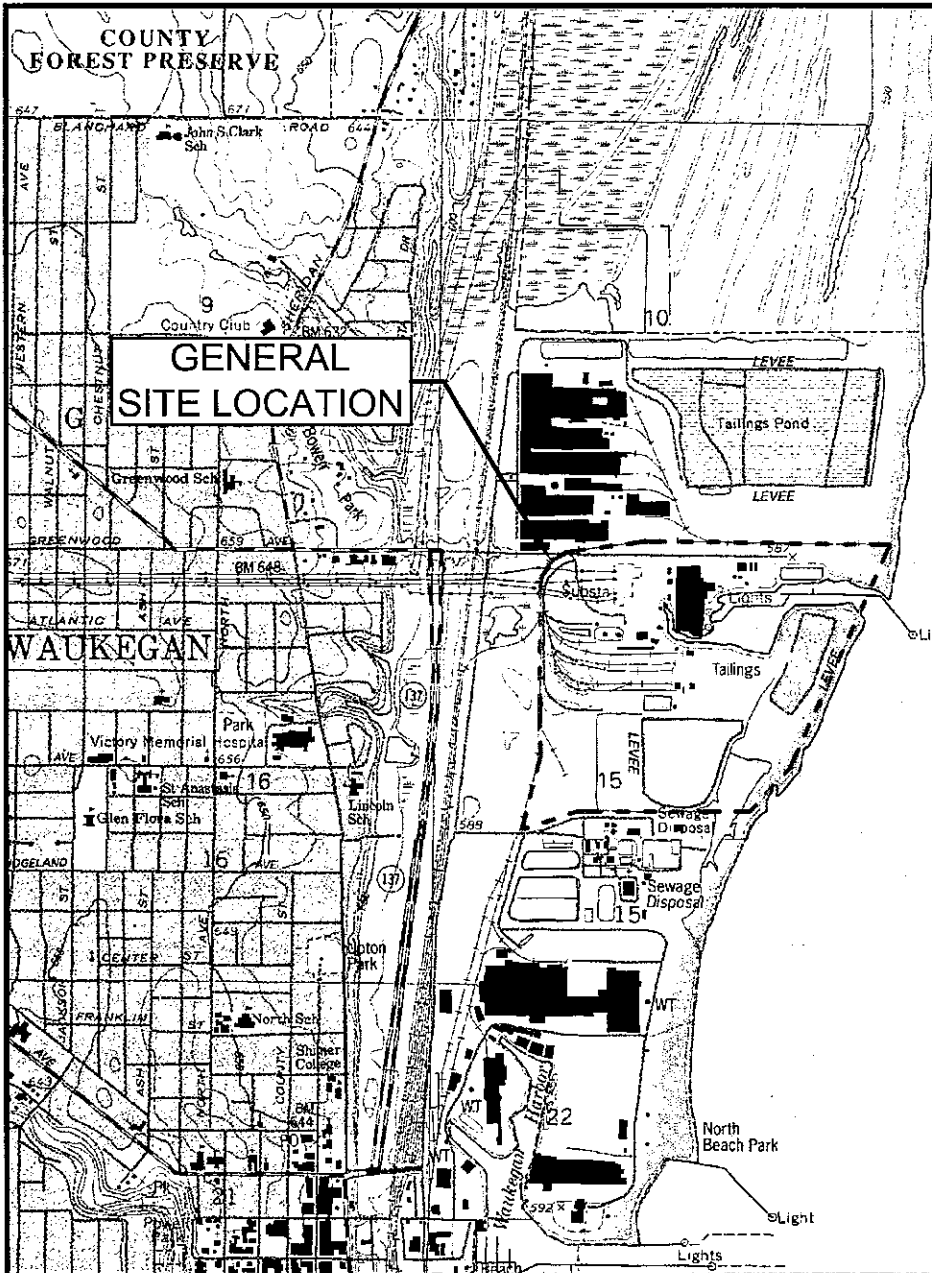
 PATRICK ENGINEERING	Water Elevation	Depth to Water	Lid Elevation	Ground Elevation	Top of Riser Elevation
<b>MONITORING WELLS</b>					
MW-1	580.635	22.50	603.465	603.462	603.135
MW-2	580.633	22.41	603.332	603.283	603.043
MW-3	580.516	22.38	603.206	603.178	602.896
MW-4	580.431	22.72	603.545	603.525	603.151
MW-5	581.830	23.01	605.369	601.526	604.840
<b>ASH PONDS</b>					
East Pond	585.443	NS	NS	NS	NS
West Pond	594.993	NS	NS	NS	NS

\*Survey data taken on 12/16/10

NS = not surveyed

Elevations are leveled from site control points per Commonwealth Edison Drawing

"Coordinates & Elevations for Coal Monuments & Test Borings-Waukegan" revised 12/1/1999



LEGEND

--- SITE BOUNDARY

NOTE:  
THIS DRAWING WAS PREPARED USING ILLINOIS' WAUKEGAN (1993) AND ZION (1993) 7.5 MINUTE-SERIES TOPOGRAPHIC QUADRANGLE MAP.



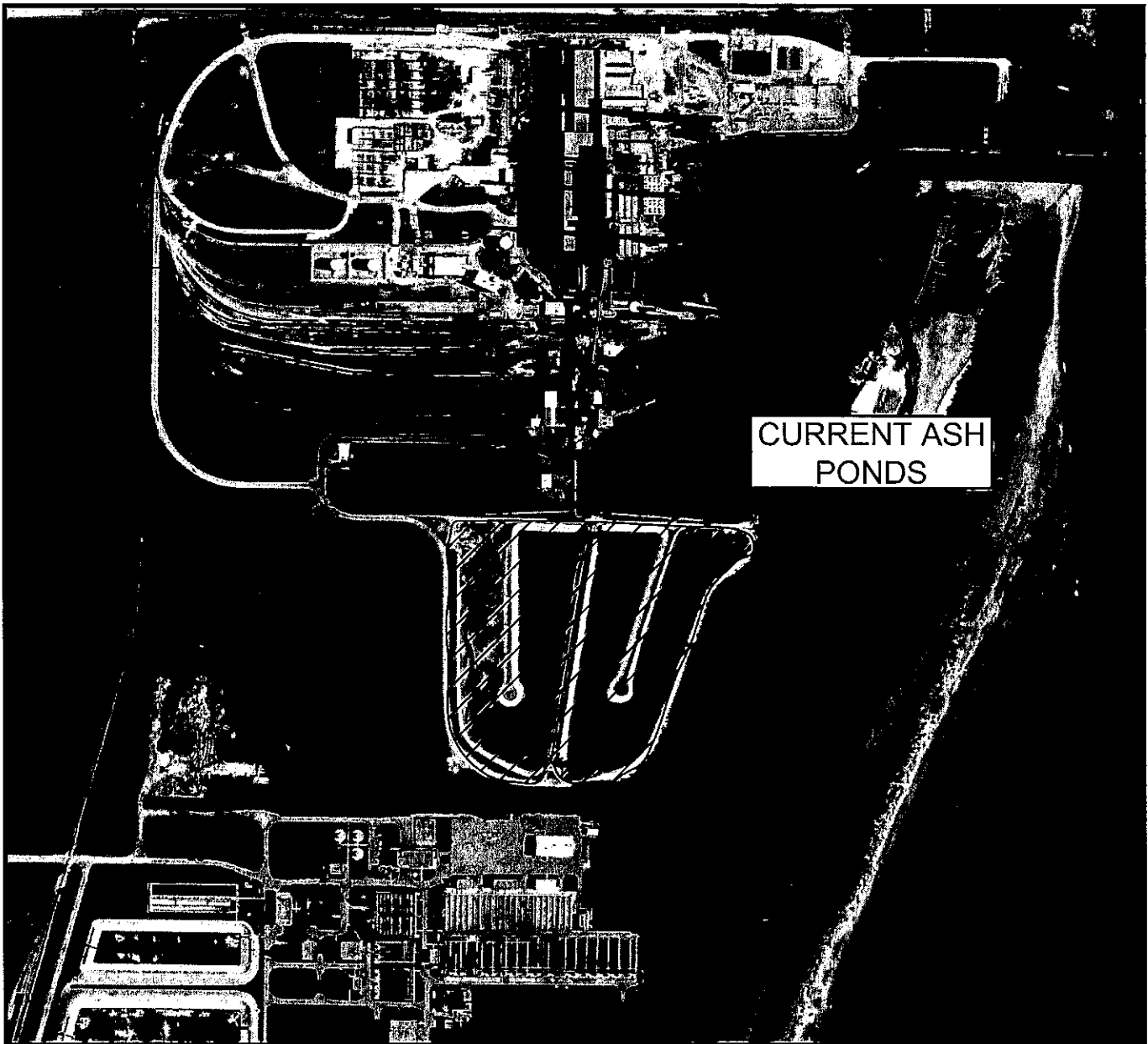
GRAPHIC SCALE

Date: FEB. 2011  
 Proj No.: 21053.070  
 App. By: RMF

FIGURE 1  
 SITE LOCATION MAP  
**WAUKEGAN STATION**  
**WAUKEGAN, ILLINOIS**

**PATRICK**  
**ENGINEERING INC.**

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CURRENT ASH  
PONDS

LEGEND



ASH POND



GRAPHIC SCALE

AERIAL IMAGE SOURCE:  
LANDISCOR AERIAL INFORMATION INC., JULY 2008

Date: FEB. 2011

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FIGURE 2  
ASH POND LOCATION MAP

**WAUKEGAN STATION  
WAUKEGAN, ILLINOIS**

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**LEGEND**

 MW-01 MONITORING WELL LOCATION



**GRAPHIC SCALE**

AERIAL IMAGE SOURCE:  
LANDISCOR AERIAL INFORMATION INC., JULY 2008

**Date:** FEB. 2011

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**FIGURE 3  
MONITORING WELL LOCATION MAP**

**WAUKEGAN STATION  
WAUKEGAN, ILLINOIS**

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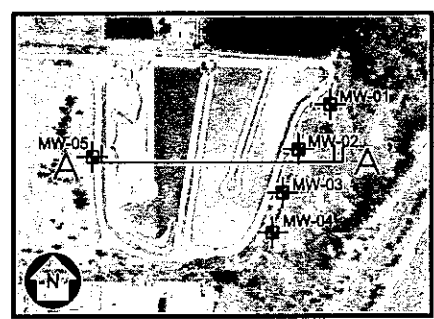
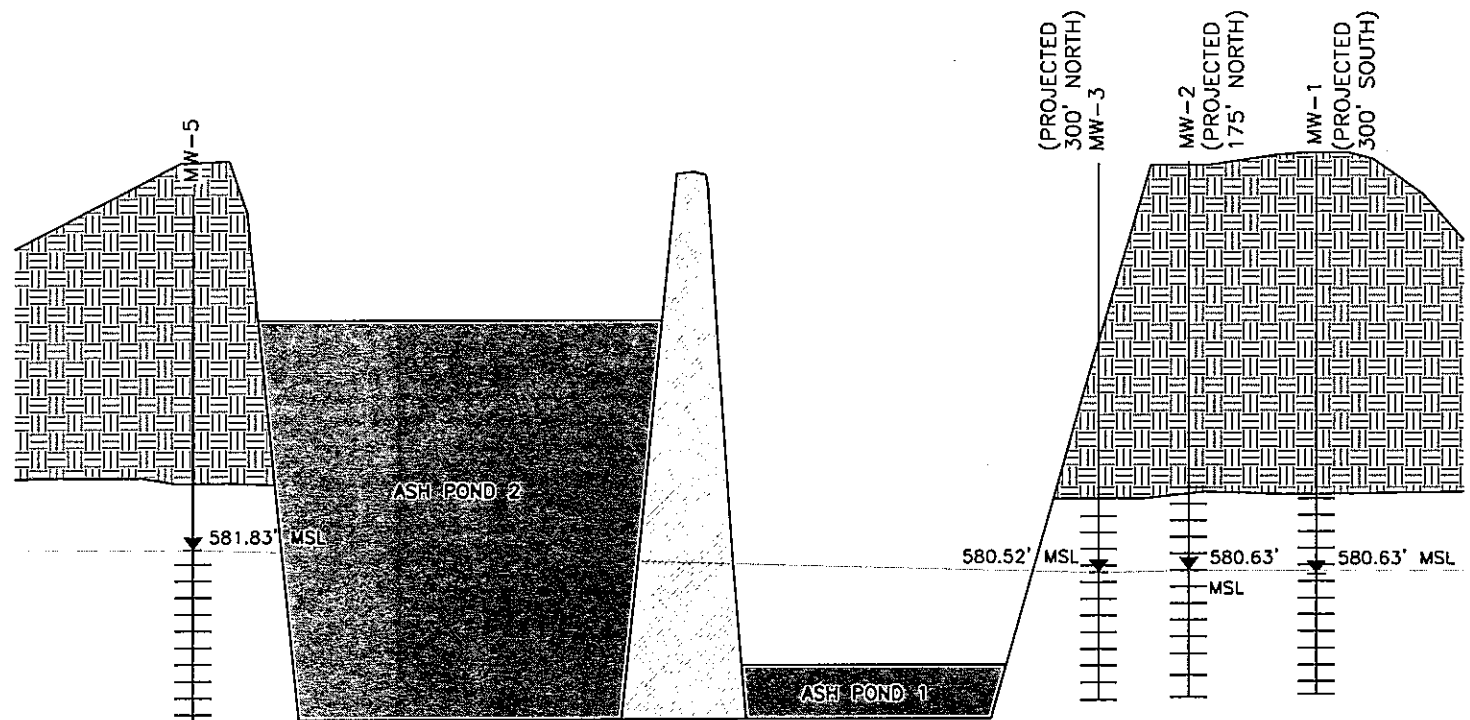
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ELEVATION IN FEET (MSL)

600  
595  
590  
585  
580  
575  
570  
565





ELEVATION IN FEET (MSL)

600  
595  
590  
585  
580  
575  
570  
565



CROSS SECTION A-A'  
NOT TO SCALE

**LEGEND**

-  FILL
-  SILTY CLAY
-  SANDY GRAVEL
-  GROUNDWATER ELEVATION (FT. / MSL)

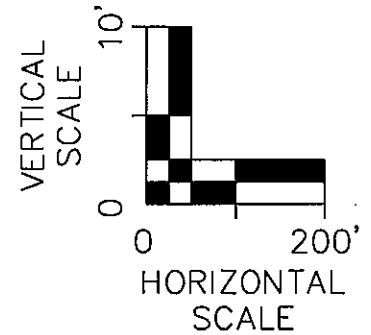


FIGURE 4  
CROSS SECTION A-A' - SITE LITHOLOGY

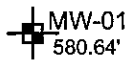
**WAUKEGAN STATION  
WAUKEGAN, ILLINOIS**

Date: FEB. 2011  
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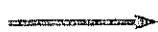
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**LEGEND**



MW-01 MONITORING WELL LOCATION (NOVEMBER 2010)  
580.64' WITH GROUNDWATER ELEVATION (FT. / MSL)



GROUNDWATER FLOW DIRECTION

POTENTIOMETRIC SURFACE CONTOUR (FT. / MSL)



**GRAPHIC SCALE**

AERIAL IMAGE SOURCE:  
LANDISCOR AERIAL INFORMATION INC., JULY 2008

**Date:** FEB. 2011  
**Proj No.:** 21053.070  
**App. By:** RMF

**FIGURE 5**  
**POTENTIOMETRIC SURFACE MAP**  
**WAUKEGAN STATION**  
**WAUKEGAN, ILLINOIS**


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**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-1-Wa** SHEET **1 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **23.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *			LL		
						10	20	30	40	50		
23.5	0.0		Brown fine sand, fine gravel, black cinders, ash <b>FILL</b>	SS-1 1.0-2.5 16"R	3 5 7						qu=NT	
			Dry	SS-2 3.5-5.0 18"R	6 10 13						Bentonite seal 2.0'-20.0'. Stickup protective cover installed. qu=NT	
			Dry	SS-3 6.0-7.5 14"R	6 11 16						qu=NT	
			Dry	SS-4 8.5-10.0 12"R	4 9 10						qu=NT	
				SS-5 11.0-12.5 16"R	2 3 3						qu=NT	
10.0	13.5			Light brown fine and medium sand, dry <b>FILL</b>	SS-6 13.5-15.0 18"R	2 4 3					qu=NT	
				Occasional black coal, cinders	SS-7 16.0-17.5 18"R	3 4 4					qu=NT	
				Brown fine sand, occasional black cinders	SS-8 18.5-20.0 18"R	6 7 9					qu=NT	
3.5	20.0											

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/13/10** ENDED **10/13/10**

REMARKS  
**Installed 2" diameter PVC monitoring well.**

WATER LEVEL (ft.)  
 ▽ 23.5  
 ▽  
 ▼

**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-1-Wa** SHEET **2 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **23.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *			LL		
						10	20	30	40	50		
						1	2	3	4	5		
3.5	20.0		Light brown fine sand, trace medium sand, medium dense, moist  SM									Sand pack 20.0'-32.0' qu=NT
				SS-9 21.0-22.5 18"R	5 8 10							
0.0	23.5	▽	Saturated  Trace fine gravel									qu=NT
				SS-10 23.5-25.0 18"R	6 9 10							qu=NT
				SS-11 26.0-27.5 18"R	5 6 12							qu=NT
				SS-12 28.5-30.0 18"R	6 9 13							qu=NT
-8.5	32.0		End of Boring at 32.0'									

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/13/10** ENDED **10/13/10**

REMARKS  
**Installed 2" diameter PVC monitoring well.**

WATER LEVEL (ft.)  
 ▽ 23.5  
 ▽  
 ▽

**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-2-Wa** SHEET **1 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **23.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS		
						PL	Unconfined Compressive Strength (TSF) *			LL			
						10	20	30	40	50			
23.0	0.0	[Cross-hatched pattern]	Black coal cinders, ash, fine sand, fine gravel, gray silt  FILL	SS-1 1.0-2.5 14"R	4 10 15						qu=NT		
			Dry	SS-2 3.5-5.0 14"R	8 10 23							Bentonite seal 2.0'-19.0'. Stickup protective cover installed. qu=NT	
				SS-3 6.0-7.5 14"R	12 11 16							qu=NT	
				SS-4 8.5-10.0 18"R	7 12 14							qu=NT	
12.0	11.0		[Dotted pattern]	Light brown fine sand, gray fine sand	SS-5 11.0-12.5 18"R	12 13 13						qu=NT	
					SS-6 13.5-15.0 18"R	1 3 6							qu=NT
					SS-7 16.0-17.5 18"R	8 10 10							qu=NT
4.5	18.5				Light brown fine sand, trace medium sand, well graded  SM	SS-8 18.5-20.0 18"R	9 12 14						qu=NT Sand pack 19.0'-30.0'

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/13/10** ENDED **10/13/10**

REMARKS  
**Installed 2" diameter PVC monitoring well.**

WATER LEVEL (ft.)  
 ▽ **21.5**  
 ▽  
 ▽

**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-2-Wa** SHEET **2 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **23.0**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF) *			LL	
						10	20	30	40	50	
						1	2	3	4	5	
3.0	20.0										Set screen (slot 0.010") 20.0'-30.0'
1.5	21.5	∇	Saturated	SS-9 21.0-22.5 18"R	6 10 11						qu=NT
			Medium dense, dry								
			Trace fine gravel and coarse sand	SS-10 23.5-25.0 18"R	3 7 12						qu=NT
				SS-11 26.0-27.5 18"R	4 7 13						qu=NT
				SS-12 28.5-30.0 18"R	2 8 12						qu=NT
-7.0	30.0		End of Boring at 30.0'								

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/13/10** ENDED **10/13/10**

REMARKS  
**Installed 2" diameter PVC monitoring well.**

WATER LEVEL (ft.)  
 ∇ 21.5  
 ∇  
 ∇

**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-3-Wa** SHEET **1 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **23.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS			
						PL	Unconfined Compressive Strength (TSF) *			LL				
						10	20	30	40	50				
23.2	0.0	[Cross-hatched pattern]	Brown silty sand, fine gravel, black coal cinders, ash	FILL								qu=NT  Bentonite seal 2.0'-19.0'. Stickup protective cover installed. qu=NT		
				Dry	SS-1 1.0-2.5 16"R	7 13 16								
					SS-2 3.5-5.0 18"R	9 16 18								
				Gray silt, cinders, ash, sand	SS-3 6.0-7.5 14"R	15 20 26/4.5'								qu=NT
					SS-4 8.5-10.0 18"R	9 16 18								qu=NT
					SS-5 11.0-12.5 18"R	6 10 12								qu=NT
				Light brown fine sand	SS-6 13.5-15.0 18"R	3 4 9								qu=NT
				Black coarse coal cinders	SS-7 16.0-17.5 18"R	7 7 9								qu=NT
4.7	18.5		[Dotted pattern]	Light brown fine sand	SM									Sand pack 19.0'-20.0'
3.2	20.0				SS-8 18.5-20.0 18"R	6 7 12								

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/13/10** ENDED **10/13/10**

REMARKS  
**Installed 2" diameter PVC monitoring well.**

WATER LEVEL (ft.)  
 ∇ **21.0**  
 ∇  
 ∇



**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-3-Wa** SHEET **2 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **23.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF) *			LL	
						10	20	30	40	50	
3.2	20.0		Light brown fine sand, trace medium sand, well graded, medium dense								
2.2	21.0	▽	Saturated SM	SS-9 21.0-22.5 18"R	4 6 10						Set screen (slot 0.010") 20.0'-30.0' qu=NT
			Trace fine gravel	SS-10 23.5-25.0 18"R	4 6 10						qu=NT
				SS-11 26.0-27.5 18"R	6 7 16						qu=NT
				SS-12 28.5-30.0 18"R	6 12 14						qu=NT
-6.8	30.0		End of Boring at 30.0'								

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/13/10** ENDED **10/13/10**

REMARKS  
**Installed 2" diameter PVC monitoring well.**

WATER LEVEL (ft.)  
 ▽ **21.0**  
 ▽  
 ▽

**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-4-Wa** SHEET **1 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **23.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *			LL		
						1	2	3	4	5		
23.6	0.0	[Cross-hatched pattern]	Dark brown silt, coarse gravel, black coal cinders, dry	FILL							qu=NT	
					SS-1 1.0-2.5 18"R	6 13 19						Bentonite seal 2.0'-19.0'. Stickup protective cover installed. qu=NT
					SS-2 3.5-5.0 17"R	8 24 21						qu=NT
					SS-3 6.0-7.5 6"R	13 31 1/4"						qu=NT
				Wood, gray silt, cinders, dry	SS-4 8.5-10.0 18"R	14 26 26						qu=NT
				Some medium sand	SS-5 11.0-12.5 18"R	11 14 13						qu=NT
				Cinders mixed with brown fine sand	SS-6 13.5-15.0 18"R	5 8 8						qu=NT
					SS-7 16.0-17.5 18"R	7 10 12						qu=NT
5.1	18.5		[Dotted pattern]	Light brown fine sand, well graded, medium dense	SM SS-8 18.5-20.0 18"R	7 11 13						qu=NT Sand pack 19.0'-30.0'

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/12/10** ENDED **10/12/10**

REMARKS  
**Installed 2" diameter PVC monitoring well.**

WATER LEVEL (ft.)  
 ▽ 23.0  
 ▽  
 ▽

**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-4-Wa** SHEET **2 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **23.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF) *			LL	
						10	20	30	40	50	
						1	2	3	4	5	
3.6	20.0		Moist	SS-9 21.0-22.5 18"R	4 6 6						Set screen (slot 0.010") 20.0'-30.0' qu=NT
0.6	23.0	∇	Saturated	SS-10 23.5-25.0 18"R	4 4 8						qu=NT
			Trace fine gravel, trace coarse sand	SS-11 26.0-27.5 18"R	8 8 10						qu=NT
				SS-12 28.5-30.0 18"R	7 8 12						qu=NT
-6.4	30.0		End of Boring at 30.0'								

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/12/10** ENDED **10/12/10**

REMARKS  
**Installed 2" diameter PVC monitoring well.**

WATER LEVEL (ft.)  
 ∇ 23.0  
 ∇  
 ∇

**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-5-Wa** SHEET **1 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **21.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY (IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS
						PL	Unconfined Compressive Strength (TSF) *			LL	
						1	2	3	4	5	
21.5	0.0		Dark brown silty clay topsoil								
	0.9		FILL Black coal cinders, medium sand								
			FILL	SS-1 1.0-2.5 14"R	6 10 10						qu=NT
			Dry	SS-2 3.5-5.0 14"R	4 6 5						Bentonite seal 2.0'-18.0'. Stickup protective cover installed. qu=NT
			Brown fine to medium sand, with black coal cinders	SS-3 6.0-7.5 16"R	2 6 8						qu=NT
			Loose	SS-4 8.5-10.0 18"R	2 2 2						qu=NT
			Brick	SS-5 11.0-12.5 18"R	1 2 1						qu=NT
			Moist								
			Black coal cinders	SS-6 13.5-15.0 17"R	1 2 1						qu=NT
			Dark gray silt	SS-7 16.0-17.5 18"R	4 2 2						qu=NT
4.5	17.0		Gray medium sand, black coal cinders								
			Gray fine sand, trace medium to coarse sand, well graded, loose to medium dense, saturated								
			SM	SS-8 18.5-20.0	4 4 5						Sand pack 18.0'-30.0' Set screen (slot 0.010") 18.5'-28.5'

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/12/10** ENDED **10/12/10**

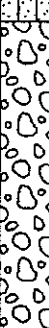

REMARKS  
**Installed 2" diameter PVC monitoring well.**

WATER LEVEL (ft.)  
 ∇ 21.0  
 ∇  
 ∇

**PATRICK ENGINEERING INC.**

BORING NUMBER **B-MW-5-Wa** SHEET **2 OF 2**  
 CLIENT **Midwest Generation**  
 PROJECT & NO. **21053.070**  
 LOCATION **Waukegan**

LOGGED BY **MPG**  
 GROUND ELEVATION **21.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content					NOTES & TEST RESULTS	
						PL	Unconfined Compressive Strength (TSF) *			LL		
						10	20	30	40	50		
1.5	20.0											
0.5	21.0		Gray fine gravel, coarse sand, poorly graded, medium dense, saturated GP	SS-9 21.0-22.5 16"R	5 7 8						qu=NT	
					SS-10 23.5-25.0 18"R	6 9 8						qu=NT
-4.5	26.0			Gray fine sand, trace medium sand, trace fine gravel, well graded, medium dense SM	SS-11 26.0-27.5 16"R	6 8 13						qu=NT
						SS-12 28.5-30.0 18"R	7 10 13					
-8.5	30.0		End of Boring at 30.0'									

DRILLING CONTRACTOR **Groff Testing**  
 DRILLING METHOD **4.25" I.D. HSA**  
 DRILLING EQUIPMENT **CME 550 ATV**  
 DRILLING STARTED **10/12/10** ENDED **10/12/10**

REMARKS  
**Installed 2" diameter PVC monitoring well.**

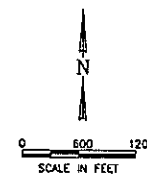
WATER LEVEL (ft.)  
 ▽ 21.0  
 ▽  
 ▽




LEGEND	
	POTABLE WELL LOCATION (APPROXIMATE)
	ASH POND
	2,500 FOOT RADIUS OF ASH POND SYSTEMS

NOTE:  
REFER TO SUMMARY TABLE FOR SPECIFIC WELL INFORMATION.

SOURCE:  
2005 DIGITAL ORTHOPHOTO FROM ILLINOIS NATURAL RESOURCES GEOSPATIAL DATA CLEARINGHOUSE  
WELL LOCATIONS FROM ILLINOIS STATE GEOLOGICAL SURVEY, ILLINOIS ENVIRONMENTAL PROTECTION AGENCY, AND ILLINOIS STATE WATER SURVEY.



POTABLE WATER WELLS   NATURAL RESOURCE TECHNOLOGY	DRAWN BY: KNW DATE: 6/09/09
	CHECKED BY: HMS DATE: 6/15/09
	APPROVED BY: HMS DATE: 07/07/09
	DRAWING NO: 1792-3-B05 REFERENCE: <a href="http://www.dnr.state.il.us/geo/">http://www.dnr.state.il.us/geo/</a>
WAUKEGAN STATION MIDWEST GENERATION WAUKEGAN, LAKE COUNTY, ILLINOIS	
PROJECT NO. 1792/3.0	
FIGURE NO. 1	

## ANALYTICAL REPORT

Job Number: 500-28779-1

Job Description: Waukegan GW Sampling

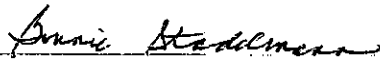
For:

Patrick Engineering

4985 Varsity Drive

Lisle, IL 60532-4144

Attention: Andrew Gagnon



Approved for release.  
Bonnie M Stadelmann  
Project Manager II  
10/28/2010 4:22 PM

---

Bonnie M Stadelmann

Project Manager II

bonnie.stadelmann@testamericainc.com

10/28/2010

cc: Ms. Maria Race

These test results meet all the requirements of NELAC for accredited parameters.

The Lab Certification ID#:  
TestAmerica Chicago 100201

All questions regarding this test report should be directed to the TestAmerica Project Manager whose signature appears on this report. All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

TestAmerica Laboratories, Inc.  
TestAmerica Chicago 2417 Bond Street, University Park, IL 60484  
Tel (708) 534-5200 Fax (708) 534-5211 [www.testamericainc.com](http://www.testamericainc.com)



**Job Narrative**  
**500-28779-1**

**Comments**

No additional comments.

**Receipt**

All samples were received in good condition within temperature requirements.

**Metals**

Method(s) 6020: The serial dilution performed for the following sample, 500-28779-1, was outside control limits for As.

Method(s) 6020: The matrix duplicate %RPD for 500-28779-1 was outside the control limits for Sb.

No other analytical or quality issues were noted.

**Field Service / Mobile Lab**

No analytical or quality issues were noted.

**General Chemistry**

Method(s) SM 4500 NO3 F: The nitrate matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 98229 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. MW-04 (500-28779-4)

No other analytical or quality issues were noted.



## METHOD SUMMARY

Client: Patrick Engineering

Job Number: 500-28779-1

Description	Lab Location	Method	Preparation Method
<b>Matrix: Water</b>			
Metals (ICP/MS)	TAL CHI	SW846 6020	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD
Preparation, Soluble	TAL CHI		Soluble Metals
Mercury (CVAA)	TAL CHI	SW846 7470A	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD
Preparation, Mercury	TAL CHI		SW846 7470A
Cyanide	TAL CHI	SW846 9014	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD
Cyanide, Distillation	TAL CHI		SW846 9010B
Sulfate, Turbidimetric	TAL CHI	SW846 9038	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD
Chloride	TAL CHI	SW846 9251	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD
Nitrogen, Nitrate-Nitrite	TAL CHI	SM Nitrate by calc	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD
Solids, Total Dissolved (TDS)	TAL CHI	SM SM 2540C	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD
Fluoride	TAL CHI	SM SM 4500 F C	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD
Nitrogen, Nitrite	TAL CHI	SM SM 4500 NO2 B	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD
Nitrogen, Nitrate	TAL CHI	SM SM 4500 NO3 F	
Sample Filtration, Field	TAL CHI		FIELD_FLTRD

**Lab References:**

TAL CHI = TestAmerica Chicago

**Method References:**

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

## METHOD / ANALYST SUMMARY

Client: Patrick Engineering

Job Number: 500-28779-1

<b>Method</b>	<b>Analyst</b>	<b>Analyst ID</b>
SW846 6020	Kolarczyk, Paul F	PFK
SW846 7470A	Roach, Jessica	JR
SW846 9014	Moore, Colleen L	CLM
SW846 9038	Boyd, Cheryl L	CLB
SW846 9251	Deb, Khona	KD
SM Nitrate by calc	Ficarello, Peter M	PMF
SM SM 2540C	Boyd, Cheryl L	CLB
SM SM 4500 F C	Moore, Colleen L	CLM
SM SM 4500 NO2 B	Moore, Colleen L	CLM
SM SM 4500 NO3 F	Ficarello, Peter M	PMF

## SAMPLE SUMMARY

Client: Patrick Engineering

Job Number: 500-28779-1

<b>Lab Sample ID</b>	<b>Client Sample ID</b>	<b>Client Matrix</b>	<b>Date/Time Sampled</b>	<b>Date/Time Received</b>
500-28779-1	MW-01	Water	10/25/2010 1645	10/26/2010 1000
500-28779-2	MW-02	Water	10/25/2010 1615	10/26/2010 1000
500-28779-3	MW-03	Water	10/25/2010 1530	10/26/2010 1000
500-28779-4	MW-04	Water	10/25/2010 1445	10/26/2010 1000
500-28779-5	MW-05	Water	10/25/2010 1330	10/26/2010 1000

# SAMPLE RESULTS

Andrew Gagnon  
 Patrick Engineering  
 4985 Varsity Drive  
 Lisle, IL 60532-4144

Job Number: 500-28779-1

Client Sample ID: MW-01  
 Lab Sample ID: 500-28779-1

Date Sampled: 10/25/2010 1645  
 Date Received: 10/26/2010 1000  
 Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1244	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Beryllium	<0.0010	mg/L	0.0010	1.0
Boron	2.6	mg/L	0.050	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1625	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Antimony	0.0052	mg/L	0.0030	1.0
Arsenic	0.054	mg/L	0.0010	1.0
Barium	0.023	mg/L	0.0025	1.0
Cadmium	<0.00050	mg/L	0.00050	1.0
Chromium	<0.0050	mg/L	0.0050	1.0
Cobalt	<0.0010	mg/L	0.0010	1.0
Copper	<0.0020	mg/L	0.0020	1.0
Iron	<0.10	mg/L	0.10	1.0
Lead	<0.00050	mg/L	0.00050	1.0
Manganese	<0.0025	mg/L	0.0025	1.0
Nickel	<0.0020	mg/L	0.0020	1.0
Silver	<0.00050	mg/L	0.00050	1.0
Thallium	<0.0020	mg/L	0.0020	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/28/2010 1349	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Selenium	0.031	mg/L	0.0025	1.0
Zinc	<0.020	mg/L	0.020	1.0
<b>Method: Dissolved-7470A</b>		Date Analyzed:	10/28/2010 0910	
<b>Prep Method: 7470A</b>		Date Prepared:	10/27/2010 1511	
Mercury	<0.00020	mg/L	0.00020	1.0
<b>Method: Dissolved-9014</b>		Date Analyzed:	10/27/2010 1316	
<b>Prep Method: 9010B</b>		Date Prepared:	10/27/2010 1020	
Cyanide, Total	<0.010	mg/L	0.010	1.0
<b>Method: Dissolved-9038</b>		Date Analyzed:	10/27/2010 0630	
Sulfate	350	mg/L	50	10
<b>Method: Dissolved-9251</b>		Date Analyzed:	10/27/2010 1932	
Chloride	39	mg/L	2.0	1.0
<b>Method: Dissolved-Nitrate by calc</b>		Date Analyzed:	10/27/2010 1531	
Nitrogen, Nitrate	<0.10	mg/L	0.10	1.0
<b>Method: Dissolved-SM 2540C</b>		Date Analyzed:	10/26/2010 2110	

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Job Number: 500-28779-1

Client Sample ID: MW-01  
Lab Sample ID: 500-28779-1

Date Sampled: 10/25/2010 1645  
Date Received: 10/26/2010 1000  
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Total Dissolved Solids	460	mg/L	10	1.0
<b>Method: Dissolved-SM 4500 F C</b> Fluoride	0.45	mg/L	Date Analyzed: 10/28/2010 0932 0.10	1.0
<b>Method: Dissolved-SM 4500 NO2 B</b> Nitrogen, Nitrite	<0.020	mg/L	Date Analyzed: 10/27/2010 1112 0.020	1.0
<b>Method: Dissolved-SM 4500 NO3 F</b> Nitrogen, Nitrate Nitrite	<0.10	mg/L	Date Analyzed: 10/27/2010 1046 0.10	1.0

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Job Number: 500-28779-1

Client Sample ID: MW-02  
 Lab Sample ID: 500-28779-2

Date Sampled: 10/25/2010 1615  
 Date Received: 10/26/2010 1000  
 Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1253	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Beryllium	<0.0010	mg/L	0.0010	1.0
Boron	2.2	mg/L	0.050	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1643	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Antimony	0.015	mg/L	0.0030	1.0
Arsenic	0.025	mg/L	0.0010	1.0
Barium	0.0091	mg/L	0.0025	1.0
Cadmium	<0.00050	mg/L	0.00050	1.0
Chromium	<0.0050	mg/L	0.0050	1.0
Cobalt	<0.0010	mg/L	0.0010	1.0
Copper	<0.0020	mg/L	0.0020	1.0
Iron	<0.10	mg/L	0.10	1.0
Lead	<0.00050	mg/L	0.00050	1.0
Manganese	0.0034	mg/L	0.0025	1.0
Nickel	<0.0020	mg/L	0.0020	1.0
Silver	<0.00050	mg/L	0.00050	1.0
Thallium	<0.0020	mg/L	0.0020	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/28/2010 1341	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Selenium	0.026	mg/L	0.0025	1.0
Zinc	<0.020	mg/L	0.020	1.0
<b>Method: Dissolved-7470A</b>		Date Analyzed:	10/28/2010 0913	
<b>Prep Method: 7470A</b>		Date Prepared:	10/27/2010 1511	
Mercury	<0.00020	mg/L	0.00020	1.0
<b>Method: Dissolved-9014</b>		Date Analyzed:	10/27/2010 1317	
<b>Prep Method: 9010B</b>		Date Prepared:	10/27/2010 1020	
Cyanide, Total	<0.010	mg/L	0.010	1.0
<b>Method: Dissolved-9038</b>		Date Analyzed:	10/27/2010 0631	
Sulfate	230	mg/L	50	10
<b>Method: Dissolved-9251</b>		Date Analyzed:	10/27/2010 1933	
Chloride	42	mg/L	2.0	1.0
<b>Method: Dissolved-Nitrate by calc</b>		Date Analyzed:	10/27/2010 1535	
Nitrogen, Nitrate	<0.10	mg/L	0.10	1.0
<b>Method: Dissolved-SM 2540C</b>		Date Analyzed:	10/26/2010 2122	

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Job Number: 500-28779-1

Client Sample ID: MW-02  
 Lab Sample ID: 500-28779-2

Date Sampled: 10/25/2010 1615  
 Date Received: 10/26/2010 1000  
 Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Total Dissolved Solids	410	mg/L	10	1.0
<b>Method: Dissolved-SM 4500 F C</b> Fluoride	0.35	mg/L	0.10	1.0
<b>Method: Dissolved-SM 4500 NO2 B</b> Nitrogen, Nitrite	<0.020	mg/L	0.020	1.0
<b>Method: Dissolved-SM 4500 NO3 F</b> Nitrogen, Nitrate Nitrite	<0.10	mg/L	0.10	1.0



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Job Number: 500-28779-1

Client Sample ID: MW-03  
 Lab Sample ID: 500-28779-3

Date Sampled: 10/25/2010 1530  
 Date Received: 10/26/2010 1000  
 Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1254	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Beryllium	<0.0010	mg/L	0.0010	1.0
Boron	1.7	mg/L	0.050	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1646	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Antimony	0.0051	mg/L	0.0030	1.0
Arsenic	0.0043	mg/L	0.0010	1.0
Barium	0.0057	mg/L	0.0025	1.0
Cadmium	<0.00050	mg/L	0.00050	1.0
Chromium	<0.0050	mg/L	0.0050	1.0
Cobalt	<0.0010	mg/L	0.0010	1.0
Copper	<0.0020	mg/L	0.0020	1.0
Iron	<0.10	mg/L	0.10	1.0
Lead	<0.00050	mg/L	0.00050	1.0
Manganese	<0.0025	mg/L	0.0025	1.0
Nickel	<0.0020	mg/L	0.0020	1.0
Silver	<0.00050	mg/L	0.00050	1.0
Thallium	<0.0020	mg/L	0.0020	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/28/2010 1343	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Selenium	0.0094	mg/L	0.0025	1.0
Zinc	<0.020	mg/L	0.020	1.0
<b>Method: Dissolved-7470A</b>		Date Analyzed:	10/28/2010 0916	
<b>Prep Method: 7470A</b>		Date Prepared:	10/27/2010 1511	
Mercury	<0.00020	mg/L	0.00020	1.0
<b>Method: Dissolved-9014</b>		Date Analyzed:	10/27/2010 1317	
<b>Prep Method: 9010B</b>		Date Prepared:	10/27/2010 1020	
Cyanide, Total	<0.010	mg/L	0.010	1.0
<b>Method: Dissolved-9038</b>		Date Analyzed:	10/27/2010 0632	
Sulfate	120	mg/L	20	4.0
<b>Method: Dissolved-9251</b>		Date Analyzed:	10/27/2010 1934	
Chloride	53	mg/L	2.0	1.0
<b>Method: Dissolved-Nitrate by calc</b>		Date Analyzed:	10/27/2010 1539	
Nitrogen, Nitrate	<0.10	mg/L	0.10	1.0
<b>Method: Dissolved-SM 2540C</b>		Date Analyzed:	10/26/2010 2125	

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Job Number: 500-28779-1

Client Sample ID: MW-03  
Lab Sample ID: 500-28779-3

Date Sampled: 10/25/2010 1530  
Date Received: 10/26/2010 1000  
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Total Dissolved Solids	280	mg/L	10	1.0
<b>Method: Dissolved-SM 4500 F C</b> Fluoride	0.27	mg/L	0.10	1.0
<b>Method: Dissolved-SM 4500 NO2 B</b> Nitrogen, Nitrite	<0.020	mg/L	0.020	1.0
<b>Method: Dissolved-SM 4500 NO3 F</b> Nitrogen, Nitrate Nitrite	<0.10	mg/L	0.10	1.0

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Job Number: 500-28779-1

Client Sample ID: MW-04  
 Lab Sample ID: 500-28779-4

Date Sampled: 10/25/2010 1445  
 Date Received: 10/26/2010 1000  
 Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1255	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Beryllium	<0.0010	mg/L	0.0010	1.0
Boron	2.0	mg/L	0.050	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1648	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Antimony	<0.0030	mg/L	0.0030	1.0
Arsenic	0.0060	mg/L	0.0010	1.0
Barium	0.026	mg/L	0.0025	1.0
Cadmium	<0.00050	mg/L	0.00050	1.0
Chromium	<0.0050	mg/L	0.0050	1.0
Cobalt	<0.0010	mg/L	0.0010	1.0
Copper	<0.0020	mg/L	0.0020	1.0
Iron	<0.10	mg/L	0.10	1.0
Lead	<0.00050	mg/L	0.00050	1.0
Manganese	0.058	mg/L	0.0025	1.0
Nickel	<0.0020	mg/L	0.0020	1.0
Silver	<0.00050	mg/L	0.00050	1.0
Thallium	<0.0020	mg/L	0.0020	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/28/2010 1345	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Selenium	0.0039	mg/L	0.0025	1.0
Zinc	<0.020	mg/L	0.020	1.0
<b>Method: Dissolved-7470A</b>		Date Analyzed:	10/28/2010 0918	
<b>Prep Method: 7470A</b>		Date Prepared:	10/27/2010 1511	
Mercury	<0.00020	mg/L	0.00020	1.0
<b>Method: Dissolved-9014</b>		Date Analyzed:	10/27/2010 1317	
<b>Prep Method: 9010B</b>		Date Prepared:	10/27/2010 1020	
Cyanide, Total	<0.010	mg/L	0.010	1.0
<b>Method: Dissolved-9038</b>		Date Analyzed:	10/27/2010 0635	
Sulfate	250	mg/L	50	10
<b>Method: Dissolved-9251</b>		Date Analyzed:	10/27/2010 1935	
Chloride	39	mg/L	2.0	1.0
<b>Method: Dissolved-Nitrate by calc</b>		Date Analyzed:	10/27/2010 1542	
Nitrogen, Nitrate	<0.10	mg/L	0.10	1.0
<b>Method: Dissolved-SM 2540C</b>		Date Analyzed:	10/26/2010 2129	

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Job Number: 500-28779-1

Client Sample ID: MW-04  
Lab Sample ID: 500-28779-4

Date Sampled: 10/25/2010 1445  
Date Received: 10/26/2010 1000  
Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Total Dissolved Solids	430	mg/L	10	1.0
Method: Dissolved-SM 4500 F C Fluoride	0.60	mg/L	0.10	1.0
Method: Dissolved-SM 4500 NO2 B Nitrogen, Nitrite	<0.020	mg/L	0.020	1.0
Method: Dissolved-SM 4500 NO3 F Nitrogen, Nitrate Nitrite	<0.10	mg/L	0.10	1.0

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Job Number: 500-28779-1

Client Sample ID: MW-05  
 Lab Sample ID: 500-28779-5

Date Sampled: 10/25/2010 1330  
 Date Received: 10/26/2010 1000  
 Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1256	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Beryllium	<0.0010	mg/L	0.0010	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1320	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Boron	28	mg/L	5.0	100
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/26/2010 1651	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Antimony	<0.0030	mg/L	0.0030	1.0
Arsenic	0.0076	mg/L	0.0010	1.0
Barium	0.060	mg/L	0.0025	1.0
Cadmium	<0.00050	mg/L	0.00050	1.0
Chromium	<0.0050	mg/L	0.0050	1.0
Cobalt	<0.0010	mg/L	0.0010	1.0
Copper	<0.0020	mg/L	0.0020	1.0
Iron	3.5	mg/L	0.10	1.0
Lead	<0.00050	mg/L	0.00050	1.0
Manganese	0.71	mg/L	0.0025	1.0
Nickel	<0.0020	mg/L	0.0020	1.0
Silver	<0.00050	mg/L	0.00050	1.0
Thallium	<0.0020	mg/L	0.0020	1.0
<b>Method: Dissolved-6020</b>		Date Analyzed:	10/28/2010 1347	
<b>Prep Method: Soluble Metals</b>		Date Prepared:	10/26/2010 1142	
Selenium	0.0028	mg/L	0.0025	1.0
Zinc	<0.020	mg/L	0.020	1.0
<b>Method: Dissolved-7470A</b>		Date Analyzed:	10/28/2010 0921	
<b>Prep Method: 7470A</b>		Date Prepared:	10/27/2010 1511	
Mercury	<0.00020	mg/L	0.00020	1.0
<b>Method: Dissolved-9014</b>		Date Analyzed:	10/27/2010 1317	
<b>Prep Method: 9010B</b>		Date Prepared:	10/27/2010 1020	
Cyanide, Total	<0.010	mg/L	0.010	1.0
<b>Method: Dissolved-9038</b>		Date Analyzed:	10/27/2010 0636	
Sulfate	920	mg/L	200	40
<b>Method: Dissolved-9251</b>		Date Analyzed:	10/27/2010 1950	
Chloride	100	mg/L	10	5.0
<b>Method: Dissolved-Nitrate by calc</b>		Date Analyzed:	10/28/2010 1513	

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Job Number: 500-28779-1

Client Sample ID: MW-05  
 Lab Sample ID: 500-28779-5

Date Sampled: 10/25/2010 1330  
 Date Received: 10/26/2010 1000  
 Client Matrix: Water

Analyte	Result/Qualifier	Unit	RL	Dilution
Nitrogen, Nitrate	<0.10	mg/L	0.10	1.0
<b>Method: Dissolved-SM 2540C</b>			Date Analyzed: 10/26/2010 2133	
Total Dissolved Solids	1500	mg/L	10	1.0
<b>Method: Dissolved-SM 4500 F C</b>			Date Analyzed: 10/28/2010 0955	
Fluoride	0.29	mg/L	0.10	1.0
<b>Method: Dissolved-SM 4500 NO2 B</b>			Date Analyzed: 10/27/2010 1115	
Nitrogen, Nitrite	<0.020	mg/L	0.020	1.0
<b>Method: Dissolved-SM 4500 NO3 F</b>			Date Analyzed: 10/28/2010 1025	
Nitrogen, Nitrate Nitrite	<0.10	mg/L	0.10	1.0

## DATA REPORTING QUALIFIERS

Client: Patrick Engineering

Job Number: 500-28779-1

<u>Lab Section</u>	<u>Qualifier</u>	<u>Description</u>
Metals	F	Duplicate RPD exceeds the control limit
General Chemistry	F	MS or MSD exceeds the control limits

# QUALITY CONTROL RESULTS



## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
<b>Metals</b>					
<b>Prep Batch: 500-98116</b>					
LCS 500-98116/2-A	Lab Control Sample	S	Water	Soluble Metals	
MB 500-98116/1-A	Method Blank	S	Water	Soluble Metals	
500-28779-1	MW-01	D	Water	Soluble Metals	
500-28779-1DU	Duplicate	D	Water	Soluble Metals	
500-28779-1MS	Matrix Spike	D	Water	Soluble Metals	
500-28779-1MSD	Matrix Spike Duplicate	D	Water	Soluble Metals	
500-28779-2	MW-02	D	Water	Soluble Metals	
500-28779-3	MW-03	D	Water	Soluble Metals	
500-28779-4	MW-04	D	Water	Soluble Metals	
500-28779-5	MW-05	D	Water	Soluble Metals	
<b>Analysis Batch:500-98137</b>					
LCS 500-98116/2-A	Lab Control Sample	S	Water	6020	500-98116
MB 500-98116/1-A	Method Blank	S	Water	6020	500-98116
500-28779-1	MW-01	D	Water	6020	500-98116
500-28779-1DU	Duplicate	D	Water	6020	500-98116
500-28779-1MS	Matrix Spike	D	Water	6020	500-98116
500-28779-1MSD	Matrix Spike Duplicate	D	Water	6020	500-98116
500-28779-2	MW-02	D	Water	6020	500-98116
500-28779-3	MW-03	D	Water	6020	500-98116
500-28779-4	MW-04	D	Water	6020	500-98116
500-28779-5	MW-05	D	Water	6020	500-98116
<b>Analysis Batch:500-98199</b>					
LCS 500-98116/2-A	Lab Control Sample	S	Water	6020	500-98116
MB 500-98116/1-A	Method Blank	S	Water	6020	500-98116
500-28779-1	MW-01	D	Water	6020	500-98116
500-28779-1DU	Duplicate	D	Water	6020	500-98116
500-28779-1MS	Matrix Spike	D	Water	6020	500-98116
500-28779-1MSD	Matrix Spike Duplicate	D	Water	6020	500-98116
500-28779-2	MW-02	D	Water	6020	500-98116
500-28779-3	MW-03	D	Water	6020	500-98116
500-28779-4	MW-04	D	Water	6020	500-98116
500-28779-5	MW-05	D	Water	6020	500-98116
<b>Prep Batch: 500-98248</b>					
LCS 500-98248/2-A	Lab Control Sample	T	Water	7470A	
MB 500-98248/1-A	Method Blank	T	Water	7470A	
500-28779-1	MW-01	D	Water	7470A	
500-28779-2	MW-02	D	Water	7470A	
500-28779-3	MW-03	D	Water	7470A	
500-28779-4	MW-04	D	Water	7470A	
500-28779-5	MW-05	D	Water	7470A	

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## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
<b>Metals</b>					
<b>Analysis Batch:500-98258</b>					
LCS 500-98116/2-A	Lab Control Sample	S	Water	6020	500-98116
MB 500-98116/1-A	Method Blank	S	Water	6020	500-98116
500-28779-1	MW-01	D	Water	6020	500-98116
500-28779-1DU	Duplicate	D	Water	6020	500-98116
500-28779-1MS	Matrix Spike	D	Water	6020	500-98116
500-28779-1MSD	Matrix Spike Duplicate	D	Water	6020	500-98116
500-28779-2	MW-02	D	Water	6020	500-98116
<b>Analysis Batch:500-98340</b>					
LCS 500-98248/2-A	Lab Control Sample	T	Water	7470A	500-98248
MB 500-98248/1-A	Method Blank	T	Water	7470A	500-98248
500-28779-1	MW-01	D	Water	7470A	500-98248
500-28779-2	MW-02	D	Water	7470A	500-98248
500-28779-3	MW-03	D	Water	7470A	500-98248
500-28779-4	MW-04	D	Water	7470A	500-98248
500-28779-5	MW-05	D	Water	7470A	500-98248
<b>Analysis Batch:500-98378</b>					
LCS 500-98116/2-A	Lab Control Sample	S	Water	6020	500-98116
MB 500-98116/1-A	Method Blank	S	Water	6020	500-98116
500-28779-1	MW-01	D	Water	6020	500-98116
500-28779-1DU	Duplicate	D	Water	6020	500-98116
500-28779-1MS	Matrix Spike	D	Water	6020	500-98116
500-28779-1MSD	Matrix Spike Duplicate	D	Water	6020	500-98116
500-28779-2	MW-02	D	Water	6020	500-98116
500-28779-3	MW-03	D	Water	6020	500-98116
500-28779-4	MW-04	D	Water	6020	500-98116
500-28779-5	MW-05	D	Water	6020	500-98116

**Report Basis**

D = Dissolved

S = Soluble

T = Total

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
<b>General Chemistry</b>					
<b>Analysis Batch:500-98171</b>					
LCS 500-98171/2	Lab Control Sample	T	Water	SM 2540C	
MB 500-98171/1	Method Blank	T	Water	SM 2540C	
500-28779-1	MW-01	D	Water	SM 2540C	
500-28779-1DU	Duplicate	D	Water	SM 2540C	
500-28779-1MS	Matrix Spike	D	Water	SM 2540C	
500-28779-2	MW-02	D	Water	SM 2540C	
500-28779-3	MW-03	D	Water	SM 2540C	
500-28779-4	MW-04	D	Water	SM 2540C	
500-28779-5	MW-05	D	Water	SM 2540C	
<b>Prep Batch: 500-98202</b>					
HLCS 500-98202/3-A	High Level Control Sample	T	Water	9010B	
LCS 500-98202/2-A	Lab Control Sample	T	Water	9010B	
LLCS 500-98202/4-A	Low Level Control Sample	T	Water	9010B	
MB 500-98202/1-A	Method Blank	T	Water	9010B	
500-28779-1	MW-01	D	Water	9010B	
500-28779-2	MW-02	D	Water	9010B	
500-28779-3	MW-03	D	Water	9010B	
500-28779-4	MW-04	D	Water	9010B	
500-28779-5	MW-05	D	Water	9010B	
<b>Analysis Batch:500-98229</b>					
LCS 500-98229/4	Lab Control Sample	T	Water	SM 4500 NO3 F	
MB 500-98229/3	Method Blank	T	Water	SM 4500 NO3 F	
500-28779-1	MW-01	D	Water	SM 4500 NO3 F	
500-28779-2	MW-02	D	Water	SM 4500 NO3 F	
500-28779-3	MW-03	D	Water	SM 4500 NO3 F	
500-28779-4	MW-04	D	Water	SM 4500 NO3 F	
500-28779-4MS	Matrix Spike	D	Water	SM 4500 NO3 F	
500-28779-4MSD	Matrix Spike Duplicate	D	Water	SM 4500 NO3 F	
<b>Analysis Batch:500-98243</b>					
HLCS 500-98202/3-A	High Level Control Sample	T	Water	9014	500-98202
LCS 500-98202/2-A	Lab Control Sample	T	Water	9014	500-98202
LLCS 500-98202/4-A	Low Level Control Sample	T	Water	9014	500-98202
MB 500-98202/1-A	Method Blank	T	Water	9014	500-98202
500-28779-1	MW-01	D	Water	9014	500-98202
500-28779-2	MW-02	D	Water	9014	500-98202
500-28779-3	MW-03	D	Water	9014	500-98202
500-28779-4	MW-04	D	Water	9014	500-98202
500-28779-5	MW-05	D	Water	9014	500-98202

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## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
<b>General Chemistry</b>					
<b>Analysis Batch:500-98250</b>					
LCS 500-98250/4	Lab Control Sample	T	Water	SM 4500 NO2 B	
MB 500-98250/3	Method Blank	T	Water	SM 4500 NO2 B	
500-28779-1	MW-01	D	Water	SM 4500 NO2 B	
500-28779-2	MW-02	D	Water	SM 4500 NO2 B	
500-28779-3	MW-03	D	Water	SM 4500 NO2 B	
500-28779-3MS	Matrix Spike	D	Water	SM 4500 NO2 B	
500-28779-3MSD	Matrix Spike Duplicate	D	Water	SM 4500 NO2 B	
500-28779-4	MW-04	D	Water	SM 4500 NO2 B	
500-28779-5	MW-05	D	Water	SM 4500 NO2 B	
<b>Analysis Batch:500-98255</b>					
500-28779-1	MW-01	D	Water	Nitrate by calc	
500-28779-2	MW-02	D	Water	Nitrate by calc	
500-28779-3	MW-03	D	Water	Nitrate by calc	
500-28779-4	MW-04	D	Water	Nitrate by calc	
500-28779-5	MW-05	D	Water	Nitrate by calc	
<b>Analysis Batch:500-98277</b>					
LCS 500-98277/122	Lab Control Sample	T	Water	9251	
MB 500-98277/121	Method Blank	T	Water	9251	
500-28779-1	MW-01	D	Water	9251	
500-28779-1MS	Matrix Spike	D	Water	9251	
500-28779-1MSD	Matrix Spike Duplicate	D	Water	9251	
500-28779-2	MW-02	D	Water	9251	
500-28779-3	MW-03	D	Water	9251	
500-28779-4	MW-04	D	Water	9251	
500-28779-5	MW-05	D	Water	9251	
<b>Analysis Batch:500-98305</b>					
LCS 500-98305/4	Lab Control Sample	T	Water	9038	
MB 500-98305/3	Method Blank	T	Water	9038	
500-28779-1	MW-01	D	Water	9038	
500-28779-2	MW-02	D	Water	9038	
500-28779-3	MW-03	D	Water	9038	
500-28779-3MS	Matrix Spike	D	Water	9038	
500-28779-3MSD	Matrix Spike Duplicate	D	Water	9038	
500-28779-4	MW-04	D	Water	9038	
500-28779-5	MW-05	D	Water	9038	

TestAmerica Chicago

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
<b>General Chemistry</b>					
<b>Analysis Batch:500-98335</b>					
LCS 500-98335/4	Lab Control Sample	T	Water	SM 4500 F C	
MB 500-98335/3	Method Blank	T	Water	SM 4500 F C	
500-28779-1	MW-01	D	Water	SM 4500 F C	
500-28779-1MS	Matrix Spike	D	Water	SM 4500 F C	
500-28779-1MSD	Matrix Spike Duplicate	D	Water	SM 4500 F C	
500-28779-2	MW-02	D	Water	SM 4500 F C	
500-28779-3	MW-03	D	Water	SM 4500 F C	
500-28779-4	MW-04	D	Water	SM 4500 F C	
500-28779-5	MW-05	D	Water	SM 4500 F C	
<b>Analysis Batch:500-98362</b>					
LCS 500-98362/35	Lab Control Sample	T	Water	SM 4500 NO3 F	
MB 500-98362/34	Method Blank	T	Water	SM 4500 NO3 F	
500-28779-5	MW-05	D	Water	SM 4500 NO3 F	

#### Report Basis

D = Dissolved

T = Total

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### Method Blank - Batch: 500-98116

Lab Sample ID: MB 500-98116/1-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 1242  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98137  
Prep Batch: 500-98116  
Units: mg/L

### Method: 6020 Preparation: Soluble Metals Soluble

Instrument ID: ICPMS2  
Lab File ID: MS2102610B.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Result	Qual	RL
Beryllium	<0.0010		0.0010
Boron	<0.050		0.050

### Method Blank - Batch: 500-98116

Lab Sample ID: MB 500-98116/1-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 1619  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98199  
Prep Batch: 500-98116  
Units: mg/L

### Method: 6020 Preparation: Soluble Metals Soluble

Instrument ID: ICPMS2  
Lab File ID: MS2102610D.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Result	Qual	RL
Antimony	<0.0030		0.0030
Arsenic	<0.0010		0.0010
Barium	<0.0025		0.0025
Cadmium	<0.00050		0.00050
Chromium	<0.0050		0.0050
Cobalt	<0.0010		0.0010
Copper	<0.0020		0.0020
Iron	<0.10		0.10
Lead	<0.00050		0.00050
Manganese	<0.0025		0.0025
Nickel	<0.0020		0.0020
Silver	<0.00050		0.00050
Thallium	<0.0020		0.0020

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### Method Blank - Batch: 500-98116

Lab Sample ID: MB 500-98116/1-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 1324  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98378  
Prep Batch: 500-98116  
Units: mg/L

### Method: 6020 Preparation: Soluble Metals Soluble

Instrument ID: ICPMS2  
Lab File ID: MS2102810AA.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Result	Qual	RL
Selenium	<0.0025		0.0025
Zinc	<0.020		0.020

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### Lab Control Sample - Batch: 500-98116

**Method: 6020**  
**Preparation: Soluble Metals**  
**Soluble**

Lab Sample ID: LCS 500-98116/2-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 1243  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98137  
Prep Batch: 500-98116  
Units: mg/L

Instrument ID: ICPMS2  
Lab File ID: MS2102610B.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Beryllium	0.0500	0.0464	93	80 - 120	
Boron	1.00	1.03	103	80 - 120	

### Lab Control Sample - Batch: 500-98116

**Method: 6020**  
**Preparation: Soluble Metals**  
**Soluble**

Lab Sample ID: LCS 500-98116/2-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 1622  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98199  
Prep Batch: 500-98116  
Units: mg/L

Instrument ID: ICPMS2  
Lab File ID: MS2102610D.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Antimony	0.500	0.440	88	80 - 120	
Arsenic	0.100	0.0988	99	80 - 120	
Barium	0.500	0.459	92	80 - 120	
Cadmium	0.0500	0.0512	102	80 - 120	
Chromium	0.200	0.194	97	80 - 120	
Cobalt	0.500	0.502	100	80 - 120	
Copper	0.250	0.267	107	80 - 120	
Iron	1.00	0.913	91	80 - 120	
Lead	0.100	0.109	109	80 - 120	
Manganese	0.500	0.486	97	80 - 120	
Nickel	0.500	0.525	105	80 - 120	
Silver	0.0500	0.0520	104	80 - 120	
Thallium	0.100	0.110	110	80 - 120	



## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### Lab Control Sample - Batch: 500-98116

Method: 6020

Preparation: Soluble Metals  
Soluble

Lab Sample ID: LCS 500-98116/2-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 1318  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98378  
Prep Batch: 500-98116  
Units: mg/L

Instrument ID: ICPMS2  
Lab File ID: MS2102810AA.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Selenium	0.100	0.0942	94	80 - 120	
Zinc	0.500	0.480	96	80 - 120	

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 500-98116

**Method: 6020**  
**Preparation: Soluble Metals  
Dissolved**

MS Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 1251  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98137  
Prep Batch: 500-98116

Instrument ID: ICPMS2  
Lab File ID: MS2102610B.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

MSD Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 1252  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98137  
Prep Batch: 500-98116

Instrument ID: ICPMS2  
Lab File ID: MS2102610B.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	% Rec.		Limit	RPD	RPD Limit	MS Qual	MSD Qual
	MS	MSD					
Beryllium	103	106	75 - 125	2	20		
Boron	108	119	75 - 125	3	20		

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Matrix Spike/  
Matrix Spike Duplicate Recovery Report - Batch: 500-98116**

**Method: 6020  
Preparation: Soluble Metals  
Dissolved**

MS Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 1638  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98199  
Prep Batch: 500-98116

Instrument ID: ICPMS2  
Lab File ID: MS2102610D.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

MSD Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 1641  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98199  
Prep Batch: 500-98116

Instrument ID: ICPMS2  
Lab File ID: MS2102610D.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	% Rec.		Limit	RPD	RPD Limit	MS Qual	MSD Qual
	MS	MSD					
Antimony	91	96	75 - 125	5	20		
Arsenic	115	118	75 - 125	2	20		
Barium	94	95	75 - 125	1	20		
Cadmium	108	111	75 - 125	3	20		
Chromium	91	96	75 - 125	5	20		
Cobalt	93	98	75 - 125	5	20		
Copper	96	101	75 - 125	5	20		
Iron	85	91	75 - 125	6	20		
Lead	108	109	75 - 125	1	20		
Manganese	94	99	75 - 125	5	20		
Nickel	96	101	75 - 125	5	20		
Silver	80	82	75 - 125	2	20		
Thallium	109	110	75 - 125	1	20		

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Matrix Spike/  
Matrix Spike Duplicate Recovery Report - Batch: 500-98116**

**Method: 6020  
Preparation: Soluble Metals  
Dissolved**

MS Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 1337  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98378  
Prep Batch: 500-98116

Instrument ID: ICPMS2  
Lab File ID: MS2102810AA.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

MSD Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 1339  
Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98378  
Prep Batch: 500-98116

Instrument ID: ICPMS2  
Lab File ID: MS2102810AA.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	% Rec.		Limit	RPD	RPD Limit	MS Qual	MSD Qual
	MS	MSD					
Selenium	103	106	75 - 125	2	20		
Zinc	108	108	75 - 125	1	20		

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Duplicate - Batch: 500-98116**

**Method: 6020**  
**Preparation: Soluble Metals**  
**Dissolved**

Lab Sample ID: 500-28779-1  
 Client Matrix: Water  
 Dilution: 1.0  
 Date Analyzed: 10/26/2010 1250  
 Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98137  
 Prep Batch: 500-98116  
 Units: mg/L

Instrument ID: ICPMS2  
 Lab File ID: MS2102610B.csv  
 Initial Weight/Volume: 1.0 mL  
 Final Weight/Volume: 1.0 mL

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Beryllium	<0.0010	<0.0010	NC	20	
Boron	2.6	2.62	1	20	

**Duplicate - Batch: 500-98116**

**Method: 6020**  
**Preparation: Soluble Metals**  
**Dissolved**

Lab Sample ID: 500-28779-1  
 Client Matrix: Water  
 Dilution: 1.0  
 Date Analyzed: 10/26/2010 1635  
 Date Prepared: 10/26/2010 1142

Analysis Batch: 500-98199  
 Prep Batch: 500-98116  
 Units: mg/L

Instrument ID: ICPMS2  
 Lab File ID: MS2102610D.csv  
 Initial Weight/Volume: 1.0 mL  
 Final Weight/Volume: 1.0 mL

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Antimony	0.0052	<0.0030	157	20	F
Arsenic	0.054	0.0547	0.9	20	
Barium	0.023	0.0230	1	20	
Cadmium	<0.00050	<0.00050	NC	20	
Chromium	<0.0050	<0.0050	NC	20	
Cobalt	<0.0010	<0.0010	NC	20	
Copper	<0.0020	<0.0020	NC	20	
Iron	<0.10	<0.10	NC	20	
Lead	<0.00050	<0.00050	NC	20	
Manganese	<0.0025	<0.0025	8	20	
Nickel	<0.0020	<0.0020	7	20	
Silver	<0.00050	<0.00050	NC	20	
Thallium	<0.0020	<0.0020	NC	20	

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Duplicate - Batch: 500-98116**

**Method: 6020**

**Preparation: Soluble Metals  
Dissolved**

Lab Sample ID: 500-28779-1

Analysis Batch: 500-98378

Instrument ID: ICPMS2

Client Matrix: Water

Prep Batch: 500-98116

Lab File ID: MS2102810AA.csv

Dilution: 1.0

Units: mg/L

Initial Weight/Volume: 1.0 mL

Date Analyzed: 10/28/2010 1335

Final Weight/Volume: 1.0 mL

Date Prepared: 10/26/2010 1142

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Selenium	0.031	0.0379	19	20	
Zinc	<0.020	<0.020	NC	20	

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### Method Blank - Batch: 500-98248

Method: 7470A  
Preparation: 7470A

Lab Sample ID: MB 500-98248/1-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 0832  
Date Prepared: 10/27/2010 1511

Analysis Batch: 500-98340  
Prep Batch: 500-98248  
Units: mg/L

Instrument ID: HG5  
Lab File ID: 102810R.PRN  
Initial Weight/Volume: 25 mL  
Final Weight/Volume: 25 mL

Analyte	Result	Qual	RL
Mercury	<0.00020		0.00020

### Lab Control Sample - Batch: 500-98248

Method: 7470A  
Preparation: 7470A

Lab Sample ID: LCS 500-98248/2-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 0834  
Date Prepared: 10/27/2010 1511

Analysis Batch: 500-98340  
Prep Batch: 500-98248  
Units: mg/L

Instrument ID: HG5  
Lab File ID: 102810R.PRN  
Initial Weight/Volume: 25 mL  
Final Weight/Volume: 25 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Mercury	0.00200	0.00186	93	80 - 120	

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### Method Blank - Batch: 500-98202

Method: 9014  
Preparation: 9010B

Lab Sample ID: MB 500-98202/1-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1315  
Date Prepared: 10/27/2010 1020

Analysis Batch: 500-98243  
Prep Batch: 500-98202  
Units: mg/L

Instrument ID: SPEC5  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Result	Qual	RL
Cyanide, Total-Dissolved	<0.010		0.010



## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### Lab Control Sample - Batch: 500-98202

Method: 9014  
Preparation: 9010B

Lab Sample ID: LCS 500-98202/2-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1315  
Date Prepared: 10/27/2010 1020

Analysis Batch: 500-98243  
Prep Batch: 500-98202  
Units: mg/L

Instrument ID: SPEC5  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Cyanide, Total-Dissolved	0.100	0.0963	96	80 - 120	

### High Level Control Sample - Batch: 500-98202

Method: 9014  
Preparation: 9010B

Lab Sample ID: HLCS 500-98202/3-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1316  
Date Prepared: 10/27/2010 1020

Analysis Batch: 500-98243  
Prep Batch: 500-98202  
Units: mg/L

Instrument ID: SPEC5  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Cyanide, Total-Dissolved	0.400	0.368	92	90 - 110	

### Low Level Control Sample - Batch: 500-98202

Method: 9014  
Preparation: 9010B

Lab Sample ID: LLCS 500-98202/4-A  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1316  
Date Prepared: 10/27/2010 1020

Analysis Batch: 500-98243  
Prep Batch: 500-98202  
Units: mg/L

Instrument ID: SPEC5  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Cyanide, Total-Dissolved	0.0400	0.0431	108	75 - 125	

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Method Blank - Batch: 500-98305**

**Method: 9038**  
**Preparation: N/A**

Lab Sample ID: MB 500-98305/3  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 0628  
Date Prepared: N/A

Analysis Batch: 500-98305  
Prep Batch: N/A  
Units: mg/L

Instrument ID: SPEC3  
Lab File ID: N/A  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Result	Qual	RL
Sulfate-Dissolved	<5.0		5.0

**Lab Control Sample - Batch: 500-98305**

**Method: 9038**  
**Preparation: N/A**

Lab Sample ID: LCS 500-98305/4  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 0629  
Date Prepared: N/A

Analysis Batch: 500-98305  
Prep Batch: N/A  
Units: mg/L

Instrument ID: SPEC3  
Lab File ID: N/A  
Initial Weight/Volume: 100 mL  
Final Weight/Volume: 100 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Sulfate-Dissolved	20.0	18.2	91	80 - 120	

**Matrix Spike/  
Matrix Spike Duplicate Recovery Report - Batch: 500-98305**

**Method: 9038**  
**Preparation: N/A**

MS Lab Sample ID: 500-28779-3  
Client Matrix: Water  
Dilution: 8.0  
Date Analyzed: 10/27/2010 0633  
Date Prepared: N/A

Analysis Batch: 500-98305  
Prep Batch: N/A

Instrument ID: SPEC3  
Lab File ID: N/A  
Initial Weight/Volume: 100 mL  
Final Weight/Volume: 100 mL

MSD Lab Sample ID: 500-28779-3  
Client Matrix: Water  
Dilution: 8.0  
Date Analyzed: 10/27/2010 0634  
Date Prepared: N/A

Analysis Batch: 500-98305  
Prep Batch: N/A

Instrument ID: SPEC3  
Lab File ID: N/A  
Initial Weight/Volume: 100 mL  
Final Weight/Volume: 100 mL

Analyte	% Rec.		Limit	RPD	RPD Limit	MS Qual	MSD Qual
	MS	MSD					
Sulfate-Dissolved	112	108	75 - 125	2	20		

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Method Blank - Batch: 500-98277**

**Method: 9251**  
**Preparation: N/A**

Lab Sample ID: MB 500-98277/121  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1929  
Date Prepared: N/A

Analysis Batch: 500-98277  
Prep Batch: N/A  
Units: mg/L

Instrument ID: AQ2  
Lab File ID: 2010-10-27-19-58-1.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Result	Qual	RL
Chloride-Dissolved	<2.0		2.0

**Lab Control Sample - Batch: 500-98277**

**Method: 9251**  
**Preparation: N/A**

Lab Sample ID: LCS 500-98277/122  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1930  
Date Prepared: N/A

Analysis Batch: 500-98277  
Prep Batch: N/A  
Units: mg/L

Instrument ID: AQ2  
Lab File ID: 2010-10-27-19-58-1.csv  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Chloride-Dissolved	50.0	48.9	98	80 - 120	

**Matrix Spike - Batch: 500-98277**

**Method: 9251**  
**Preparation: N/A**

Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 5.0  
Date Analyzed: 10/27/2010 1949  
Date Prepared: N/A

Analysis Batch: 500-98277  
Prep Batch: N/A  
Units: mg/L

Instrument ID: AQ2  
Lab File ID: 2010-10-27-19-58-1.csv  
Initial Weight/Volume: 10 mL  
Final Weight/Volume: 10 mL

Analyte	Sample Result/Qual	Spike Amount	Result	% Rec.	Limit	Qual
Chloride-Dissolved	39	50.0	92.8	108	75 - 125	

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Method Blank - Batch: 500-98171**

**Method: SM 2540C**  
**Preparation: N/A**

Lab Sample ID: MB 500-98171/1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 2103  
Date Prepared: N/A

Analysis Batch: 500-98171  
Prep Batch: N/A  
Units: mg/L

Instrument ID: No Equipment Assigned  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Result	Qual	RL
Total Dissolved Solids-Dissolved	<10		10

**Lab Control Sample - Batch: 500-98171**

**Method: SM 2540C**  
**Preparation: N/A**

Lab Sample ID: LCS 500-98171/2  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 2106  
Date Prepared: N/A

Analysis Batch: 500-98171  
Prep Batch: N/A  
Units: mg/L

Instrument ID: No Equipment Assigned  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Total Dissolved Solids-Dissolved	250	264	106	80 - 120	

**Matrix Spike - Batch: 500-98171**

**Method: SM 2540C**  
**Preparation: N/A**

Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 2118  
Date Prepared: N/A

Analysis Batch: 500-98171  
Prep Batch: N/A  
Units: mg/L

Instrument ID: No Equipment Assigned  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Sample Result/Qual	Spike Amount	Result	% Rec.	Limit	Qual
Total Dissolved Solids-Dissolved	460	250	714	101	75 - 125	

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Duplicate - Batch: 500-98171**

**Method: SM 2540C**  
**Preparation: N/A**

Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/26/2010 2114  
Date Prepared: N/A

Analysis Batch: 500-98171  
Prep Batch: N/A  
Units: mg/L

Instrument ID: No Equipment Assigned  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Total Dissolved Solids-Dissolved	460	476	3	20	

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Method Blank - Batch: 500-98335**

**Method: SM 4500 F C**  
**Preparation: N/A**

Lab Sample ID: MB 500-98335/3  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 0924  
Date Prepared: N/A

Analysis Batch: 500-98335  
Prep Batch: N/A  
Units: mg/L

Instrument ID: PC-Titrate  
Lab File ID: 10102801.txt  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Result	Qual	RL
Fluoride-Dissolved	<0.10		0.10

**Lab Control Sample - Batch: 500-98335**

**Method: SM 4500 F C**  
**Preparation: N/A**

Lab Sample ID: LCS 500-98335/4  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 0927  
Date Prepared: N/A

Analysis Batch: 500-98335  
Prep Batch: N/A  
Units: mg/L

Instrument ID: PC-Titrate  
Lab File ID: 10102801.txt  
Initial Weight/Volume: 100 mL  
Final Weight/Volume: 100 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Fluoride-Dissolved	10.0	10.4	104	80 - 120	

**Matrix Spike/  
Matrix Spike Duplicate Recovery Report - Batch: 500-98335**

**Method: SM 4500 F C**  
**Preparation: N/A**

MS Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 0934  
Date Prepared: N/A

Analysis Batch: 500-98335  
Prep Batch: N/A

Instrument ID: PC-Titrate  
Lab File ID: 10102801.txt  
Initial Weight/Volume: 100 mL  
Final Weight/Volume: 100 mL

MSD Lab Sample ID: 500-28779-1  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 0937  
Date Prepared: N/A

Analysis Batch: 500-98335  
Prep Batch: N/A

Instrument ID: PC-Titrate  
Lab File ID: 10102801.txt  
Initial Weight/Volume: 100 mL  
Final Weight/Volume: 100 mL

Analyte	<u>% Rec.</u>		Limit	RPD	RPD Limit	MS Qual	MSD Qual
	MS	MSD					
Fluoride-Dissolved	87	88	75 - 125	2	20		

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Method Blank - Batch: 500-98250**

**Method: SM 4500 NO2 B**  
**Preparation: N/A**

Lab Sample ID: MB 500-98250/3  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1111  
Date Prepared: N/A

Analysis Batch: 500-98250  
Prep Batch: N/A  
Units: mg/L

Instrument ID: SPEC5  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Result	Qual	RL
Nitrogen, Nitrite-Dissolved	<0.020		0.020

**Lab Control Sample - Batch: 500-98250**

**Method: SM 4500 NO2 B**  
**Preparation: N/A**

Lab Sample ID: LCS 500-98250/4  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1111  
Date Prepared: N/A

Analysis Batch: 500-98250  
Prep Batch: N/A  
Units: mg/L

Instrument ID: SPEC5  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Nitrogen, Nitrite-Dissolved	0.100	0.0997	100	80 - 120	

**Matrix Spike/  
Matrix Spike Duplicate Recovery Report - Batch: 500-98250**

**Method: SM 4500 NO2 B**  
**Preparation: N/A**

MS Lab Sample ID: 500-28779-3  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1113  
Date Prepared: N/A

Analysis Batch: 500-98250  
Prep Batch: N/A

Instrument ID: SPEC5  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

MSD Lab Sample ID: 500-28779-3  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1114  
Date Prepared: N/A

Analysis Batch: 500-98250  
Prep Batch: N/A

Instrument ID: SPEC5  
Lab File ID: N/A  
Initial Weight/Volume: 50 mL  
Final Weight/Volume: 50 mL

Analyte	% Rec.		Limit	RPD	RPD Limit	MS Qual	MSD Qual
	MS	MSD					
Nitrogen, Nitrite-Dissolved	92	95	75 - 125	3	20		

## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

**Method Blank - Batch: 500-98229**

**Method: SM 4500 NO3 F**  
**Preparation: N/A**

Lab Sample ID: MB 500-98229/3  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1003  
Date Prepared: N/A

Analysis Batch: 500-98229  
Prep Batch: N/A  
Units: mg/L

Instrument ID: AQ2  
Lab File ID: 2010-10-27-11-37-12.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Result	Qual	RL
Nitrogen, Nitrate Nitrite-Dissolved	<0.10		0.10

**Lab Control Sample - Batch: 500-98229**

**Method: SM 4500 NO3 F**  
**Preparation: N/A**

Lab Sample ID: LCS 500-98229/4  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1006  
Date Prepared: N/A

Analysis Batch: 500-98229  
Prep Batch: N/A  
Units: mg/L

Instrument ID: AQ2  
Lab File ID: 2010-10-27-11-37-12.csv  
Initial Weight/Volume: 100 mL  
Final Weight/Volume: 100 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Nitrogen, Nitrate Nitrite-Dissolved	1.00	1.10	110	80 - 120	

**Matrix Spike/  
Matrix Spike Duplicate Recovery Report - Batch: 500-98229**

**Method: SM 4500 NO3 F**  
**Preparation: N/A**

MS Lab Sample ID: 500-28779-4  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1058  
Date Prepared: N/A

Analysis Batch: 500-98229  
Prep Batch: N/A

Instrument ID: AQ2  
Lab File ID: 2010-10-27-11-37-12.csv  
Initial Weight/Volume: 10 mL  
Final Weight/Volume: 10 mL

MSD Lab Sample ID: 500-28779-4  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/27/2010 1101  
Date Prepared: N/A

Analysis Batch: 500-98229  
Prep Batch: N/A

Instrument ID: AQ2  
Lab File ID: 2010-10-27-11-37-12.csv  
Initial Weight/Volume: 10 mL  
Final Weight/Volume: 10 mL

Analyte	% Rec.		Limit	RPD	RPD Limit	MS Qual	MSD Qual
	MS	MSD					
Nitrogen, Nitrate Nitrite-Dissolved	56	54	75 - 125	3	20	F	F



## Quality Control Results

Client: Patrick Engineering

Job Number: 500-28779-1

### Method Blank - Batch: 500-98362

Method: SM 4500 NO3 F  
Preparation: N/A

Lab Sample ID: MB 500-98362/34  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 1021  
Date Prepared: N/A

Analysis Batch: 500-98362  
Prep Batch: N/A  
Units: mg/L

Instrument ID: AQ2  
Lab File ID: 2010-10-28-11-30-20.csv  
Initial Weight/Volume: 1.0 mL  
Final Weight/Volume: 1.0 mL

Analyte	Result	Qual	RL
Nitrogen, Nitrate Nitrite-Dissolved	<0.10		0.10

### Lab Control Sample - Batch: 500-98362

Method: SM 4500 NO3 F  
Preparation: N/A

Lab Sample ID: LCS 500-98362/35  
Client Matrix: Water  
Dilution: 1.0  
Date Analyzed: 10/28/2010 1023  
Date Prepared: N/A

Analysis Batch: 500-98362  
Prep Batch: N/A  
Units: mg/L

Instrument ID: AQ2  
Lab File ID: 2010-10-28-11-30-20.csv  
Initial Weight/Volume: 100 mL  
Final Weight/Volume: 100 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Nitrogen, Nitrate Nitrite-Dissolved	1.00	1.05	105	80 - 120	

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484  
Phone: 708.534.5200 Fax: 708.534.5211

Report To (optional) ANDREW GAGNON  
 Contact: ANDREW GAGNON  
 Company: PATRICK ENG  
 Address: 4970 VARSITY DR  
 Address: LISLE IL 60532  
 Phone: 630-795-7200  
 Fax: \_\_\_\_\_  
 E-Mail: AGAGNON@PATRICKENGINEERING.COM

Bill To (optional) SAME  
 Contact: SAME  
 Company: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Fax: \_\_\_\_\_  
 E-Mail: 21053.070-200

## Chain of Custody Record

Lab Job #: 500-20779  
 Chain of Custody Number: \_\_\_\_\_  
 Page \_\_\_\_\_ of \_\_\_\_\_  
 Temperature °C of Cooler: 2.1

Client		Client Project #		Preservative		Parameter		Comments	
<u>PATRICK ENG</u>		<u>21053.070-200</u>		<u>WATER</u>		<u>SEE ATTACHED LIST</u>		Preservative Key 1. HCL, Cool to 4° 2. H2SO4, Cool to 4° 3. HNO3, Cool to 4° 4. NaOH, Cool to 4° 5. NaOH/Zn, Cool to 4° 6. NaHSO4 7. Cool to 4° 8. None 9. Other	
Project Name		Lab Project #		Sampling		Matrix		Comments	
<u>MIDWEST GENERATION</u>		_____		Date Time		# of Containers		_____	
Project Location/State		Lab PM		Date		Time		# of Containers	
<u>WAUKEGAN IL</u>		_____		Date		Time		# of Containers	
Sampler		Sample ID		Date		Time		# of Containers	
<u>MPS</u>		Sample ID		Date		Time		# of Containers	
<u>1</u>	<u>MSMSD</u>	<u>MW-01</u>	<u>10/25</u>	<u>16:45</u>	<u>5</u>	<u>W</u>			
<u>2</u>		<u>MW-02</u>	<u>10/25</u>	<u>16:15</u>	<u>5</u>	<u>W</u>			
<u>3</u>		<u>MW-03</u>	<u>10/25</u>	<u>15:30</u>	<u>5</u>	<u>W</u>			
<u>4</u>		<u>MW-04</u>	<u>10/25</u>	<u>14:45</u>	<u>5</u>	<u>W</u>			
<u>5</u>		<u>MW-05</u>	<u>10/25</u>	<u>13:00</u>	<u>5</u>	<u>W</u>			

Turnaround Time Required (Business Days)  
 1 Day  2 Days  5 Days  / Days  10 Days  15 Days  Other \_\_\_\_\_

Requested Due Date \_\_\_\_\_

Sample Disposal  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By: <u>[Signature]</u>	Company: <u>PATRICK</u>	Date: <u>10/26</u>	Time: <u>1000</u>	Received By: <u>[Signature]</u>	Company: <u>EA</u>	Date: <u>10/26/10</u>	Time: <u>1000</u>
Relinquished By: _____	Company: _____	Date: _____	Time: _____	Received By: _____	Company: _____	Date: _____	Time: _____
Relinquished By: _____	Company: _____	Date: _____	Time: _____	Received By: _____	Company: _____	Date: _____	Time: _____

Lab Courier: \_\_\_\_\_  
 Shipped: \_\_\_\_\_  
 Hand Delivered: \_\_\_\_\_

- Matrix Key
- WW - Wastewater
  - W - Water
  - S - Soil
  - SL - Sludge
  - MS - Miscellaneous
  - OL - Oil
  - A - Air
  - SE - Sediment
  - SO - Soil
  - L - Leachate
  - WI - Wipe
  - DW - Drinking Water
  - O - Other

Client Comments: \_\_\_\_\_

Lab Comments: \_\_\_\_\_

**TABLE 1**  
**PROPOSED SAMPLING AND ANALYSIS PLAN**  
**Midwest Generation, LLC**  
**Powerton Generating Station**  
**Waukegan, Pekin, Illinois**  
**July 2010**

Parameter	Analysis Method
pH	Field Parameter
Specific Conductance	Field Parameter
Groundwater Depth	Field Parameter
Well Depth	Field Parameter
Boron <sup>a</sup>	Laboratory Parameter
Sulfate <sup>b</sup>	Laboratory Parameter
Iron <sup>a</sup>	Laboratory Parameter
Manganese <sup>a</sup>	Laboratory Parameter
Total Dissolved Solids <sup>c</sup>	Laboratory Parameter
Antimony <sup>a</sup>	Laboratory Parameter
Arsenic <sup>a</sup>	Laboratory Parameter
Barium <sup>a</sup>	Laboratory Parameter
Beryllium <sup>a</sup>	Laboratory Parameter
Cadmium <sup>a</sup>	Laboratory Parameter
Chloride <sup>d</sup>	Laboratory Parameter
Chromium <sup>a</sup>	Laboratory Parameter
Cobalt <sup>a</sup>	Laboratory Parameter
Copper <sup>a</sup>	Laboratory Parameter
Cyanide <sup>a</sup>	Laboratory Parameter
Fluoride <sup>a</sup>	Laboratory Parameter
Lead <sup>a</sup>	Laboratory Parameter
Mercury <sup>e</sup>	Laboratory Parameter
Nickel <sup>a</sup>	Laboratory Parameter
Nitrate as N <sup>f</sup>	Laboratory Parameter
Selenium <sup>a</sup>	Laboratory Parameter
Silver <sup>a</sup>	Laboratory Parameter
Thallium <sup>a</sup>	Laboratory Parameter
Zinc <sup>a</sup>	Laboratory Parameter

## NOTES:

<sup>a</sup> Dissolved metals analyzed by SW-846 Method 6020<sup>b</sup> Dissolved sulfate analyzed by SW-846 Method 9038<sup>c</sup> Total dissolved solids analyzed by SW-846 Method 2540C<sup>d</sup> Dissolved chloride analyzed by SW-846 Method 9251<sup>e</sup> Dissolved mercury analyzed by SW-846 Method 7470A<sup>f</sup> Dissolved nitrate analyzed by SW-846 Method 4500 NO<sub>2</sub> and NO<sub>3</sub>

## Login Sample Receipt Check List

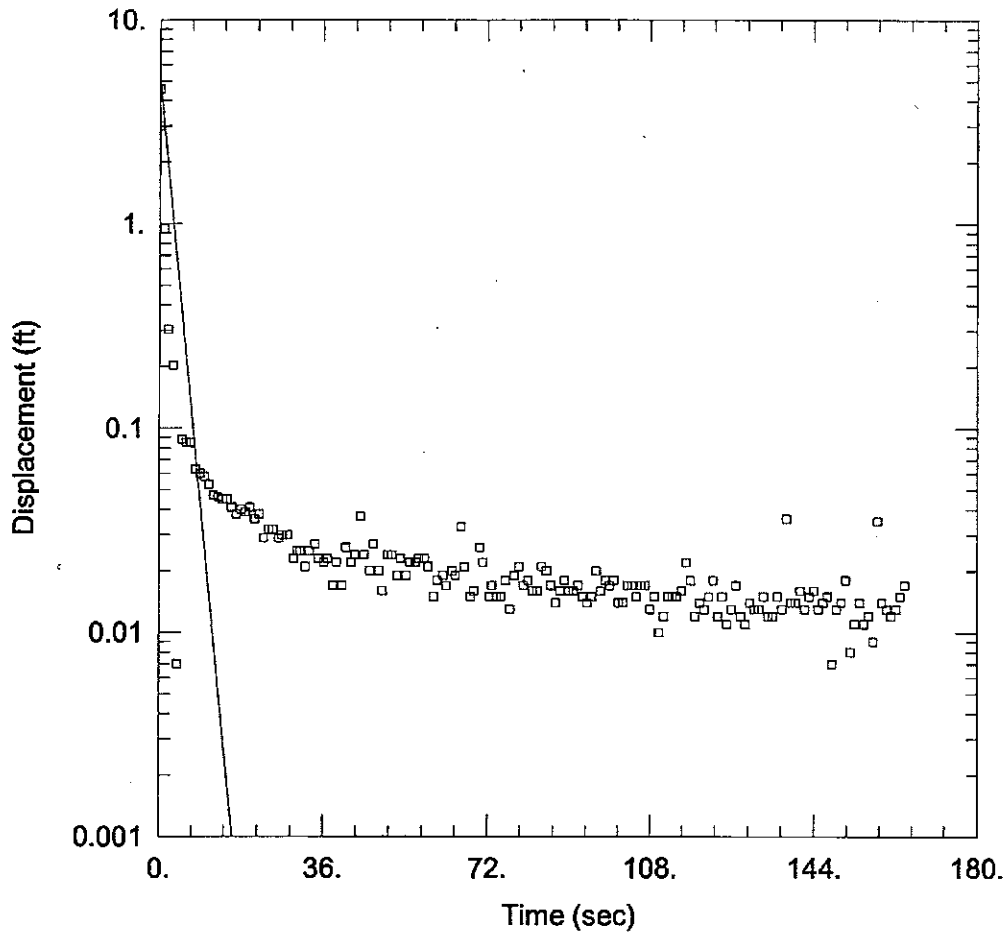
Client: Patrick Engineering

Job Number: 500-28779-1

**Login Number: 28779**  
**Creator: Kelsey, Shawn M**  
**List Number: 1**

**List Source: TestAmerica Chicago**

Question	T / F / NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	



WELL TEST ANALYSIS

Data Set: P:\...waukegan mw-3 d2.aqt  
 Date: 02/18/11

Time: 09:16:45

PROJECT INFORMATION

Company: Patrick Engineering  
 Client: Midwest Generation  
 Project: 21053.070  
 Location: Waukegan  
 Test Well: MW-1 (u2)  
 Test Date: 12/22/10

AQUIFER DATA

Saturated Thickness: 7.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-3 (d2))

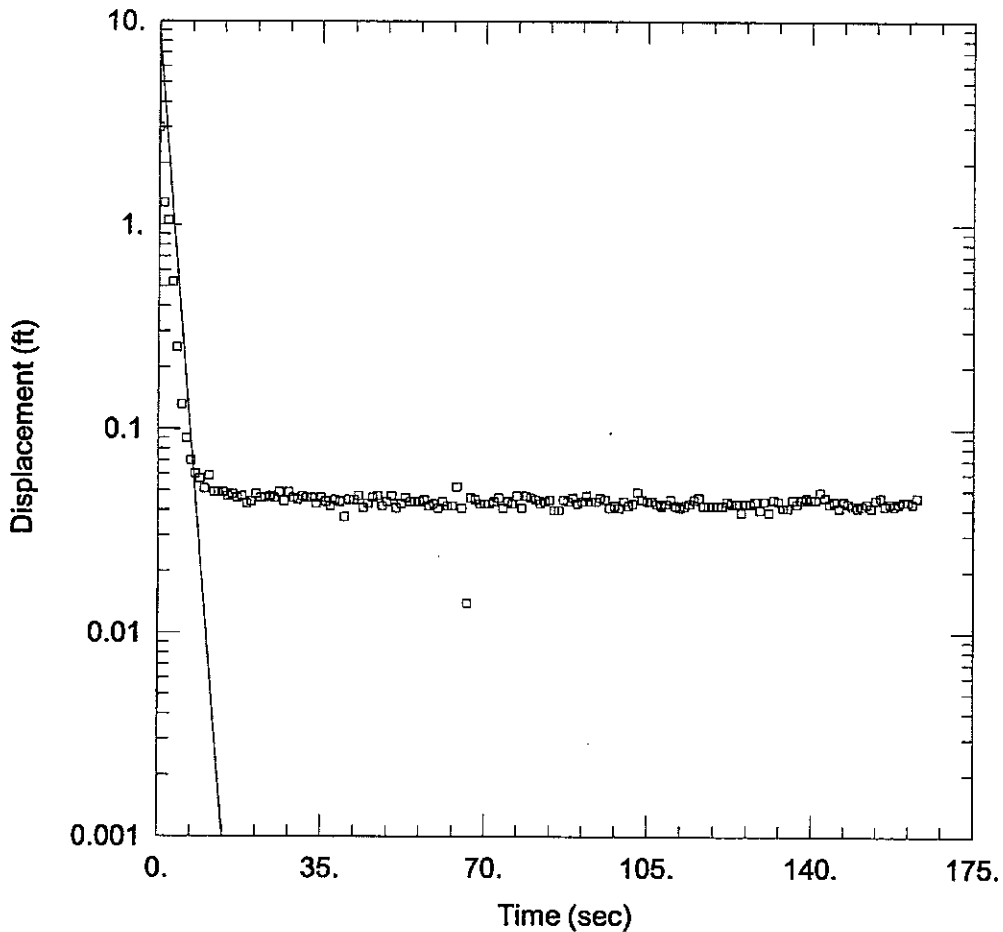
Initial Displacement: 3. ft  
 Total Well Penetration Depth: 29.84 ft  
 Casing Radius: 0.2 ft

Static Water Column Height: 7.8 ft  
 Screen Length: 10. ft  
 Well Radius: 0.085 ft  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined  
 K = 0.004353 ft/sec

Solution Method: Bower-Rice  
 y0 = 5.111 ft



WELL TEST ANALYSIS

Data Set: P:\...waukegan mw-1 u2.aqt  
 Date: 02/18/11

Time: 09:17:01

PROJECT INFORMATION

Company: Patrick Engineering  
 Client: Midwest Generation  
 Project: 21053.070  
 Location: Waukegan  
 Test Well: MW-1 (u2)  
 Test Date: 12/22/10

AQUIFER DATA

Saturated Thickness: 9.62 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1 (u2))

Initial Displacement: 3. ft  
 Total Well Penetration Depth: 31.92 ft  
 Casing Radius: 0.2 ft

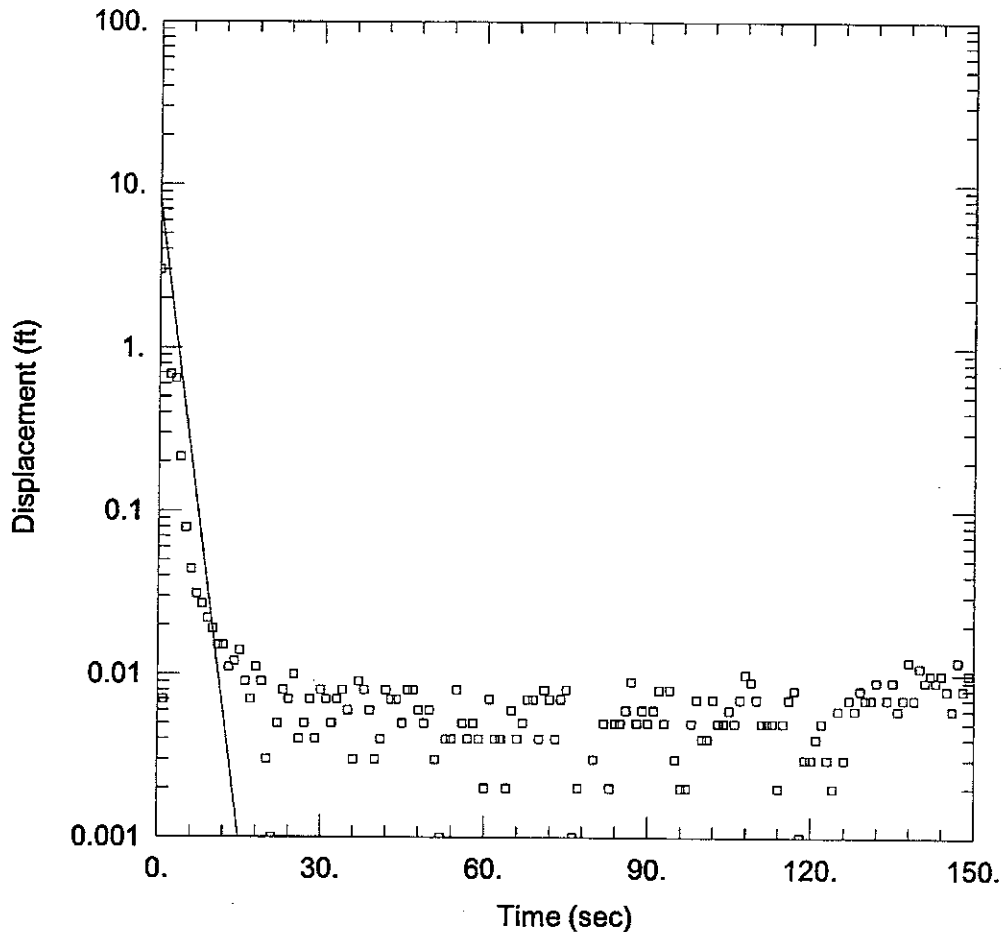
Static Water Column Height: 9.62 ft  
 Screen Length: 10. ft  
 Well Radius: 0.085 ft  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined  
 K = 0.004406 ft/sec

Solution Method: Bower-Rice  
 y0 = 8.075 ft





**WELL TEST ANALYSIS**

Data Set: P:\...waukegan mw-5 u3.aqt  
 Date: 02/18/11

Time: 09:17:32

**PROJECT INFORMATION**

Company: Patrick Engineering  
 Client: Midwest Generation  
 Project: 21053.070  
 Location: Waukegan  
 Test Well: MW-1 (u2)  
 Test Date: 12/22/10

**AQUIFER DATA**

Saturated Thickness: 9.56 ft

Anisotropy Ratio (Kz/Kr): 1.

**WELL DATA (MW-5 (u3))**

Initial Displacement: 3. ft  
 Total Well Penetration Depth: 32.18 ft  
 Casing Radius: 0.2 ft

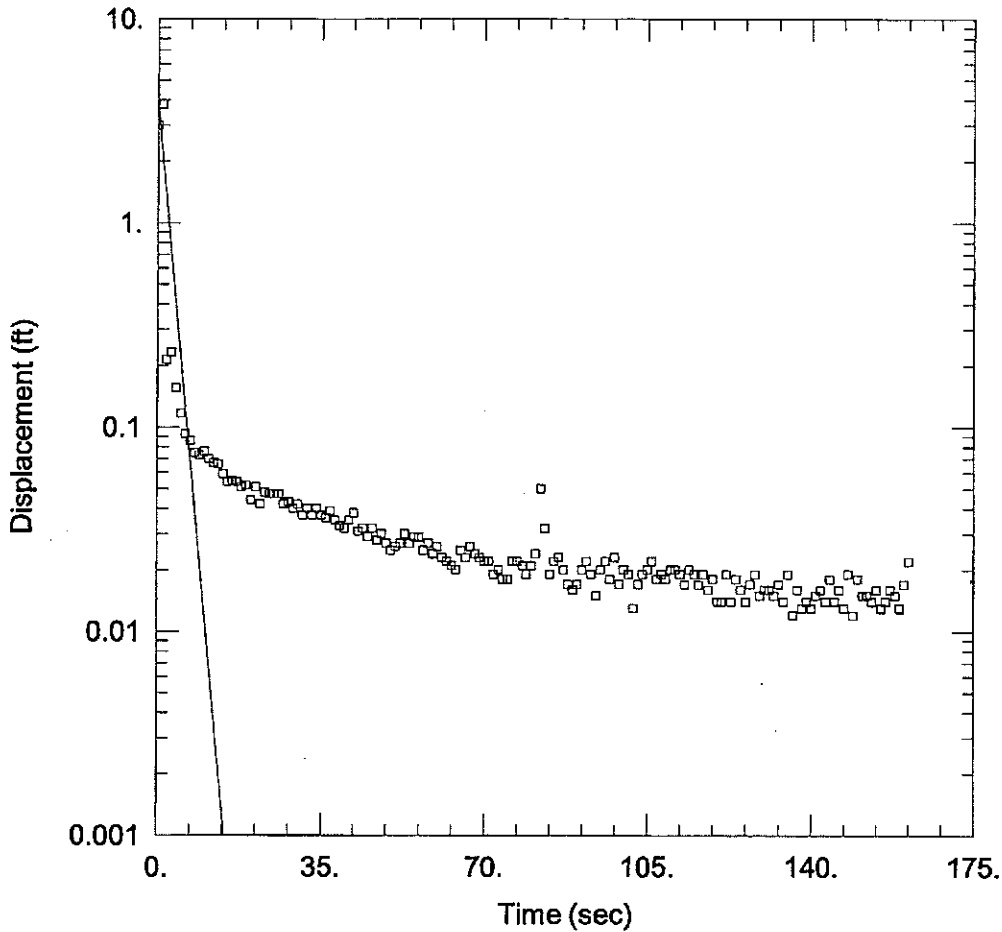
Static Water Column Height: 9.56 ft  
 Screen Length: 10. ft  
 Well Radius: 0.085 ft  
 Gravel Pack Porosity: 0.

**SOLUTION**

Aquifer Model: Unconfined  
 K = 0.004135 ft/sec

Solution Method: Bouwer-Rice  
 $y_0 =$  7.778 ft





**WELL TEST ANALYSIS**

Data Set: P:\...waukegan mw-5 d3.aqt  
 Date: 02/18/11

Time: 09:18:36

**PROJECT INFORMATION**

Company: Patrick Engineering  
 Client: Midwest Generation  
 Project: 21053.070  
 Location: Waukegan  
 Test Well: MW-1 (u2)  
 Test Date: 12/22/10

**AQUIFER DATA**

Saturated Thickness: 9.56 ft

Anisotropy Ratio (Kz/Kr): 1.

**WELL DATA (MW-5 (d3))**

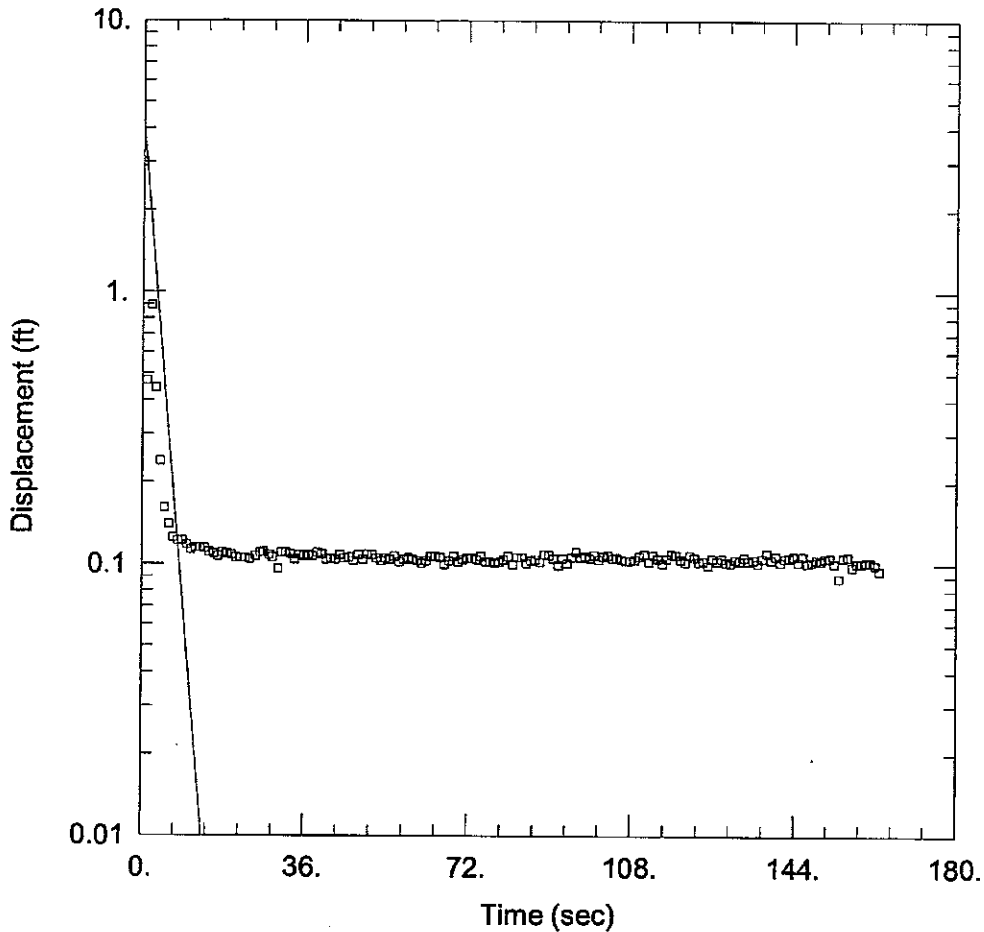
Initial Displacement: 3. ft  
 Total Well Penetration Depth: 32.18 ft  
 Casing Radius: 0.2 ft

Static Water Column Height: 9.56 ft  
 Screen Length: 10. ft  
 Well Radius: 0.085 ft  
 Gravel Pack Porosity: 0.

**SOLUTION**

Aquifer Model: Unconfined  
 K = 0.003948 ft/sec

Solution Method: Bower-Rice  
 y0 = 3.829 ft



WELL TEST ANALYSIS

Data Set: P:\...waukegan mw-3 u3.aqt  
 Date: 02/18/11

Time: 09:19:02

PROJECT INFORMATION

Company: Patrick Engineering  
 Client: Midwest Generation  
 Project: 21053.070  
 Location: Waukegan  
 Test Well: MW-1 (u2)  
 Test Date: 12/22/10

AQUIFER DATA

Saturated Thickness: 7.8 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-3 (u3))

Initial Displacement: 3. ft  
 Total Well Penetration Depth: 29.84 ft  
 Casing Radius: 0.2 ft

Static Water Column Height: 7.8 ft  
 Screen Length: 10. ft  
 Well Radius: 0.085 ft  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bower-Rice

K = 0.00367 ft/sec

y0 = 4.161 ft