Illinois Environmental Protection Agency

1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276 • (217) 782-3397

Coal Combustion Residual Surface Impoundment Permitting Program

Application Form CCR 1:

General Provisions

This form must be submitted for all Construction and Operating Permit Applications. Two sets of the applications must be submitted. Items which are self-explanatory are omitted in these instructions. Signatures on at least one (1) submittal must be original.

The owner or operator must place in the facility's operating record all permit applications submitted to the Agency and all permits issued under 35 IAC 845 as required by 35 IAC 845.800(d)(1).

DESCRIPTION OF CCR PERMIT APPLICATIONS FORMS

The application forms for Coal Combustion Residual (CCR) Surface Impoundment permits include the following:

Form CCR 1 – General Provisions (included in this packet)

Form CCR 2 – Forms Based on Activity Type (Not included in this packet):

- 2 CN New Construction
- 2 CA Corrective Active Construction
- 2 CC Closure Construction
- 2 N Initial Operating Permit for a <u>New</u> CCR surface impoundment and any lateral expansion of a CCR surface impoundment
- 2 R Renewal Operating Permit
- 2 E Initial Operating Permit for Existing or Inactive Surface Impoundments that have *<u>not</u>* completed an Agency approved closure before July 30, 2021
- 2 OE Initial Operating Permit for Existing, Inactive that *<u>have</u>* completed an Agency approved closure before July 30, 2021
- 2 OI Initial Operating Permit for inactive closed CCR surface impoundments

1. Are you building a new CCR surface impoundment, lateral expansion or a CCR surface impoundment, orretrofitting an existing CCR surface impoundment?	2. Are you performing corrective action under Subpart F of the Rule?
Yes → Complete Forms CCR 1 and 2 CN	Yes → Complete Forms CCR 1 and 2 CA
3. Are you closing a CCR surface impoundment under Subpart G of the Act?	4. Are you submitting an Initial Operating Permit for a new CCR surface impoundment and any lateral expansion of aCCR surface impoundment?
Yes → Complete Forms CCR 1 and 2CC	Yes → Complete Forms CCR 1 and 2N
5. Are you renewing an Operating Permit?	6. Are you submitting a Post-Closure Care OperatingPermit?
Yes → Complete Forms CCR 1 and 2R	Yes → Complete Forms CCR 1 and 2E
7. Are you submitting an initial Operating Permit for Existing, Inactive, and Inactive Closed Surface Impoundments that have not completed an Agency approved closure before July 30, 2021?	8. Are you submitting an Initial Operating Permit for Existing,Inactive, and Inactive Closed Surface Impoundments thathave completed an Agency approved closure before July 30, 2021?
Yes → Complete Forms CCR 1 and 2OE	Yes → Complete Forms 1 and 2OI

CONTENTS OF FORM CCR 1 PACKAGE

Form CCR 1 – General Instructions
Form CCR 1 – Line-by-line Instructions
Form CCR 1 - Application

FORM CCR 1 – GENERAL INSTRUCTIONS

Who Must Apply for an CCR Surface Impoundment Permit?

Owners and operators of new and existing CCR surface impoundments, including any lateral expansions of CCR surface impoundments that dispose of or otherwise engage in solid waste management of CCR generated from the combustion of coal at electric utilities and independent power producers.

What other forms must be completed?

Form CCR 1 collects general information only. You must also complete a more detailed application based uponyour proposed activity(s) as, follows:

- If your facility is building a new CCR Impoundment, lateral expansion of a CCR surface impoundment, or retrofit of an existing CCR impoundment; you must also complete Forms CCR CN for each new CCR Impoundment, lateral expansion of a CCR surface impoundment, or retrofit of an existing CCR surface impoundment.
- If your facility will be performing any corrective action under Subpart F of 35 IAC 845, you must also complete Form CCR 2CA for each CCR impoundment undergoing corrective action.
- If your facility is closing a CCR surface impoundment under Subpart G of 35 IAC 845, you must also complete Form CCR 2CC for each CCR impoundment that you will be closing.
- If your facility is applying for an initial operating permit for a new CCR surface impoundment and any lateral expansion of a CCR surface impoundment, you must also complete Form CCR 2N for each newCCR surface impoundment and any lateral expansion of a CCR surface impoundment.

listed if they have questions on the material submitted.

Item 1.8 Enter the address of the Owner/Operator

Section 2: Legal Description

Item 2.1 Provide the legal description of the facility boundary.

Section 3: Publicly Accessible Internet Site Requirement

Item 3.1 Enter the web address

Item 3.2 Select yes, to indicate that the website is titled, "Illinois CCR Rule Compliance Data and Information"

Section 4: Impoundment identification

Item 4.1 List all the Impoundment Identification numbers for your facility and check the corresponding box to indicate that you have attached a written description for each impoundment.

Section 5: Checklist and Certification

Item 5.1 Review the checklist provided. In Column 1, mark the sections of Form CCR1 that you have completed and are submitting with your application. In Column 2, indicate for each section whether you are submitting attachments.

Item 5.2 Certification Statement: The IEPA provides for severe penalties for submitting false information this application form. 415 ILCS provides that, "Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony."

All permit applications must be signed by the owner, operator, or a duly authorized agent of the operator. 35 IAC 845.210(b)(2)

An application submitted by a corporation must be signed by a principal executive officer of at least the level of vice president, or his or her duly authorized representative, if that representative is responsible for the overall operation of the facility described in the application form. In the case of a partnership or a sole proprietorship, the application must be signed by a general partner or the proprietor, respectively. In the case of a publicly owned facility, the application must be signed by either the principal executive officer, ranking elected official, or other duly authorized employee. 35 IAC 845.210(b)(3)

This form must be typewritten or printed legibly. This form may be completed manually or online using Adobe Reader, a copy of it saved locally, printed, and signed before it is submitted to:

Illinois EPA
Bureau of Water, #15
Attn: CCR Rule Submittal
P.O. Box 19276 Springfield, IL 62794-9276

Facility, Operator, and Owner Info		
1.7	Owner/Operator Contact Information	

Name (first and last)	Title	Phone Number
Todd Mundorf	Plant Manager	309-477-5212

Email address
Todd.Mundorf@NRG.com

1.8 Owner/Operator Mailing Address

Street or P.O. box		
804 Carnegie Center		
City or town	State	Zip Code
Princeton	New Jersey	08540

SECTION 2: LEGAL DESCRIPTION (35 IAC 845.210(c))

Legal Description

2.1 Legal Description of the facility boundary

SEC 9 T24N R5W LYING W OF RR IN W 1/2 & W 50 X 2220.46 OF ADJ RR (EXC 2.05 AC TRACT) NW 1/4 300.7 AC

SECTION 3: PUBLICLY ACCESSIBLE INTERNET SITE REQUIREMENTS (35 IAC 845.810)

Internet Site

3.1 Web Address(es) to publicly accessible internet site(s) (CCR website)

https://midwestgenerationllc.com/illinois-ccr-rule-compliance-data-and-information/

3.2 Is/are the website(s) titled "Illinois CCR Rule Compliance Data and Information"

(Yes) No

SECTION 4: IMPOUNDMENT IDENTIFICATION

Impoundment Identification

4.1 List all the Impoundment Identification numbers for your facility and check the corresponding box to indicate that you have attached a written description for each impoundment.

W1798010008-05	☑	Attached written description
	☐	Attached written description
	☐	Attached written description
	☐	Attached written description
	☐	Attached written description
	☐	Attached written description
	☐	Attached written description

Form 2CC	Illinois Environmental Protection Agency CCR Surface Impoundment Permit Application Form CCR 2CC – Closure Construction

Bureau of Water ID Number: **CCR Permit Number:** **Facility Name:**	For IEPA Use Only

SECTION 1: DESIGN AND CONSTRUCTION PLANS (35 Ill. Adm. Code 845.220)

Design and Construction Plans (Construction History)

1.1	CCR surface impoundment name.	
	Former Ash Basin	
1.2	Identification number of the CCR surface impoundment (if one has been assigned by the Agency).	
	1798010008-05	
1.3	Describe the boundaries of the CCR surface impoundment (35 Ill. Adm. Code 845.210 (c)).	
	SEC 9 T24N R5W LYING W OF RR IN W 1/2 & W 50 X 2220.46 OF ADJ RR (EXC 2.05 AC TRACT) NW 1/4	
1.4	State the purpose for which the CCR surface impoundment is being used.	
	Used as a former settling pond for sluiced CCR associated with the electrical power generating process. The surface impoundment is inactive.	
1.5	How long has the CCR surface impoundment been in operation?	
	approximately 40-50 years	
1.6	List the types of CCR that have been placed in the CCR surface impoundment.	
	unknown	

SECTION 2: NARRATIVE DESCRIPTION OF THE FACILITY (35 Ill. Adm. Code 845.220)			
Narrative Description	2.1	List the types of CCR expected in the CCR surface impoundments.	
		Unknown. The FAB was used for historical CCR disposal	
	2.2	Have you attached a chemical analysis of each type of expected CCR?	
		☑	Yes
	2.3	Estimate of the maximum capacity of the surface impoundment in gallons or cubic yards.	
		north portion = 465,000 cubic yards; south portion = 240,000 CY	
	2.4	The rate at which CCR and non-CCR waste streams currently enter the CCR impoundment in gallons per day and dry tons.	
		0 GPD	0 dTn
	2.5	Estimate length of time the CCR surface impoundment will receive CCR and non-CCR waste streams.	
		The surface impoundment is inactive	
	2.6	Have you attached an on-site transportation plan that includes all existing and planned roads in the facility that will be used during the operation of the CCR surface impoundment?	
		☑	Yes

SECTION 3: MAPS (35 Ill. Adm. Code 845.220)			
Maps	3.1	Check the corresponding boxes to indicate that you have attached the following maps:	
		☑	A site location map on the most recent United Sates Geological Survey (USGS) quadrangle of the area from the 7 ½ minute series (topographic) or on another map whose scale clearly shows the information required in 35 Ill. Adm. Code 845.220(a)(3).
		☑	Site plans maps satisfying the requirements of 35 Ill. Adm. Code 845.220(a)(4).

SECTION 4: ATTACHMENTS			
Attachments	4.1	Check the corresponding boxes to indicate that you have attached the following:	
		☑	A narrative description of the proposed construction of, or modification to, a CCR surface impoundment and any projected changes in the volume or nature of the CCR or non-CCR waste streams.
		☑	Plans and specifications fully describing the design, nature, function, and interrelationship of each individual component of the facility.
		☑	The signature and seal of a qualified professional engineer.
		☑	Certification that the owner or operator of the CCR surface impoundment completed the public notification and public meetings required under 35 Ill. Adm. Code 845.240.

		☐	Capture zone modeling, if applicable.
		☑	Any necessary licenses and software needed to review and access both the model and the data contained within the model.

K P R G

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

APPLICATION FOR CONSTRUCTION PERMIT – FORMER ASH BASIN

POWERTON GENERATING STATION
MIDWEST GENERATION, LLC
PEKIN, ILLINOIS

Illinois EPA Site No. 1798010008-05

October 26, 2022

Submitted To:

Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, Illinois 62702

Prepared For:

Midwest Generation, LLC
13082 East Manito Rd.
Pekin, IL 61554

Prepared By:

KPRG and Associates, Inc.
14665 West Lisbon Road, Suite 1A
Brookfield, WI 53005

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Introduction

Midwest Generation, LLC (Midwest Generation) currently operates the coal-fired generating station, referred to as Powerton Station, located in Pekin, Illinois ("site" or "generating station"). As part of generating electricity and managing coal combustion residuals (CCR), the station operates two active CCR surface impoundments (the Ash Surge Basin (ASB) and Ash Bypass Basin (ABB)). The station also operates the Metal Cleaning Basin (MCB), a CCR surface impoundment subject to the state CCR regulations. As part of the earlier historical operations at the station, the Former Ash Basin (FAB) was used for the management/storage of CCR and has been identified as an inactive CCR surface impoundment subject to Federal and State regulation.

The objective of this submittal is to apply for the initial construction permit for the FAB at the Powerton Generating Station. Midwest Generation seeks to receive the construction permit to close the FAB by closure in place in compliance with the State CCR Rule. The information required for a construction permit application for existing surface impoundments as specified under 35 Ill. Adm. Code 845.220 of the State CCR Rule is provided in the following sections.

This permit application is organized with supporting Tables and Figures that are referenced in the discussions being provided at the end of the full Permit text with the table numbers and figures tied to the Section number within which they are referenced with sequential numbering (e.g., Tables referenced in Section 9 are numbered 9-1, 9-2, etc. Figures referenced in Section 9 are numbered Figure 9-1, 9-2, etc.). Specific Attachments referenced within each Section are provided in a similar fashion (e.g., Attachment 1 information is tied to Section 1 of the Permit text, Attachment 2 information is tied to Section 2 of the Permit text, etc.). It should be noted that if a Section does not reference an Attachment, then that Attachment number is not included as part of the permit application. For example, Section 10 does not reference an Attachment; therefore, there is no Attachment 10 in this permit application.

1.0 History of Construction, 845.220(a)(1)

The history of construction of the CCR surface impoundment as specified in Section 845.220(a)(1) is presented below.

1.1 CCR Surface Impoundment Identifying Information

The identifying information associated with the CCR surface impoundment at the generating station is listed in the table below.

Name	Owner/Operator	Impoundment ID Number
Former Ash Basin	Midwest Generation 804 Carnegie Center Princeton, NJ 08540	W1798010008-05

1.2 Purpose of CCR Impoundment

The Former Ash Basin (FAB) is an inactive surface impoundment that was previously used for disposal of unknown types of ash. It is estimated that the FAB stopped receiving CCR by the 1970's.

1.3 CCR Impoundment Length of Operation

Due to the age of the FAB, there is no documentation of when it was constructed. The Powerton Station began operating its first generating unit in approximately 1928 and the FAB was used previously as a CCR impoundment. Midwest Generation has not sent coal ash to this basin since purchasing the station in 1999. Based on available information, it is estimated that the FAB stopped receiving CCR by the 1970's. If the FAB was used for CCR management since the station began operating, then the FAB operated for approximately 40-50 years.

1.4 Type of CCR in Impoundment

The FAB is currently inactive and was historically used for CCR disposal, however, the types of CCR placed into the FAB is not documented. According to Geosyntec's History of Construction, it has been estimated that it stopped receiving CCR in the 1970's. The chemical constituents that make up the CCR is discussed in further detail in Section 2.

1.5 Name and Size of the Watershed

The Former Ash Basin is located within the Pekin Lake-Illinois River subwatershed (HUC12 071300030304), which is approximately 28,847 acres (USGS 2015).

1.6 Description of CCR Impoundment Foundation

The following description of the Former Ash Basin's foundation is provided in the History of Construction created by Geosyntec.

"The FAB was constructed with fill embankments on the north, east, and west sides. The south side of the FAB is currently incised. Because no in-situ or native materials provide lateral structural support for the embankments, the basins do not contain abutments".

The following sections discuss the foundation materials' physical and engineering properties.

1.6.1 Physical Properties of Foundation Materials

The physical properties of the foundation materials in the vicinity generally consists of interlayering of sandy and clayey units. Soil borings performed in 2005 as part of a KPRG site investigation identified layers of sand with silt and gravel, silty sand with traces of clay from the ground surface to a depth of about 20 feet. Approximately 100 to 125 feet of alluvial sands and gravels with some minor clay underlies the Station based on publicly available geologic information. Silt and clay layers were observed beneath the fill material used to construct the basin's embankments based on logs from monitoring wells installed in the basin's embankments as well as borings and cone penetration test (CPT) soundings performed in the vicinity of the basin. This information was obtained from site investigation work performed by Patrick Engineering in 2011 and Geosyntec in 2016. The logs and CPT soundings show that the silt and clay layers range from 16 to 20 feet thick and these layers are underlain by approximately 34 to 43 feet of medium dense sand and gravel that is poorly graded. Geosyntec performed a soil boring and a CPT sounding east of the ASB that identified a layer of very hard lean clay below the above-mentioned poorly graded sand and gravel. No abutments are present.

1.6.2 Engineering Properties of Foundation Materials

Due to the age of the FAB, the engineering properties of the foundation materials are not available. Construction as-built drawings or construction completion reports were not available at the time of completing this construction permit application. No documentation of the actual materials and methods used to construct the FAB were available at the time of this construction permit application.

1.7 Description of the Construction Materials, Methods, and Dates

The descriptions of the construction materials, methods, and dates are based on available documentation from site investigations. The drawings discussed in the following sections are located in Attachment 1.

1.7.1 Physical and Engineering Properties of Construction Materials

There is no historical documentation available regarding the construction materials for the FAB. Site investigations identified that fill material was present in the embankments of the FAB and that sand and clay layers were present in the subsurface in the vicinity of the FAB.

1.7.2 Construction Methods

Due to the age of the FAB, no documents related to its construction are available for review. Prior to 2010, the FAB was one containment area with embankments on the north, west, and east sides and the south side is currently incised. In 2010, a railroad spur was constructed that split the FAB into two sections, north-half and south-half pursuant to a construction permit issued by the Illinois EPA. The railroad spur was placed on top of the embankment that was constructed using CCR material. Based on the available construction document from Cornette Engineering Services dated 2008, the side slopes for the rail spur embankment were designed at 2H:1V. The embankment was designed to be approximately 20 to 25 feet tall in relation to the surrounding site elevations with a crest width of approximately 23 feet.

1.7.3 Construction Dates

The construction dates for the FAB are unknown and no known construction documents are available. The available construction document for the railroad berm is dated 2010. A drawing dated 2019 showing the proposed closure of the FAB and the existing conditions of the basin shows the railroad spur bisecting the basin.

1.8 Detailed Dimensional Drawings

Construction documents for the railway crossing prepared by Cornette Engineering Services, dated 2008, are included in Attachment 1. There are no other construction documents available for the FAB.

1.9 Instrumentation

There is no instrumentation present at the FAB. A staff gauge has been installed in the basin to determine the water level visually.

1.10 Area-Capacity Curve

An area-capacity curve for the FAB created by Geosyntec is provided on Figure 1. It should be noted that without the original construction documents, the curve could not be developed for the estimated in-place 500,000 cubic yards of CCR.

1.11 Spillway and Diversion Capacities and Calculations

The FAB does not contain spillways.

1.12 Surveillance, Maintenance, and Repair Construction Specifications

As previously noted, specifications for the original construction of the FAB are not available.

1.13 Record of Structural Instability

There is no record or knowledge of structural instability associated with the FAB.

2.0 Narrative Description of the Facility, 845.220(a)(2)

2.1 CCR Type and CCR Chemical Analysis

The FAB is currently inactive and was historically used for CCR disposal, however, the types of CCR placed into the FAB is not documented. The CCR in the FAB was sampled and analyzed and the results are shown in Table 2. The laboratory data package is included in Attachment 2.

2.2 Maximum Capacity

The estimated maximum inventory of CCR on-site contained in the north portion of the FAB and south portion of the FAB are estimated at 465,000 cubic yards (CY) and 240,000 CY respectively.

2.3 Waste Streams

The FAB is not in service and does not receive CCR or non-CCR waste streams. The FAB has not received any CCR or non-CCR waste streams since the 1970's. Powerton Station began operation in the late 1920's with pulverized coal-fired boilers (Units 1 through 4) that burned Illinois coal. Units 1 through 4 were retired, presumably in the 1970's, the same decade that placement of CCR in the FAB ceased, before MWG began operating Powerton Station.

2.4 On-Site Transportation Plan

The Powerton Generating Station property is a secure facility. The property boundary is partially fenced and patrolled daily with one main entrance gate that is guarded 24 hours a day, 7 days a week, and 365 days a year. Access to the station property is controlled through the one main gate with visitors required to sign in and out with the guard personnel. Other gates are present at the facility, such as the fly ash gate, which is used during the day, but locked after hours and monitored by security.

The FAB is an inactive surface impoundment and upon approval of this permit, the FAB will be closed. During the closure activities that main gate access road, mentioned above, and the road that circumferences the FAB will be used for access by construction personnel to bring materials and equipment that will be used during closure, as shown on Figure 2. Since the FAB is inactive, there are no normal day-to-day operations associated with it. Midwest Generation personnel use the adjacent road to perform inspections as needed to ensure that no issues arise. On a quarterly basis, groundwater sampling is performed at the monitoring wells that surround the FAB and the adjacent roads are used to access the wells. Each sampling event requires about 4 days to complete.

As needed, intersections at the property are traffic controlled with stop signs and the speed limit on the property is 10 miles per hour.

3.0 Site Location Map, 845.220(a)(3)

A site location map on the most recent United States Geological Survey (USGS) quadrangle of the area from the 7 ½ minute topographic series has been included in Attachment 3. This map includes details regarding the facility and adjacent properties boundaries extending 1,000 meters (3,280 feet), surface waters, the prevailing wind direction, and the limits of all 100-year floodplains. All-natural areas designated as a Dedicated Illinois Nature Preserve under the Natural Areas Preservation Act, all historic and archaeological sites designated by the National Historic Preservation Act and the Illinois Historic Sites Advisory Council Act, and all areas identified as critical habitat under the Endangered Species Protection Act of 1973 and the Illinois Endangered Species Protection Act are not present at the site or within 1,000 meters of the site and, therefore, not shown on this map.

4.0 Site Plan Map, 845.220(a)(4)

Site plan map(s) in accordance with 845.220(a)(1)(4) are included in Attachment 4. The information required is depicted on multiple maps. Figure 4-1 shows the entire Powerton Station including the existing groundwater monitoring wells, the existing CCR surface impoundments and the main service corridors, transportation routes, and access roads. Cross-sectional maps showing the boundaries above and below ground level of the facility and CCR surface impoundments are included on Figures 4-2 through 4-5.

5.0 Construction Description, 845.220(a)(5)

The FAB is an inactive surface impoundment and the CCR from the north portion will be consolidated with the CCR in the south portion and then closed in place. The removal of the CCR from the north portion of the FAB will be conducted based on the closure by removal requirements in accordance with 845.740. The consolidated CCR in the south portion will then be closed in place with a Final Cover System (FCS) in accordance with 845.750(c). The anticipated steps to execute the removal of the north portion CCR, CCR consolidation, and closure in place for the south portion of the FAB are listed below.

1. Obtain a construction permit from the Illinois EPA for closing the FAB.

2. Clear and Grub the north portion of the FAB.

3. Dewater the south portion of the FAB into the Ash Surge Basin or into the north portion to be used as part of the hydraulic dredging of the north portion CCR. Promote additional drainage and dewatering by excavating sumps and trenches within the CCR material, using portable pumps as necessary to remove additional water by pumping water from the south portion of the FAB into the Ash Surge Basin.

4. Remove the CCR from the north portion of the FAB with placement in the south portion of the FAB.

5. Upon completion of dewatering and stabilization of the consolidated CCR, establishing the slopes of the final cover system by grading the stabilized CCR material to establish the slopes for the final cover system.

6. Installing an engineered final cover system (ClosureTurf), which consists of a structured geomembrane as the system's low permeability layer and a synthetic turf with sand infill as the system's final protective layer.

7. Initiating post-closure monitoring of groundwater and the final cover system's integrity.

The following sections detail the activities that will be executed to comply with the closure requirements.

5.1 Obtain EPA Construction Permit

This submittal is the application for an IEPA construction permit to close the FAB by consolidating the CCR from the northern portion in the southern portion and closing the southern portion with a final cover system.

5.2 Site Clearing and Grubbing

Vegetation will be removed from the site to execute the closure. Trees and grass from the north portion of the FAB and other areas around the south portion of the FAB as needed will be removed and disposed of either onsite or offsite. Any non-CCR soil on the north portion of the FAB will be scraped to expose the existing CCR material and stockpiled. As needed, the cleared areas around the south portion of the FAB will be graded and shaped to create a staging area for the contractor. If hydraulic dredging is used as part of transporting the CCR from the north portion to the south portion, a crane pad will be constructed.

5.3 Dewatering

The south portion of the FAB will be dewatered to an extent to allow the placement of CCR from the north portion of the FAB. Any standing water from the north portion of the FAB will also be removed through dewatering. The water will be removed through artificially pumping from the south portion and north portion of the FAB, as necessary. The water pumped from the south portion of the FAB will be discharged into the Ash Surge Basin and the water pumped from north portion of the FAB will be discharged to the northern grass area. Additional IEPA discharge permits will be applied for and obtained as necessary to discharge water towards the northern grass area. The water discharged to the Ash Surge Basin would be ultimately discharged through the process water treatment system, which is regulated by the Station's NPDES permit. The water discharged to the northern grass area will be in accordance with the appropriate IEPA permit and any discharge limits.

As much of the water as possible will be pumped from the south portion to expose the existing CCR and allow for the placement of the CCR from the north portion.

5.4 North Portion CCR Removal

The CCR from the north portion of the FAB would be either hydraulically dredged into the south portion of the FAB or mechanically excavated and dumped into the south portion of the FAB. The CCR in the north portion averages 16 feet in depth and the groundwater elevation ranges from 434 feet above mean sea level (ft amsl) to 439 ft amsl. Excavation of the north portion CCR may consist of mechanically excavating the CCR above the groundwater elevation, loading onto trucks and transporting to the south portion where they would place the CCR into the south portion of the FAB. If the CCR material requires it, CCR material may be temporarily stockpiled and allowed to drain. The embankment that surrounds the north portion of the FAB would also be excavated and placed in the south portion of the FAB. It is anticipated that the embankment would be mechanically excavated and transported to the south portion via trucks.

Excavation of the CCR below the groundwater elevation may occur through hydraulically dredging the CCR and discharging in the south portion of the FAB. The dredged CCR would be contained, allowing the CCR to settle and the water would be returned into the north portion of the FAB for reuse in the hydraulic dredging process. The water would be returned to the north portion of the FAB by mechanically pumping through a newly installed pipe through the berm that separates the north and south portions.

After CCR removal, the north portion of the FAB will be graded in accordance with the contours shown on Figure 2 to create a stormwater runoff management area for the south portion of the FAB. Dewatering will be necessary to finish grading the north portion of the FAB after CCR removal. Once grading is complete, a new gravel road will be constructed along the north perimeter to allow for access to the existing monitoring wells and the slopes of the north portion of the FAB will be permanently stabilized.

The gravel road is anticipated to be constructed using breaker run as an initial base to ensure the base of the road is above the groundwater elevation. The breaker run will then be covered with traffic bond or a similar type stone, graded, and compacted.

The amount of CCR that is either mechanically excavated or hydraulically dredged, or whether or not one method is chosen over the other will ultimately be decided by the contractor selected to perform the closure work. Having both methods of CCR removal approved in the construction permit allows flexibility to perform the CCR removal method that will be least impactful to the surrounding environment.

5.5 South Portion Grading and Stabilization

Once the CCR material placed in the south portion of the FAB is sufficiently dried, it will be graded to achieve the desired elevations needed for the FCS. The FCS would then be constructed on top of all the consolidated CCR. The south FAB FCS would be sloped to drain stormwater off, but not so steep as to cause erosion. In general, the CCR grades will be sloped towards the berm that divides the north and south portions to drain stormwater off the south portion FCS. The stormwater will then drain through a new pipe installed through the berm, which will discharge into the north portion of the FAB. This will minimize the potential for ponding and infiltration into the CCR below. As the slopes are constructed, measures will be taken to prevent sloughing and movement of the material and final cover system during the post-closure period. The layer of fill material directly below the geomembrane will be free from large, protruding, or sharp objects that could potentially damage the geomembrane.

5.6 Installation of Final Cover System

The proposed FCS for the south portion of the FAB is the proprietary ClosureTurf cover system created by Watershed Geo, LLC. ClosureTurf consists of a geomembrane low permeability layer that also incorporates a drainage layer. The final protective layer is replaced with engineered synthetic turf that is infilled with sand/small aggregate to provide ballast to the synthetic turf. The infiltration layer will be a 60-mil HDPE geomembrane with a hydraulic conductivity that is no greater than $1x10^{-7}$ cm/sec. The engineered synthetic turf is comprised of polyethylene fibers that are tufted through a double layer of woven geotextiles that are highly UV and heat resistant. The engineered synthetic turf is then infilled with small aggregate that is approximately 1/8 inch to 1/4 inch diameter in size. The small aggregate is brushed into the synthetic turf to ensure that it settles to the bottom of the turf, which provides ballast and prevents the turf's movement during wind events.

Section 845.750(c)(1) requires that the low permeability layer must have a permeability less than or equal to the permeability of any bottom liner system present or a hydraulic conductivity no greater than $1 \text{ x } 10^{-7}$ centimeters per second (cm/sec). The FAB does not have a bottom liner system; therefore, the structured geomembrane's permeability for the final cover system must be no greater than $1 \text{ x } 10^{-7}$ cm/sec. As such, the structured geomembrane in the ClosureTurf final cover system will be a 60-mil HDPE structured geomembrane that combines a studded drain surface on the top side and a spiked friction surface on the bottom side into one geomembrane liner. This structured geomembrane has a permeability that has been independently tested at $1.5 \text{ x } 10^{-13}$ cm/sec.

When using a geomembrane as the low permeability layer, it is required by 845.750(c)(1)(B)(i) to have a hydraulic flux equivalent or superior to a 3-foot layer of soil with a hydraulic conductivity of $1 \text{ x } 10^{-7}$ cm/sec. The following table demonstrates that the geomembrane provides a superior performance at reducing the infiltration of liquid when compared to a 3-foot thick layer of earthen material. The following table is created here to demonstrate the geomembrane that will be used as part of the ClosureTurf final cover system is compliant with 845.750(c)(1)(B)(i).

Table – Liquid Flow Rate Comparison Between Low Permeability Layers Constructed Using Geomembrane & Earthen Material

Parameter	Symbol	Value
Liquid Flow Rate Through Earthen Material		
Hydraulic Conductivity	k	1×10^{-7} m/sec
Hydraulic Head Above Layer	h	0.14 m
Layer Thickness	t	3 ft = 0.91 m
Hydraulic Gradient Through Earthen Material	$i = h / t$	0.15
Liquid Flow Rate Through Layer per Acre of Final Cover System	$q = k \times (i + 1)$	1.15×10^{-7} m^3/sec/m^2
Liquid Flow Rate Through Geomembrane		
Hole Area in Geomembrane	a	3.1 mm^2 / 4000 m^2
Acceleration Due to Gravity	g	9.81 m/sec^2
Hydraulic Head Above Layer	h	0.14 m
Liquid Flow Rate Through Layer per Unit Area	$q = 0.6a(2gh)^{0.5}$	7.71×10^{-10} m^3/sec/m^2

The geomembrane comes in rolls, which will be deployed with the spike side down and the stud side up on top of the graded general fill material. The rolls will be deployed perpendicular to the slope elevation contours and the deployment method will protect the geomembrane as well as the graded material below. Adequate anchoring will be used, such as sand bags, to prevent uplift by wind during the deployment of the geomembrane rolls. The edges of each roll are overlapped in the downgradient direction a minimum of three inches to form the seam that is then welded together. Welding is performed by either extrusion welding or hot wedge welding depending on manufacturer's recommendations and as construction of the geomembrane dictates.

The geomembrane will be covered with engineered synthetic turf and sand/aggregate infill, which will be the final protective layer. The engineered synthetic turf is green and replaces the need for an erosion layer and vegetation while providing a natural look and feel of grass and protecting the geomembrane from extreme weather. The engineered turf does not require as much maintenance as a vegetated final protective layer which needs to be mowed regularly and may need to be reseeded, refertilized, and/or regraded throughout the post-closure period. The engineered turf will be installed in accordance with the manufacturer's recommendations and equipment used during the installation will not damage the turf or the underlying geomembrane.

The engineered synthetic turf also comes in rolls, which will be rolled out on top of the geomembrane starting from the highest slope to the lowest slope. The rolls will be deployed so that the filaments of the engineered turf are pointed upslope and the edges of each roll touch each other so the seams can be joined together. The turf will be laid substantially smooth and it will be secured with sandbags at the top of any slope after it is deployed. The engineered synthetic turf will cover all of the geomembrane and will follow the same slope as the geomembrane. The rolls of the engineered turf are joined together either by sewing with polyester thread or by fusion seaming with a fusion welder.

It's important to note that a thicker final protective layer is not needed for frost protection because the freeze-thaw cycle and freezing temperatures does not affect the hydraulic performance of the geomembrane liner that will be used as the final protective layer based on the Geosynthetic Institute's White Paper #28, titled "Cold Temperatures and Free[ze]-Thaw Cycling Behavior of Geomembranes and Their Seams."

A specified sand/aggregate infill will be placed between the blades of the engineered synthetic turf after the turf is in place on top of the geomembrane. The sand infill will be spread with a minimum thickness of 0.5 inches and a maximum thickness of 0.75 inches using conveyor systems and/or express blowers. The infill will be driven into the space between the synthetic blades and the sand/aggregate mixture will meet ASTM C-33-03 for fine aggregates. The infill thickness will be checked at approximately 100-foot grid intervals. The sand infill installation will be done as to not damage or displace previously installed ClosureTurf components and the placement will not occur with snow or ice on the engineered turf.

An anchor trench will be used on the perimeter of the FCS to anchor the ClosureTurf system. The anchor trench will bury the edge of the geomembrane and engineered turf beneath two feet of soil to anchor the geomembrane in place. The soil that is placed in the anchor trench will be compacted to prevent the potential pullout of the geomembrane and engineered turf.

QA/QC testing will be performed on the ClosureTurf cover system as part of the installation. Closure drawings and specifications are located in Attachment 5.

5.7 Post-Closure Groundwater Monitoring

Post-construction groundwater monitoring will be performed in accordance with the post-closure plan.

6.0 Facility Component Plans and Specifications, 845.220(a)(6)

The Powerton Generating Station is a coal-fired steam electric generating station that burns coal to generate electricity. The Station consists of four coal-fired boilers and two electric generating units (Units 5 and 6). Not much of the original history of the station is known, but some information was obtained from a Power Magazine article that was published in June 1930 and the existing station personnel.

The station became active in approximately 1928 with its first generating unit (Unit 1) and subsequently added an additional 3 generating units (Unit 2, Unit 3, and Unit 4) by the end of 1931. These original four units were pulverized-coal units compared to the cyclone units that the station currently uses. The original two units (Unit 1 and Unit 2) had pits at the bottom that collected bottom ash that would then be sluiced to outside pits. From the outside pits, a locomotive crane transferred the bottom ash into rail cars, which placed the bottom ash on the premises to fill low areas. Based on historic drawings, it was observed that Unit 3 and Unit 4 have a similar base that would have collected bottom ash and sluiced it to an outside pit. The timeframe is unknown, but at some point, the bottom ash sluicing system was modified to sluice the bottom ash directly to the FAB where it was allowed to dewater and remain. As indicated in Section 1.3, the FAB stopped receiving bottom ash/CCR in the 1970's.

Subsequently, Units 1 through 4 have been retired and the station now operates Unit 5 and Unit 6 to generate electricity. Unit 5 and Unit 6 operate as cyclone style boilers as opposed to the pulverized-coal style boilers that were Unit 1 through Unit 4. The CCR generated by the units is now handled using bottom ash dewatering bins and fly ash silos to contain temporarily the CCR before it is hauled off-site.

7.0 Closure Construction, 845.220(d)

7.1 Closure Categorization Category

Based on Section 845.700(g), the category designation for the FAB is Category 6. The Category 6 designation for the FAB is based on the following:

- The FAB is an inactive CCR surface impoundment.
- There are no potable water supply wells or setbacks of existing potable water supply wells downgradient of the FAB. As such, Midwest Generation is not aware of any imminent threat to human health or the environment.
- The Illinois EPA EJ Start tool found at https://illinois-epa.maps.arcgis.com/apps/webappviewer/index.html?id=f154845da68a4a3f837cd3b880b0233c was used to determine that the FAB is not within one mile of an area of environmental justice concern.
- Section 13 of this permit application has identified those groundwater concentrations downgradient of the FAB are not present above the standards provided in Section 845.600(a).

7.2 Final Closure Plan

The CCR from the north portion of the FAB will be removed and consolidated with the CCR in the south portion of the FAB. The consolidated CCR will be closed in place with a final cover system constructed in accordance with Section 845.750. The final cover system will be constructed consisting of a HDPE geomembrane infiltration-control layer and a synthetic turf/small aggregate infill erosion control layer. The written closure plan complies with Section 845.720 and is included as Attachment 7-1.

7.3 Closure Alternatives Analysis

A closure alternatives analysis (CAA) was completed for the FAB. The CAA evaluated closing the FAB by removal in accordance with 845.740 and closure in place in accordance with 845.750. The completed CAA is included in Attachment 7-2.

7.4 Proposed Closure Schedule

The proposed schedule to execute the closure of the FAB is included in the Final Closure Plan in Attachment 7-1. The initial closure activity is applying for and obtaining an IEPA construction permit and the final closure step is submitting a closure report and closure certification with the closure construction activities occurring in between. The total time to execute the closure activities is estimated to be up to 36 months, which includes time to obtain the construction permit and closure report approval.

7.5 Post-Closure Plan

The Post-Closure Plan for the FAB is included in Attachment 7-3. The Plan outlines the maintenance and inspection requirements for the final cover system.

8.0 Groundwater Modeling, 845.220(d)(3)

The groundwater modeling of the CCR surface impoundment as specified in Section 845.220(d)(3) is presented below.

8.1 Groundwater Modeling Inputs and Assumptions

The existing groundwater quality data do not indicate groundwater impacts above Section 845.600(a) groundwater protection standards (GWPS) downgradient of the FAB. Therefore, the modeling that was conducted is based on a theoretical distribution of dissolved contaminants beneath the FAB, assuming a source at the FAB. The modeling looks at theoretical, potential contamination from the FAB, and it assumes the FAB contains CCR and water and that a liner is non-existent.

To conduct the support modeling a theoretical unit source with a concentration of “1” was established beneath the FAB and projected forward in time 100 years with advection and dispersion to establish an equilibrated distribution of contaminants in groundwater if the FAB was the source. This equilibrated contaminant mass distribution was established as the initial conditions or base case. The equilibrated distribution (base case) of the mass was then used as the initial concentrations in the groundwater for model runs to simulate the closure alternatives to evaluate corresponding improvement in groundwater quality from the base case scenario.

The groundwater modeling inputs and parameters are discussed further in the groundwater modeling report in Attachment 8.

8.2 Groundwater Modeling Results

Four (4) closure scenarios were modeled involving the FAB and the scenarios are listed below.

- Scenario 1: Closure by removal of the both the north and south portions of the FAB;
- Scenario 2: Closure in place of both the north and south portions of the FAB;
- Scenario 3: Closure by removal of the north portion of the FAB with consolidation and closure in place of the south portion of the FAB;
- Scenario 4: In-situ Soil Stabilization of the north and south portion of the FAB.

The results of Scenario 1 indicate that removing the theoretical mass source reduces the hypothetical groundwater concentrations beneath the site approximately 40 to 50 percent at the Illinois River by 5 years and the dissolved mass was effectively removed from the groundwater within 25 years. The modeling indicates that the hypothetical groundwater source has moved completely through the groundwater at a point near the river within approximately 20 years.

The results of Scenario 2 indicate that preventing recharge within the footprint of the FAB reduces groundwater concentrations by approximately 10 percent at the river by 5 years with a slight reduction continuing until 25 years, when the groundwater plume reached steady state conditions.

The results of Scenario 3 indicate that removing the hypothetical source from the north portion of the FAB reduced groundwater concentrations in this area, and downgradient of, by 50 percent within 5 years, and the resulting plume reached a steady state after 25 years. Overall, the results of Scenario 3 show that the reduction in groundwater concentrations of approximately 15 to 40 percent are noted, depending on the observed location within the hypothetical area of impact.

The results of Scenario 4 indicate that groundwater concentrations between the FAB and the river are reduced by approximately 40 to 50 percent at the river by 5 years and the dissolved mass was effectively removed from the groundwater with 25 years. Overall, the results of Scenario 4 show that a reduction in groundwater concentrations of approximately 98% at a point approaching the river are observed within about 20 years.

8.3 Capture Zone Modeling

Capture zone modeling is not applicable based on the selected method of closure.

8.4 Groundwater Modeling Software

The groundwater modeling was completed using standard publicly available platforms, which included MODFLOW-NWT and for contaminant transport MT3D-USGS. The graphical user interface is Groundwater Vistas. Both MODFLOW-NWT and MT3D-USGS are publicly available programs that can be downloaded from the USGS website at https://water.usgs.gov/water-resources/software/modflow-nwt/ and https://www.usgs.gov/software/mt3d-usgs-groundwater-solute-transport-simulator-modflow, respectively.

9.0 Groundwater Monitoring Program, 845.220(a)(7)

9.1 Hydrogeologic Site Characterization

9.1.1 Geology

The physiography of Tazewell County is made up of end moraines, plains (including flood plains), river terraces and valleys, alluvial fans and loess. The Illinois and Mackinaw River Valleys are the prominent landforms. Several small lakes are located near the western border of the county, which is bound by the Illinois River. Tazewell County is in the Till Plaines Section of the Central Lowland Province. Near surface soils near the subject impoundment have been grouped as Orthents, loamy and Urban Land. Urban Land units are primarily covered by pavement, railroad tracks, and buildings, which typically impede infiltration and are subject to surface runoff. The Orthents, loamy soils are fine to moderately coarse textured soils found in areas that have been modified by filling and leveling. Available water capacity is generally high, while permeability is typically high at the surface level and decreases with depth. Organic matter and plant nutrient content is low in the Orthents, loamy soils (Soil Survey of Tazewell County, Illinois).

Regionally, the stratigraphy in the area consists of approximately 100 to 125 feet of unconsolidated deposits consisting mainly of alluvial sands and gravels with some interspersed clays/silty clays. The unconsolidated deposits are underlain by alternating layers of limestone, shale, and coal of the Carbondale Formation. To evaluate local stratigraphy and as part of groundwater model development in support of the Construction Permit being submitted under separate cover, water and test well logs were obtained for wells in the general vicinity of the Powerton Generation Station. The stratigraphy data from these boring logs and the well locations are provided in Attachment 9-1. In addition, well logs from 21 monitoring wells that were installed in the vicinity of the subject surface impoundments were evaluated (MW-1 through MW-21; see Figure 9-1) with those borings ranging in depth from 30 feet to 41 feet. This information is also included in Attachment 9-1. Boring logs for these monitoring wells are included in Attachment 9-2. Based on an evaluation of this data, the following general site-specific stratigraphy is defined and geologic cross-sections are provided as Figures 9-2 through 9-7 based on the 21 on-site monitoring well boring logs:

- Fill (16’ to 24.5’ thick) – Consisting of tan, brown and black fine to medium sand/silty sand with some gravel and clay seams. Several locations also included black cinders and brick fragments.

- Clay/silty clay/silts (0’ to approximately 18’ thick) – Consisting of olive, brown and gray clays, silts and silty clays with some more organic rich layers. May locally contain fine silty sand and/or fine sand. This unit is not mappable across the site (i.e., discontinuous).

- Sand and gravel (thickness undetermined; borings terminate within unit) – Consisting of light brown, brown and/or gray medium to coarse sands and gravels.

Although no specific borings were extended into the sedimentary bedrock beneath this facility, water well logs obtained for water wells in the vicinity of the Powerton Generating Station indicate shale bedrock is encountered from approximately 35 to 140 feet bgs, depending on the location of the specific well. The boring logs indicate limestone was encountered from approximately 99 to 103 feet below grounds surface just northeast of the Powerton Generating Station and in close proximity to the Illinois River.

There are no underground mines beneath the subject CCR surface impoundment.

9.1.2 Hydrogeology

Based on information from the Soil Survey of Tazewell County, the average annual precipitation is approximately 36 inches with about 62% of that total falling between April and September of any given year. The average seasonal snowfall is approximately just over 26 inches. More site-specific precipitation data from a water station located in Peoria, Illinois, is provided in Table 9-1. The nearest natural surface water body is the Lost Creek which bends around the eastern edge of the FAB and property boundary. Lost Creek is an ephemeral stream that only flows during and after precipitation events. The Illinois River is located to the north of the subject CCR units. Powerton Lake is located to the west-northwest.

Groundwater beneath the Powerton Generating Station occurs under water table conditions. Saturated conditions are generally encountered between 18 to 32 feet bgs, depending on the well location. The FAB monitoring well network consists of monitoring wells (MW-01 [upgradient], MW-02, MW-03, MW-04, MW-05, and MW-10 [upgradient]). All wells associated with the FAB monitoring are screened within the extensive sand unit which underlies the area (i.e., the localized shallow clay/silty clay unit does not extend beneath the FAB). Table 9-2 provides groundwater elevation measurements obtained for the on-site monitoring wells in the vicinity of the subject CCR surface impoundment which includes data for the monitoring wells associated specifically with the ABB/ASB (upgradient wells MW-01, MW-09 and MW-19 and downgradient wells MW-08, MW- 11, MW-12, MW-15, MW-17 and MW-18) and FAB (upgradient wells MW-01 and MW-10 and downgradient wells MW-02 thru MW-05), respectively. FAB hydrographs of water levels are provided as Figure 9-8. A review of the hydrographs shows some temporal fluctuations with the highest water levels generally occurring within the first or second quarters of the year.

Groundwater flow maps for the four quarters from 3rd quarter 2020 through the 2nd quarter 2021 are provided as Figures 9-9 through 9-12. The maps include groundwater elevation data from all wells in the area, including the specific CCR monitoring wells associated with the subject FAB. The water levels from wells screened in the clay/silt unit and the water levels from monitoring wells screened within the sand unit were evaluated separately and used to generate groundwater flow maps for each unit. The water elevation data within the clay/silt unit indicates localized groundwater flow in a westerly direction. Groundwater flow within the more extensive sand unit shows some divergence with general flow in a northerly direction with flow components to the northwest and northeast towards the Illinois River. It is noted that MW-20 and MW-21 were installed in March 2021 and are therefore not shown on groundwater flow maps from prior to that time.

The horizontal hydraulic gradient is steeper within the silt/clay unit than within the deeper sandy gravel unit. Table 9-3 provides a summary of the flow direction, gradients and an estimated rate of groundwater flow for each sampling event. The flow rate was calculated using the following equation:

$$V_s = \frac{K\,dh}{n_e\,dl}$$

Where:

V_s is seepage velocity (distance/time)
K is hydraulic conductivity (distance/time)
dh/dl is hydraulic gradient (unitless)
n_e is effective porosity (unitless)

Hydraulic conductivity (K) values were initially estimated for monitor wells MW-2, -5, -8, -9, and -10 from slug tests (Patrick Engineering 2011). The geometric mean of the test data for these wells was approximately 350 feet per day (ft/d; 4.05 x 10^{-3} ft/sec) for each well, as calculated by Patrick Engineering in the Hydrogeologic Assessment Report – Powerton Generating Station, February 2011. The slug test data were reviewed as part of the modeling study being completed for the Construction Permit application and the data were reanalyzed using corrected input values for the well casing and borehole dimensions and effective porosity of the sand filter pack material. The revised geometric mean of the test data for these wells decreased to approximately 120 ft/d (1.39 x 10^{-3} ft/sec) for each well. The hydraulic conductivity estimate for MW-8 should be used with caution as this monitoring well was screened through site fill and native silty clay. The aquifer properties derived from this well have likely been impacted by the more porous non-native fill material in the upper portion of the well screen and are likely not indicative of the silty clay aquifer. As such, this data was grouped with the more porous sand/gravel materials.

The hydraulic conductivity of 1.39 x 10^{-3} ft/sec was used for the sandy unit in Table 9-3 as discussed above. The average hydraulic conductivities of 6.38 x 10^{-7} ft/sec (silt/clay unit) in Table 9-3 is consistent with estimates from literature (Freeze and Cherry, 1979) and is the center of the range of conductivity values used in the modeling work (1.16 x 10^{-7} to 1.16 x 10^{-6} ft/sec). The estimated effective porosities of the silt/clay materials (0.40) and of the sandy materials (0.35) were obtained from literature (Applied Hydrogeology, Fetter, 1980).

At this time, based on the geology discussion in Section 9.1.1 and the site-specific hydrogeology discussion above, the groundwater beneath the CCR surface impoundments is considered as Class I Potable Resource Groundwater in accordance with Section 620.210. It is noted, however, that a Groundwater Management Zone (GMZ) and an Environmental Land Use Control (“ELUC”) have been established where the CCR surface impoundments are located as part of a Compliance Commitment Agreement (CCA) between Midwest Generation and Illinois EPA. The ELUC states that the groundwater shall not be used as potable water. The extent of the established and approved GMZ and ELUC are provided on Figure 9-13. The GMZ and ELUC occupy the same extent of the Powerton property.

A survey of all potable water sources within a 2,500 feet radius of the Midwest Generation Powerton Generating Station was completed by Natural Resources Technology (NRT) in 2009. The following databases and sources of information were utilized by NRT in order to determine community water source and water well locations and construction in the vicinity of the ash pond wastewater treatment systems:

- 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;

As part of this permit preparation, KPRG evaluated the NRT information and reviewed the new Illinois State Geological Survey database and interactive map references as "ILWATER". The survey results are provided on Figure 9-14. Twelve wells were identified within a 2,500-foot radius of the Station's subject CCR surface impoundments. The two wells off-site to the east are upgradient of the subject impoundments. There were eight wells identified on Powerton Station property on the ILWATER interactive map all of which were older construction wells installed by previous Ownership. Discussions with facility personnel indicate that all eight of these wells were taken out of service/abandoned. The two wells at the far western boundary of the 2,500 foot radius (identified as wells 9 and 10 from the NRT evaluation) are part of the six water wells currently on the Powerton Station property that are in use (the remaining four wells are located further west, outside the 2,500 foot search radius). These two wells are screened within the sand/gravel aquifer but are not directly downgradient of the surface impoundments and are separated from those units by the intake and outfall channels. They are regularly sampled and analyzed for potable water constituents. The sampling results consistently have complied with potable water regulations.

A search of the Illinois Department of Natural Resources dedicated nature preserve database (https://www2.illinois.gov/dnr/INPC/Pages/NaturePreserveDirectory.aspx) was performed to determine whether there may be a nearby-dedicated nature preserve. There were no identified dedicated nature preserves in the immediate vicinity of the subject surface impoundments.

Based on the geology of the site presented in Section 9.1.1 and the above hydrogeology discussions, the primary contaminant migration pathway for a potential release from the subject CCR surface impoundments would be downward migration to groundwater within the unconsolidated silty clay or sand/gravel aquifer. Due to the proximity to the Illinois River and/or plant intake channel, which are hydrogeologic flow boundaries, minimal to no downward vertical flow mixing would be anticipated. There are no other utility or man-made preferential pathway corridors that would act to potentially intercept the flow to move any contamination in a direction other than under natural groundwater flow conditions. There are no potable water wells between the impoundments and anticipated flow discharge boundaries. In addition, as previously discussed, there are no potable surface water intakes on the Illinois River either along or within at least several miles downstream of the subject site.

There is quarterly groundwater quality data associated with the subject FAB surface impoundment dating back to December 2010. However, the parameter list was slightly different from that specified in Section 845.600 and included analysis of dissolved inorganic parameters rather than total inorganic parameters. That historical water quality data is provided in Attachment 9-3.

The FAB is subject to the federal requirements under Federal Register, Environmental Protection Agency, 40 CFR Parts 257.94, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule dated April 17, 2015 (Federal CCR Rule). As required under the Federal CCR Rule, eight rounds of background sampling were completed for the monitoring wells within the monitoring network for the subject CCR surface impoundments. This included the full list of Appendix III (detection monitoring) and IV (assessment monitoring) parameters. Since the effective date of the State CCR Rule, quarterly groundwater monitoring for the full list of parameters specified in Section 845.600, which includes all parameters in the Federal CCR Rule Appendix III/IV, has continued. This data is provided in Table 9-4 for the FAB. In addition, it is noted that Illinois EPA added turbidity measurements to the list with a required eight rounds of background of that parameter for each well in the monitoring network for the subject CCR surface impoundment. This data is provided in Table 9-5 for the FAB.

9.2 Groundwater Monitoring System Design and Construction Plans

A comprehensive monitoring well network that includes other basins in the vicinity of the FAB was established 2010 and expanded pursuant to the CCA. The well spacing was developed as part of a previous hydrogeologic assessment. The well depths were determined based on depth to groundwater and the base elevations of the basins being monitored and were approved by Illinois EPA. The groundwater monitoring network has been established for the FAB and is defined as:

- Upgradient wells MW-01 and MW-10 and downgradient wells MW-02 thru MW-05.

Groundwater data from the upgradient wells will be evaluated to provide a statistically representative upgradient water quality for the FAB prior to that water passing beneath the regulated unit. The proposed monitoring well networks will be utilized for determining whether potential leakage from the regulated unit may be causing or contributing to groundwater impacts in the vicinity of the units.

The monitoring wells MW-01 through MW-15 were installed in 2010 by Patrick Engineering, Inc. The remaining wells were installed by KPRG and Associates, Inc. at varying times since the initial 2010 well installations. Wells were drilled using 4.25-inch hollow stem augers. The wells were completed with standard 2-inch inner-diameter PVC casing with 10-feet of 0.010 slot PVC screen.

Filter sand pack around each screen was extended to approximately 2-feet above the top of the well screen. The remainder of the annulus was backfilled with bentonite. Surface completions include stick-up (above grade two to three feet) locking protector casings set in concrete aprons. The wells are further protected by traffic bollards, as necessary. Boring logs and well construction summaries for these wells are provided in Attachment 9-2. Ground surface and top-of-casing elevations were surveyed by an Illinois licensed surveyor and are included in the previously referenced groundwater elevation table.

Each of the monitoring wells within the sampling network is outfitted with a dedicated sampling system. Specifically, each well has a QED Environmental Systems (QED) Well Wizard Model P1101M dedicated sampling pump with Model No. 37789 intake screens (0.010-inch slot). The screens are set within approximately one-foot of the base of the monitoring well.

In accordance with requirements under Section 845.630(g), Attachment 9-4 includes an Illinois licensed Professional Engineer certification of the above-defined monitoring system.

9.3 Groundwater Sampling and Analysis Program

9.3.1 Sample Frequency

The FAB is regulated under the Federal CCR Rule. As such all of the above defined monitoring wells (upgradient and down-gradient) have been sampled on a quarterly basis starting the 4th quarter of 2015 for eight consecutive quarters for both Appendix III and Appendix IV parameters specified in the Federal CCR Rule which is the same parameter listing as provided under the State CCR Rule Section 845.600(a) plus calcium. This dataset will facilitate the development of proper statistical evaluation procedures for the site and use in development of applicable GWPSs for each constituent pursuant to Section 845.600(b). Additional monitoring data collected since the initial eight rounds of background sampling will also be evaluated to determine whether an expanded dataset can be used in developing an appropriate and representative background for the State CCR Rule compliance. Illinois EPA added turbidity as an additional parameter that will require development of a statistical background. Since this parameter was not included within the Federal CCR Rule, eight rounds of turbidity measurements were obtained within the 180-day period since the effective date of the State Rule. However, this restricted period of background data collection does not facilitate evaluation of potential seasonal variations during the development of statistical background for this parameter.

Currently, all wells within this CCR monitoring network are being sampled on a quarterly basis for all parameters specified in Section 845.600(a) plus calcium and turbidity. Between quarterly monitoring events, groundwater level measurements from all designated CCR monitoring wells will be also obtained and recorded on a monthly basis. During the initial rounds of monthly groundwater level measurements after the enactment of the State CCR Rule, surface impoundment measurements were not collected because the instrumentation for these measurements was not yet in-place and available for recording the data.

Quarterly groundwater monitoring will continue during the active life of the impoundment and the post-closure care period or, if closure is by removal, then in accordance with monitoring frequency requirements under Section 845.740(b). It is noted that if after 5 years of quarterly monitoring it can be demonstrated that the facility meets the requirements specified in Section 845.650(b)(4), the owner can petition Illinois EPA to shift the monitoring frequency to semi-annual.

9.3.2 Sampling Preparation and Calibrations

Prior to any sampling event, the Station's designated Environmental Specialist shall be notified in advance of sampling crew arrival so that any arrangements can be made, including security clearance and training.

Prior to sampling activities, and at intervals recommended by the manufacturer, all non-dedicated equipment shall be cleaned and calibrated. Specifically, the field parameter water quality meter to be used for pH, specific conductance, turbidity and temperature will be calibrated using standard reference solutions. In addition, an operational check of the electronic water level probe will also be performed by placing the probe into a bucket of water and ensuring that the audio signal is triggered when the sensor meets the water interface. The associated tape measure of the probe will also be checked for wear.

The monitoring network consists of all dedicated sampling equipment (QED Well Wizard P1101M). The controller used to operate individual bladder pumps will be checked and maintained prior to arrival at the site based on manufacturer specifications.

All lab ware shall be obtained directly from an Illinois certified laboratory. Upon arrival to the site, the monitoring wells will be assessed for structural integrity. Each well cover (either stick-up or flush mount) will be inspected for proper labels, locks, any damage and be cleared of any flora or fauna that may be on the well or in the vicinity that would affect the sample or the sampling operation. In addition to any other notable observations, all of the above shall be entered on the sampling sheets. Once the well is uncovered and unlocked, and the well casing inspected, the well head shall be inspected for damage and cleanliness. At that point, the well will be considered ready for sampling per procedures described below.

9.3.3 Groundwater Sample Collection

Prior to initiating sampling, a round of groundwater levels will be collected from each monitoring well using an electronic water level probe. The timeframe over which these water levels are collected should be minimized and should not exceed 8 hours. The depth to water will be measured to the nearest one-hundredth of a foot from the top of casing using an electronic water level meter. The water level probe should be properly decontaminated between each reading using procedures specified in Section 9.3.4.

All of the monitoring wells at this Station are equipped with dedicated, down-hole, bladder pumps. At the top of casing for each well is a manifold with air and water quick connects and a port for a water level meter probe to fit so that an undisturbed water level can be obtained. Immediately prior to sampling, the depth to water will be measured again to the nearest one-hundredth of a foot from the top of casing using an electronic water level indicator and recorded onto the sampling sheets. Once recorded, an air compressor and flow controller will be attached to the air side quick connect and disposable tubing attached to the discharge connection. The discharge tubing will be run to a flow-through cell of the water quality meter. A discharge line from the flow-through cell will be placed into a vessel to allow for the measurement of the volume of groundwater removed. The water quality meter will be attached within the flow-through cell that allows for real time readings of pH, specific conductivity and temperature. It is noted that a calibration check of the water quality meter should be performed at the start and end of each day of sampling and recorded in the field notes. If the meter calibration-check shows drift outside of manufacturer specifications, the meter should be recalibrated in the field using standard solutions per manufacturer requirements.

The air controller will be set to the necessary pressure and to the slowest pumping interval, approximately 50 second refill and 10 second pump (flow rates at this setting tend to be less than 100 milliliters/minute), and the compressor will be started. The intent of the low flow pumping will be to minimize drawdown in the well with an ideal goal of keeping the drawdown to 0.30 feet or less. Once the water has filled the flow-through cell, a reading of the parameters will be recorded. Readings will continue to be recorded until such time as all parameters are deemed stable for three consecutive measurements at which point a sample will be collected from the tubing prior to the flow-through cell. An unfiltered groundwater sample shall be collected directly from the water tubing after it is disconnected from the flow-through cell. The laboratory provided bottles shall be properly filled. Once the sample is collected, the bottles shall be properly labeled and placed on ice as necessary.

If the well would pump dry prior to stabilized field parameter readings, the well will be allowed to recover for up to 24-hours at which point water sample collection will be initiated.

In the event that a dedicated bladder pump fails to work, the following procedures should be implemented:

- Pull the dedicated tubing and pump from the well and ensure that the tubing does not come in contact with the ground.

- Visually inspect the intake of the pump for clogging from sedimentation. If clogging is noted, clean the intake with distilled water. If there is no clogging, dismantle the pump casing and inspect the bladder for any holes, cracks or tears.

- If the bladder is determined to be compromised (i.e., wear has resulted in cracking or tearing), remove the bladder and replace it with a new bladder. Properly clean all parts of the pump using procedures described in Section 9.3.4, reassemble the pump and slowly lower it back down hole. Continue sampling as described above.

- If the entire pump is determined to have failed, a new pump will need to be ordered for replacement and a modified sampling procedure will be implemented as described below.

In the case of bladder pump failure, at a specific well during a sampling event, the alternate sampling method will be the use of a portable peristaltic pump (the pump itself does not go down-hole) assuming depth to water is less than 23 feet bgs. Clean disposable polyethylene tubing will be attached to the pump and the tubing will be slowly lowered down hole along with the water level probe. The pump will be operated at the lowest rate possible to achieve the same goals as for sampling described above (generally below 300 milliliters/minute which is within the range of standard low flow protocols). Water will be collected in a clean glass jar for field parameter readings. Once stable field parameters are recorded, the sample will be collected directly onto laboratory prepared containers for analysis. Upon completion of sample collection, the water level meter and tubing should be removed from the well. The polyethylene tubing should be disconnected from the pump and discarded. The water level meter should be properly decontaminated as specified in Section 9.3.4. If depth to water is such that a peristaltic pump cannot be used, a submersible pump will need to be used. The submersible pump must be properly cleaned as specified in Section 9.3.4 prior to placement down the well. All subsequent procedures will be the same as above. The alternate sampling pump use will be recorded on the field data sheet for that well and noted in any subsequent reporting summary.

9.3.4 Equipment Decontamination

Any equipment that is used down-hole at more than one sampling location must be thoroughly decontaminated between uses. Based on procedures described above, only the water level meter is anticipated to be in this category, however, if a submersible pump needs to be used during a particular sampling event due to dedicated pump failure (see Section 9.3.3), these procedures will also apply. The water level meter probe and any measuring tape, or any other non-dedicated equipment that may need to be placed down the well that extended below the water surface will need to be cleaned with an Alconox solution, or equivalent, wash followed by a double rinse with distilled water. Any pump tubing that is not dedicated should be discarded and only clean tubing should be used down-hole.

9.3.5 Sample Preservation, Chain-of-Custody and Shipment

Since measurement of total recoverable metals is required by the State CCR Rule, the samples will not be filtered prior to collection. This will facilitate the analysis to capture both the particulate fraction and dissolved fraction of metals in natural groundwater. Groundwater samples will be collected directly into Illinois certified laboratory provided containers. Those containers will be prepared by the laboratory to contain any necessary chemical preservation. The samples shall be stored at temperatures required by the lab following sample collection. Table 9-6 includes a summary of sample bottle requirements, preservatives and holding times

All groundwater samples collected shall be transferred to the laboratory under proper COC procedures. The laboratory provided COC, completed with all pertinent information, shall be maintained from sample collection through receipt by the laboratory. The information shall include, but is not limited to, the following:

- Project name and number, state samples collected in, sample name and type, time and date collected, analysis requested, and printed name and signatures of person(s) sampling.

The COC shall be completed and properly relinquished by the field sampler(s) with all samples clearly printed or typed.

All samples will be either delivered directly to the laboratory or be shipped using Federal Express or a similar overnight service. It should be noted that Total Dissolved Solids (TDS) analysis has a 7-day holding time. TDS samples should be shipped to the laboratory within 72 hours after collection. All other holding times for the specified parameters are long enough to facilitate one shipment after the full round of sampling is complete.

9.3.6 Analytical Methods
A list of the analytical methods to be used by the laboratory for each specified parameter is included in the above referenced Table 9-9. Individual detection limits for the parameters may change slightly from sample to sample depending on potential matrix interferences with a sample (e.g., amount of suspended solids/sediment) and/or the concentration of the constituent in the sample. However, the base detection limits will be set below the applicable Illinois Class I Drinking Water Standards as defined in Section 845.600(a)(1) for that compound which are also provided in Table 9-6.

9.3.7 Quality Assurance and Quality Control
Laboratory

Only an Illinois certified analytical laboratory will be used for sample analysis. The laboratory will be conducting their work under their specific approved Quality Assurance and Quality Control (QA/QC) program. A copy of their program can be available upon request. A standard Level II data documentation package will be included in all subsequent reporting, however, the lab will be requested to also provide a Level IV data documentation package (i.e., U.S. EPA Contract Laboratory Protocol equivalent) in the event more detailed data validation/evaluation is deemed necessary.

Field

The QA/QC program for fieldwork will include the collection of blind duplicates and the use of a laboratory supplied trip blank. The blind duplicate will be collected from a random well during every sampling event in which more than three (3) samples are collected. The duplicate will be blind in the manner that there will be no way for the laboratory to determine from which well or point the sample was collected.

Upon receipt of the analytical data, a determination will be made if the duplicate is consistent with the sample collected from the well/point. A generally acceptable range for groundwater samples is +/- 30 percent. If outside the acceptable range, a resample may be determined to be necessary and reanalyzed. The trip blank analytical data will be reviewed for any values other than non-detect. If there are any questions regarding the duplicate, trip blank, or other reported analytical QA/QC runs, the laboratory will be contacted to determine the effect on data quality, if any, and usability. If necessary, a specific well may need to be re-sampled.

9.3.8 Statistical Methods
A proposed statistical evaluation plan meeting the requirements specified in Section 845.640(f) is provided in Attachment 9-5 along with a certification of the plan by an Illinois licensed Professional Engineer.

9.4 Groundwater Monitoring Program

The groundwater sample and water level collection frequency is discussed in Section 9.3.1 above.

As previously noted, the monitoring well system for the subject surface impoundment consists of the following monitoring wells:

- FAB monitoring network - upgradient wells MW-01 and MW-10 and downgradient wells MW-02 thru MW-05

Eight rounds of background sampling for the purposes of statistical evaluation and background determination is available from the initial groundwater sampling which occurred starting in 2015 in compliance with the Federal CCR Rule requirements. Subsequent groundwater sampling has also occurred under the Federal CCR Rule detection and assessment monitoring requirements. All available CCR monitoring data through the end of the second quarter 2021 is summarized in Table 9-4 and the eight rounds of turbidity data collected since the enactment of the State CCR Rule in April 2021 in Table 9-5.

Using the currently available data for the subject CCR surface impoundment, proposed site specific Groundwater Protection Standards (GWPSs) have been established in accordance with Section 845.600(b) and are summarized in Table 9-7 for the FAB. The background concentrations noted in these tables were calculated using the statistical evaluation approach noted in Section 9.3.8 and provided in Attachment 9-5. A presentation of the statistical evaluations, which resulted in the background concentration calculations, is provided in Attachment 9-6.

Once the proposed GWPSs presented in this permit application are approved by Illinois EPA, these values will be used for all subsequent groundwater monitoring data comparisons. Monitoring will continue on a quarterly basis for all constituents specified in Section 845.600(a)(1) plus calcium and turbidity. In accordance with Section 845.610(b)(3)(D), a data summary report will be submitted to Illinois EPA within 60-days of receipt of all analytical data (including resample data if necessary as discussed below) which will include a groundwater flow map for the quarterly sampling event, summary of water level elevations collected during the reporting period (monthly measurements), and a data summary including summary data tables with a comparison against the established/approved GWPSs. This report will be placed the facility's operating record.

If during a monitoring event, a constituent(s) is/are detected above an established and approved GWPS, that well will be resampled for the specific constituent(s). If the resample data confirms that the constituent(s) concentration(s) is/are above the GWPS then the following will occur:

- Characterize the nature and extent of the potential release and any relevant site conditions that may affect the remedy evaluation/selection. This characterization must meet the requirements set forth under Section 845.650(d)(1).

- If groundwater impacts extend off-site, provide off-site landowner/resident notifications as specified under Section 845.650(d)(2) and place the notifications into the facility's operating record. This must occur within no more than 30-days of determination that a GWPS has been exceeded.

- An Alternate Source Demonstration (ASD) may be initiated and completed for submittal to Illinois EPA review/approval as allowed under Section 845.650(e). Place the ASD into the facility's operating record.

- Within 90-days of determining that a constituent(s) was detected above an established/approved GWPS at a downgradient waste boundary monitoring point, initiate an assessment of corrective measures meeting the requirements specified under Section 845.660 unless an ASD is submitted in accordance with Section 845.650(d)(2) and subsequently approved by the Illinois EPA.

By no later January 31st of each year, an Annual Groundwater Monitoring and Corrective Action Report will be prepared for inclusion as part of an Annual Consolidated Report for the facility. The Annual Groundwater Monitoring and Corrective Action Report will meet the requirements set forth under Section 845.610(e)(1 through 4). The Annual Consolidated Report will be placed into the facility's operating record.

10.0 Professional Engineering Signature, 845.220(a)(8)

This construction permit application has been prepared to meet the requirements of 35 Ill. Adm. Code 845.220(a) and 845.220(d).

Joshua D. Davenport, P.E.
Illinois Professional Engineer

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PROFESSIONAL
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STATE OF ILLINOIS

11.0 Owner Certification, 845.220(a)(9)

A certification stating that the owner or operator of the CCR surface impoundment has completed the public notification and public meetings that are required under the Ill. Adm. Code Title 35, Part 845 Section 240 is included in Attachment 11. Also included is a summary of the issues raised by the public and a summary of any revisions, determinations, or other considerations made in response to those issues, and a list of interested persons in attendance who would like to be added to the Agent's list for the facility.

CONSTRUCTION PERMIT TABLES

Table 2 - Former Ash Basin CCR Chemical Constituents Analytical Results
Powerton Generating Station

Parameter Name	Ash Sample 6/23/2021
Antimony	<2.0
Arsenic	1.8
Barium	88
Beryllium	1.9
Boron	64
Cadmium	<0.20
Calcium	13,000
Chloride	27
Chromium	34
Cobalt	5.2
Fluoride	1.3
Lead	4.1
Lithium	10
Mercury	0.032
Molybdenum	2.4
Selenium	<0.99
Sulfate	52
Thallium	<0.99

Notes:

All results are in milligrams per kilogram (mg/kg), except for percent solids, which is percent (%)

F1 - MS and/or MSD recovery exceeds control limits

V - Serial Dilution exceeds the control limits

Table 9-1. Summary of Local Precipitation Data - Midwest Generation, LLC, Powerton Generating Station, Pekin, Illinois.

Powerton Station	
Month	**Average Monthly Precipitation* (inches)**
January	2.02
February	1.90
March	2.56
April	3.98
May	4.65
June	3.76
July	3.66
August	3.44
September	3.52
October	3.16
November	2.79
December	2.20

Notes:
* - Historical precipitation data was obtained from the National Oceanic and Atmospheric Administration. Precipitation data was averaged from thirteen stations located in and within close proximity to Pekin, Illinois. Dates of precipitation data range from 1991-2020.

Table 9-2. Former Ash Basin Groundwater Elevations - Midwest Generation, LLC, Powerton Station, Pekin, IL

Well ID	Date	Top of Casing Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft above MSL)
MW-01	11/16/2015	465.24	26.04	439.20
	2/22/2016	465.24	21.90	443.34
	5/16/2016	465.24	21.83	443.41
	8/15/2016	465.24	23.89	441.35
	11/14/2016	465.24	23.38	441.86
	2/13/2017	465.24	21.71	443.53
	5/1/2017	465.24	18.87	446.37
	6/20/2017	465.24	21.54	443.70
	8/25/2017	465.24	24.70	440.54
	11/8/2017	465.24	24.92	440.32
	5/17/2018	465.24	22.66	442.58
	8/8/2018	465.24	26.05	439.19
	10/30/2018	465.24	24.69	440.55
	2/25/2019	465.24	19.44	445.80
	4/29/2019	465.24	20.15	445.09
	8/26/2019	465.24	23.85	441.39
	2/24/2020	465.24	20.71	444.53
	4/27/2020	465.24	20.90	444.34
	12/7/2020	465.24	25.69	439.55
	4/7/2021	465.24	22.20	443.04
	5/10/2021	465.24	23.41	441.83
MW-02	6/20/2017	462.60	22.04	440.56
	8/23/2017	462.60	28.42	434.18
	11/7/2017	462.60	26.08	436.52
	5/17/2018	462.60	23.26	439.34
	8/7/2018	462.60	29.70	432.90
	10/30/2018	462.60	26.77	435.83
	2/25/2019	462.60	17.02	445.58
	4/29/2019	462.60	19.26	443.34
	8/26/2019	462.60	27.45	435.15
	2/24/2020	462.60	20.35	442.25
	4/27/2020	462.60	20.51	442.09
	12/7/2020	462.60	28.71	433.89
	4/7/2021	462.60	21.95	440.65
	5/10/2021	462.60	23.01	439.59
MW-03	6/20/2017	462.48	22.31	440.17
	8/23/2017	462.48	28.18	434.30
	11/7/2017	462.48	25.38	437.10
	5/17/2018	462.48	22.62	439.86
	8/7/2018	462.48	29.17	433.31
	10/30/2018	462.48	24.71	437.77
	2/25/2019	462.48	17.20	445.28
	4/29/2019	462.48	18.85	443.63
	8/26/2019	462.48	27.65	434.83
	2/24/2020	462.48	20.18	442.30
	4/27/2020	462.48	20.43	442.05
	12/7/2020	462.48	28.61	433.87
	4/7/2021	462.48	21.73	440.75
	5/10/2021	462.48	22.98	439.50

Table 9-3. Former Ash Basin Groundwater Elevations - Midwest Generation, LLC, Powerton Station, Pekin, IL

Well ID	Date	Top of Casing Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft above MSL)
MW-04	6/20/2017	460.57	22.15	438.42
	8/28/2017	460.57	28.49	432.08
	11/7/2017	460.57	25.62	434.95
	5/17/2018	460.57	24.13	436.44
	8/7/2018	460.57	29.23	431.34
	10/30/2018	460.57	26.58	433.99
	2/25/2019	460.57	15.45	445.12
	4/29/2019	460.57	15.88	444.69
	8/26/2019	460.57	27.35	433.22
	2/24/2020	460.57	19.81	440.76
	4/27/2020	460.57	19.76	440.81
	12/7/2020	460.57	28.50	432.07
	4/7/2021	460.57	21.90	438.67
	5/10/2021	460.57	23.92	436.65
MW-05	11/16/2015	458.58	26.39	432.19
	2/22/2016	458.66	21.12	437.54
	5/16/2016	458.66	16.58	442.08
	8/15/2016	458.66	23.59	435.07
	11/14/2016	458.66	22.72	435.94
	2/13/2017	458.66	19.13	439.53
	5/1/2017	458.66	13.09	445.57
	6/20/2017	458.66	19.43	439.15
	8/28/2017	458.66	25.38	433.20
	11/7/2017	458.66	22.91	435.67
	5/17/2018	458.66	21.54	437.04
	8/7/2018	458.66	26.17	432.41
	10/30/2018	458.66	23.97	434.61
	2/25/2019	458.66	13.21	445.45
	4/29/2019	458.66	15.40	443.26
	8/26/2019	458.66	24.35	434.31
	2/24/2020	458.66	17.25	441.41
	4/27/2020	458.66	17.41	441.25
	12/7/2020	458.66	25.65	433.01
	4/7/2021	458.66	19.40	439.26
	5/10/2021	458.66	21.38	437.28
MW-10	6/22/2017	457.31	13.46	443.85
	8/24/2017	457.31	16.39	440.92
	11/9/2017	457.31	16.86	440.45
	5/16/2018	457.31	14.88	442.43
	8/8/2018	457.31	17.88	439.43
	10/30/2018	457.31	17.04	440.27
	2/25/2019	457.31	11.28	446.03
	4/29/2019	457.31	11.88	445.43
	8/26/2019	457.31	15.89	441.42
	2/24/2020	457.31	12.64	444.67
	4/27/2020	457.31	12.75	444.56
	12/7/2020	457.31	17.80	439.51
	4/7/2021	457.31	14.21	443.10
	5/10/2021	457.31	15.58	441.73

MSL - Mean Sea Level
TOC - Top of Casing

Table 9-3. Hydraulic Gradient, Direction and Seepage Velocity. Midwest Generation, LLC, Powerton Station, Pekin, IL.

DATE	Screened Unit	Groundwater Flow Direction	Kavg (ft/sec)*	Average Hydraulic Gradient (ft/ft)	Porosity (unitless)**	Estimated Seepage Velocity (ft/day)
11/16/2015	Silt/clay	Westerly	6.380E-07	0.0093	0.4	0.001
11/16/2015	Sandy	North-Northwest	1.390E-03	0.0026	0.35	0.87
2/22/2016	Silt/clay	Westerly	6.380E-07	0.0098	0.4	0.001
2/22/2016	Sandy	North-Northwest	1.390E-03	0.0030	0.35	1.03
5/16/2016	Silt/clay	Westerly	6.380E-07	0.0124	0.4	0.002
5/16/2016	Sandy	North-Northwest	1.390E-03	0.0021	0.35	0.72
8/15/2016	Silt/clay	Westerly	6.380E-07	0.0093	0.4	0.001
8/15/2016	Sandy	North-Northwest	1.390E-03	0.0014	0.35	0.48
11/14/2016	Silt/clay	Westerly	6.380E-07	0.0083	0.4	0.001
11/14/2016	Sandy	North-Northwest	1.390E-03	0.0014	0.35	0.48
2/13/2017	Silt/clay	Westerly	6.380E-07	0.0091	0.4	0.001
2/13/2017	Sandy	Northeasterly - Northwesterly	1.390E-03	0.0049	0.35	1.68
5/1/2017	Silt/clay	Westerly	6.380E-07	0.0100	0.4	0.001
5/1/2017	Sandy	Northeasterly - Northwesterly	1.390E-03	0.0021	0.35	0.72
6/20/2017	Silt/clay	Westerly	6.380E-07	0.0088	0.4	0.001
6/20/2017	Sandy	Northeasterly - Northwesterly	1.390E-03	0.0057	0.35	1.96
8/25/2017	Silt/clay	Westerly	6.380E-07	0.0214	0.4	0.003
8/25/2017	Sandy	North-Northwest	1.390E-03	0.0174	0.35	5.97
11/8/2017	Silt/clay	Westerly	6.380E-07	0.0267	0.4	0.004
11/8/2017	Sandy	North-Northwest	1.390E-03	0.0157	0.35	5.39
5/17/2018	Silt/clay	Westerly	6.380E-07	0.0070	0.4	0.0010
5/17/2018	Sandy	North-Northwest	1.390E-03	0.0042	0.35	1.44
8/7/2018	Silt/clay	Westerly	6.380E-07	0.0263	0.4	0.004
8/7/2018	Sandy	North-Northwest	1.390E-03	0.0037	0.35	1.27
4/29/2019	Silt/clay	Westerly	6.380E-07	0.0129	0.4	0.0018
4/29/2019	Sandy	North-Northwest	1.390E-03	0.0022	0.35	0.75
11/11/2019	Silt/clay	Westerly	6.380E-07	0.0114	0.4	0.0016
11/11/2019	Sandy	North-Northwest	1.390E-03	0.0008	0.35	0.27
4/27/2020	Silt/clay	Westerly	6.380E-07	0.0114	0.4	0.0016
4/27/2020	Sandy	Northeasterly - Northwesterly	1.390E-03	0.0023	0.35	0.79
12/7/2020	Silt/clay	Westerly	6.380E-07	0.0137	0.4	0.0019
12/7/2020	Sandy	Northeasterly - Northwesterly	1.390E-03	0.0037	0.35	1.27
5/10/2021	Silt/clay	Westerly	6.380E-07	0.0208	0.4	0.0029
5/10/2021	Sandy	North-Northwest	1.390E-03	0.0041	0.35	1.41

* Kavg - See text discussion in Section 9.1.2 for average hydraulic conductivity values used (feet/second).

** - Porosity estimates from Applied Hydrogeology, Fetter, 1980.

Table 9-4. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL. Former Ash Basin.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228	Selenium	Thallium
MW-01 up-gradient	11/16/2015	1.0	98	44	0.17	7.07	93	530	< 0.003	< 0.001	0.057	^ < 0.001	< 0.0005	< 0.005	< 0.001	* < 0.0005	< 0.01	< 0.0002	< 0.0050	0.744	< 0.0025	* < 0.002
	2/25/2016	0.2	110	42	0.16	7.23	54	460	< 0.003	0.0025	0.053	< 0.001	< 0.0005	< 0.005	0.0014	0.0019	< 0.01	< 0.0002	< 0.005	< 0.722	0.0029	< 0.002
	5/20/2016	0.34	100	44	0.17	6.95	65	430	< 0.003	0.0081	0.062	< 0.001	< 0.0005	0.007	0.0053	0.011	< 0.01	< 0.0002	< 0.005	< 0.953	< 0.0025	< 0.002
	8/17/2016	0.27	78	39	0.25	7.16	50	530	< 0.003	0.0014	0.048	< 0.001	< 0.0005	< 0.005	< 0.001	0.0014	< 0.01	< 0.0002	0.0057	< 0.491	< 0.0025	< 0.002
	11/16/2016	0.18	97	39	0.21	7.22	32	500	< 0.003	0.0051	0.056	< 0.001	< 0.0005	< 0.005	0.0044	0.0082	< 0.01	< 0.0002	0.0059	< 0.618	< 0.0025	< 0.002
	2/14/2017	0.18	120	55	0.17	7.30	60	550	< 0.003	0.0041	0.056	< 0.001	< 0.0005	< 0.005	0.0045	0.0076	< 0.01	< 0.0002	0.0056	< 0.837	< 0.0025	< 0.002
	5/3/2017	0.19	86	66	0.16	7.41	45	460	< 0.003	0.0015	0.045	< 0.001	< 0.0005	< 0.005	0.0033	0.0067	< 0.01	< 0.0002	< 0.005	0.574	< 0.0025	< 0.002
	6/21/2017	0.18	85	58	0.18	7.60	47	540	< 0.003	< 0.001	0.040	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0061	< 0.418	< 0.0025	< 0.002
	8/25/2017	0.56	86	41	0.18	7.41	63	490	< 0.003	< 0.001	0.049	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0059	0.775	< 0.0025	< 0.002
	11/8/2017	0.57	130	38	0.12	6.69	61	640	< 0.003	< 0.001	0.083	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.343	< 0.0025	< 0.002
	5/17/2018	0.15	88	50	0.12	6.70	48	540	< 0.003	< 0.001	0.045	< 0.001	< 0.0005	< 0.005	< 0.001	0.00068	< 0.01	< 0.0002	< 0.005	< 0.396	< 0.0025	< 0.002
	8/8/2018	0.14	86	48	0.13	6.80	43	430	< 0.003	< 0.001	0.051	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.579	< 0.0025	< 0.002
	4/30/2019	0.07	78	54	0.17	7.20	27	450	< 0.003	0.0014	0.039	< 0.001	< 0.0005	< 0.005	< 0.001	0.0017	< 0.01	< 0.0002	< 0.005	< 0.656	< 0.0025	< 0.002
	8/26/2019	0.57	100	39	0.13	7.15	71	550	< 0.003	< 0.001	0.053	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.802	< 0.0025	< 0.002
	2/24/2020	0.28	87	53	0.21	7.19	34	410	< 0.003	< 0.001	0.044	< ^ 0.001	< 0.0005	< 0.005	< 0.001	0.00057	< 0.01	< 0.0002	< 0.005	< 0.478	< 0.0025	< 0.002
	4/28/2020	0.33	110	46	0.19	7.17	41	470	NA	< 0.001	0.051	NA	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.628	< 0.0025	< 0.002
	12/7/2020	0.59	100	54	0.25	7.22	55	640	NA	< 0.001	0.058	NA	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0052	< 0.542	< 0.0025	< 0.002
	5/11/2021	0.21	85	51	0.21	7.52	37	450	< 0.003	< 0.001	0.043	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.01	0.521	< 0.0025	< 0.002
MW-10 up-gradient	6/22/2017	0.46	100	48	0.19	6.81	54	1.0	< 0.003	0.0023	0.250	< 0.001	< 0.0005	< 0.005	0.008	0.003	< 0.01	< 0.0002	< 0.005	0.408	0.0042	< 0.002
	8/24/2017	0.32	93	51	0.18	7.14	57	480	< 0.003	0.0020	0.220	< 0.001	< 0.0005	< 0.005	0.007	0.003	< 0.01	< 0.0002	< 0.005	0.564	0.0044	< 0.002
	11/9/2017	0.36	98	48	0.18	6.78	64	500	< 0.003	< 0.0010	0.220	< 0.001	< 0.0005	< 0.005	0.004	< 0.001	< 0.01	< 0.0002	< 0.005	1.020	0.0034	< 0.002
	5/16/2018	0.42	93	44	0.19	7.64	80	530	< 0.003	0.0010	0.220	< 0.001	< 0.0005	< 0.005	0.021	0.001	< 0.01	< 0.0002	< 0.005	1.550	0.0050	< 0.002
	8/8/2018	0.39	99	58	0.19	7.10	60	550	< 0.003	0.0012	0.220	<^ 0.001	< 0.0005	< 0.005	0.014	0.001	< 0.01	< 0.0002	< 0.005	< 0.551	0.0062	< 0.002
	10/30/2018	0.34	110	49	0.22	7.65	49	510	< 0.003	0.0110	0.410	< 0.001	0.0008	0.024	0.047	0.023	0.02	< 0.0002	< 0.005	3.00	0.0046	< 0.002
	2/26/2019	0.39	150	48	0.21	6.77	36	540	< 0.003	0.0220	0.590	< 0.005	0.0015	0.063	0.081	0.036	0.03	< 0.0002	0.007	4.130	0.0041	< 0.002
	5/1/2019	0.35	92	50	0.22	6.81	30	470	< 0.003	0.0023	0.270	< 0.001	< 0.0005	< 0.005	0.011	0.0028	< 0.01	< 0.0002	< 0.005	1.330	0.0037	< 0.002
	8/26/2019	0.30	84	48	0.19	7.09	30	410	< 0.003	0.0017	0.190	< 0.001	< 0.001	< 0.005	0.007	0.0016	< 0.01	< 0.0002	< 0.005	1.540	0.0050	< 0.002
	2/25/2020	1.40	110	45	0.23	6.82	59	500	< 0.003	0.0033	0.280	< ^ 0.001	< 0.0005	0.0086	0.011	0.0046	< 0.01	< 0.0002	< 0.005	1.07	0.0058	< 0.002
	4/28/2020	1.00	110	41	0.24	6.80	64	550	NA	0.0022	0.250	NA	NA	< 0.005	0.0065	0.0017	NA	NA	< 0.005	0.639	0.0054	NA
	12/8/2020	2.40	120	44	0.26	7.11	71	550	NA	0.0015	0.280	NA	NA	< 0.005	0.0089	0.0023	NA	< 0.0002	< 0.005	1.76	0.0031	NA
	5/11/2021	0.64	100	52	0.24	7.01	59	540	< 0.003	0.0011	0.260	< 0.001	< 0.001	< 0.005	0.008	0.0009	< 0.01	< 0.0002	< 0.005	1.42	0.0049	< 0.002
MW-02 down-gradient	6/20/2017	0.33	90	55	0.19	7.01	47	500	< 0.003	0.0012	0.075	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.341	< 0.0025	< 0.002
	8/23/2017	V 1.30	86	49	0.19	7.40	61	440	< 0.003	< 0.001	0.062	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.833	< 0.0025	< 0.002
	11/7/2017	3.70	98	46	0.17	7.10	88	550	< 0.003	0.0014	0.091	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.309	0.0027	< 0.002
	5/15/2018	0.22	80	45	0.23	7.71	54	500	< 0.003	0.0013	0.065	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	0.0004	< 0.005	< 0.408	< 0.0025	< 0.002
	8/7/2018	1.50	89	54	0.15	7.09	51	530	< 0.003	0.0016	0.067	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.622	< 0.0025	< 0.002
	10/30/2018	0.23	86	43	0.17	7.83	34	480	< 0.003	0.0015	0.067	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.564	< 0.0025	< 0.002
	2/26/2019	0.07	69	49	0.16	7.82	23	400	< 0.003	0.0026	0.041	< 0.001	< 0.0005	< 0.005	< 0.001	0.0013	< 0.01	< 0.0002	< 0.005	< 0.425	< 0.0025	< 0.002
	4/30/2019	0.12	79	48	0.16	7.60	30	440	< 0.003	0.0013	0.048	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.441	< 0.0025	< 0.002
	8/26/2019	0.51	86	50	0.18	7.13	32	400	< 0.003	0.0011	0.065	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	1.180	< 0.0025	< 0.002
	2/24/2020	0.33	89	53	0.20	7.43	37	410	< 0.003	0.0011	0.061	< ^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.485	< 0.0025	< 0.002
	4/28/2020	0.33	90	50	0.20	7.32	41	430	NA	0.0016	0.06	NA	NA	< 0.005	< 0.001	< 0.0005	NA	NA	< 0.005	< 0.54	< 0.0025	NA
	12/9/2020	0.66	100	41	0.15	7.78	64	430	NA	< 0.001	0.076	NA	NA	< 0.005	< 0.001	< 0.0005	NA	< 0.0002	0.0059	< 0.471	< 0.0025	NA
	5/11/2021	0.23	79	51	0.21	7.70	37	370	< 0.003	0.0015	0.057	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.010	< 0.528	< 0.0025	< 0.002

Notes: All units are in mg/l except pH is in standard units.
V- Serial dilution exceeds control limits.
H- Sample was prepped or analyzed beyond specified holding time

F1 - MS and/or MSD Recovery outside of limits.
* - LCS or LCSD is outside acceptance limits.
^ - Denotes instrument related QC exceeds the control limits

NA - Not Analyzed

Table 9-6. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL. Former Ash Basin.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228	Selenium	Thallium
MW-03 down-gradient	6/20/2017	0.4	76	54	0.29	7.26	49	480	< 0.003	0.0013	0.066	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.325	< 0.0025	< 0.002
	8/23/2017	0.40	79	52	0.28	7.44	52	430	< 0.003	0.0010	0.066	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	1.200	< 0.0025	< 0.002
	11/7/2017	0.31	79	62	0.26	7.04	61	460	< 0.003	0.0013	0.068	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.588	< 0.0025	< 0.002
	5/15/2018	0.35	87	66	0.27	7.53	77	520	< 0.003	0.0010	0.059	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.489	< 0.0025	< 0.002
	8/7/2018	0.40	82	67	0.22	6.60	49	500	< 0.003	0.0015	0.067	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.341	< 0.0025	< 0.002
	10/30/2018	0.20	74	44	0.25	7.84	26	400	< 0.003	0.0014	0.056	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.354	< 0.0025	< 0.002
	2/26/2019	0.06	74	56	0.24	7.49	25	410	< 0.003	0.0013	0.054	< 0.001	< 0.0005	< 0.005	< 0.001	0.0007	< 0.01	< 0.0002	< 0.005	< 0.399	< 0.0025	< 0.002
	4/30/2019	0.28	74	49	0.22	7.17	38	390	< 0.003	< 0.001	0.060	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.668	< 0.0025	< 0.002
	8/26/2019	0.31	75	50	0.26	7.17	14	380	< 0.003	0.0014	0.069	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.444	< 0.0025	< 0.002
	2/24/2020	0.33	87	53	0.22	7.10	65	470	< 0.003	< 0.001	0.066	< ^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.400	< 0.0025	< 0.002
	4/28/2020	0.24	86	46	0.22	7.03	79	410	NA	0.0013	0.066	NA	NA	< 0.005	< 0.001	< 0.0005	NA	NA	< 0.005	< 0.498	0.0036	NA
	12/9/2020	0.86	92	45	0.28	7.46	60	390	NA	< 0.001	0.086	NA	NA	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.432	< 0.0025	NA
	5/11/2021	0.22	75	49	0.21	7.33	38	390	< 0.003	< 0.001	0.070	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.519	< 0.0025	< 0.002
MW-04 down-gradient	6/20/2017	0.5	77	55	0.29	7.45	53	480	< 0.003	< 0.001	0.0025	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.343	< 0.0025	< 0.002
	8/28/2017	V 0.73	90	89	0.33	7.13	110	680	< 0.003	< 0.001	0.028	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.013	< 0.246	< 0.0025	< 0.002
	11/7/2017	0.60	110	94	0.24	6.80	130	650	< 0.003	< 0.001	0.051	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.332	0.0092	< 0.002
	5/15/2018	0.68	87	66	0.27	7.63	100	630	< 0.003	< 0.001	0.037	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.661	< 0.0025	< 0.002
	8/7/2018	0.79	84	71	0.32	6.72	49	510	< 0.003	0.0011	0.031	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.006	< 0.334	< 0.0025	< 0.002
	10/30/2018	0.54	100	80	0.24	7.55	91	690	< 0.003	< 0.001	0.049	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.423	< 0.0025	< 0.002
	2/26/2019	0.38	79	55	0.25	7.18	52	490	< 0.003	0.0013	0.033	< 0.001	< 0.0005	< 0.005	0.001	0.0012	< 0.01	< 0.0002	< 0.005	0.366	< 0.0025	< 0.002
	4/30/2019	0.36	74	48	0.25	7.08	35	380	< 0.003	< 0.001	0.026	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.684	< 0.0025	< 0.002
	8/26/2019	0.64	91	60	0.24	7.08	14	490	< 0.003	< 0.001	0.032	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.008	1.090	< 0.0025	< 0.002
	2/24/2020	0.34	81	49	0.20	7.05	67	440	< 0.003	< 0.001	0.024	< ^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.595	< 0.0025	< 0.002
	4/28/2020	0.55	76	52	0.27	7.03	47	380	NA	< 0.001	0.025	NA	NA	< 0.005	< 0.001	< 0.0005	NA	NA	< 0.005	< 0.465	< 0.0025	NA
	12/9/2020	0.57	92	88	0.32	7.10	94	580	NA	< 0.001	0.034	NA	NA	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0076	< 0.411	< 0.0025	NA
	5/11/2021	0.61	77	44	0.33	7.22	76	410	< 0.003	< 0.001	0.025	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.533	< 0.0025	< 0.002
MW-05 down-gradient	5/17/2016	0.70	100	85	0.35	7.08	120	660	< 0.003	< 0.001	0.051	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.373	< 0.0025	< 0.002
	8/16/2016	0.69	110	97	0.30	6.85	150	830	< 0.003	< 0.001	0.060	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.452	< 0.0025	< 0.002
	11/15/2016	0.93	94	66	0.23	6.96	77	620	< 0.003	< 0.001	0.051	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.449	< 0.0025	< 0.002
	2/14/2017	0.79	100	100	0.25	7.25	170	760	< 0.003	< 0.001	0.062	< 0.001	< 0.0005	< 0.005	< 0.001	0.00091	< 0.01	< 0.0002	< 0.005	< 0.359	< 0.0025	< 0.002
	5/1/2017	0.70	100	92	0.28	7.60	170	710	< 0.003	< 0.001	0.059	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0066	< 0.439	< 0.0025	< 0.002
	6/20/2017	0.64	89	63	0.28	7.32	78	550	< 0.003	< 0.001	0.048	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0061	< 0.365	< 0.0025	< 0.002
	8/28/2017	0.62	110	120	0.33	7.05	210	870	< 0.003	< 0.001	0.064	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0085	0.381	< 0.0025	< 0.002
	11/7/2017	0.51	99	110	0.31	6.87	160	990	< 0.003	< 0.001	0.058	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.341	< 0.0025	< 0.002
	5/15/2018	0.61	130	89	0.29	7.70	210	910	< 0.003	< 0.001	0.062	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.390	< 0.0025	< 0.002
	8/7/2018	0.49	110	120	0.32	6.56	180	890	< 0.003	< 0.001	0.054	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0069	0.523	< 0.0025	< 0.002
	4/30/2019	0.56	84	73	0.36	6.96	120	590	< 0.003	< 0.001	0.041	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0061	< 0.709	< 0.0025	< 0.002
	8/26/2019	0.57	110	75	0.29	7.01	110	660	< 0.003	< 0.001	0.050	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0067	0.651	< 0.0025	< 0.002
	2/24/2020	0.54	110	70	0.36	6.90	120	H 700	< 0.003	< 0.001	0.057	< ^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0061	0.506	< 0.0025	< 0.002
	4/28/2020	0.49	110	56	0.37	6.87	130	620	NA	0.001	0.052	NA	NA	< 0.005	< 0.001	< 0.0005	NA	NA	0.0074	0.508	< 0.0025	NA
	12/9/2020	0.53	98	78	0.31	6.91	110	670	NA	< 0.001	0.05	NA	NA	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0072	0.569	< 0.0025	NA
	5/11/2021	0.5	83	52	0.38	7.20	100	530	< 0.003	< 0.001	0.04	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0062	< 0.525	< 0.0025	< 0.002

Notes: All units are in mg/l except pH is in standard units.
V- Serial dilution exceeds control limits.
H- Sample was prepped or analyzed beyond specified holding time

F1 - MS and/or MSD Recovery outside of limits.
* - LCS or LCSD is outside acceptance limits.
^ - Denotes instrument related QC exceeds the control limits

NA - Not Analyzed

Table 9-5 Former Ash Basin Turbidity Measurement Data - Midwest Generation, LLC, Powerton Station.

Well	Date	Turbidity (NTU)
MW-01	2/23/2021	78.20
	4/9/2021	6.96
	5/10/2021	3.24
	6/2/2021	3.80
	6/28/2021	4.30
	7/19/2021	4.88
	8/24/2021	3.34
	9/30/2021	3.04
MW-10	2/23/2021	257.70
	4/9/2021	54.91
	5/11/2021	24.74
	6/2/2021	6.02
	6/28/2021	14.11
	7/19/2021	17.53
	8/24/2021	41.55
	9/30/2021	17.07
MW-02	2/22/2021	19.60
	4/8/2021	4.55
	5/11/2021	1.82
	6/2/2021	2.06
	6/28/2021	2.67
	7/19/2021	3.56
	8/24/2021	5.23
	10/1/2021	2.76
MW-03	2/22/2021	8.20
	4/8/2021	4.00
	5/11/2021	2.68
	6/2/2021	3.63
	6/28/2021	3.32
	7/19/2021	4.22
	8/24/2021	5.75
	10/1/2021	2.45
MW-04	2/22/2021	4.20
	4/8/2021	4.05
	5/11/2021	4.33
	6/2/2021	2.12
	6/28/2021	8.21
	7/19/2021	3.84
	8/24/2021	2.92
	10/1/2021	2.72
MW-05	2/22/2021	1.72
	4/8/2021	4.00
	5/11/2021	1.82
	6/2/2021	1.88
	6/28/2021	3.49
	7/19/2021	8.39
	8/24/2021	3.20
	10/1/2021	3.12

Table 9-6. Summary of Sample Bottles, Preservation Holding Time, and Analytical Methods. Midwest Generation, LLC, Powerton Station, Pekin, IL.

PARAMETER	ANALYTICAL METHOD	CONTAINER	PRESERVATION	HOLD TIME	METHOD DETECTION LIMIT (MG/L)	Section 845.600(a) Standards
Boron	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.0245	2
Calcium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.106	NS
Chloride	SM4500 Cl-E	1 L plastic	None, < 6 °C	28 days	1.22	200
Fluoride	SM4500 F-C	1 L plastic	None, < 6 °C	28 days	0.019	4
pH	SM4500 H^+ -B	1 L plastic	None, < 6 °C	immediate *	Field Parameter	6.5 - 9.0 (secondary standard)
Sulfate	SM4500 SO_4 -E	1 L plastic	None, < 6 °C	28 days	2	400
Total Dissolved Solids	SM2400 C	1 L plastic	None, < 6 °C	7 days	6.1	1200
Antimony	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.00101	0.006
Arsenic	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000439	0.01
Barium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000841	2
Beryllium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000237	0.004
Cadmium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.00019	0.005
Chromium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000608	0.1
Cobalt	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000189	0.006
Lead	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000141	0.0075
Lithium	6010 C	250 mL plastic	HNO_3, < 6 °C	6 months	0.00215	0.04
Mercury	7470 A	250 mL plastic	HNO_3, < 6 °C	28 days	0.0000611	0.002
Molybdenum	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.00162	0.1
Selenium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000834	0.05
Thallium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000591	0.002
Radium 226	903.0	1 L plastic	HNO_3	180 days	1 pCi/L	5 pCi/L **
Radium 228	904.0	2 L plastic	HNO_3	180 days	1 pCi/L	5 pCi/L **

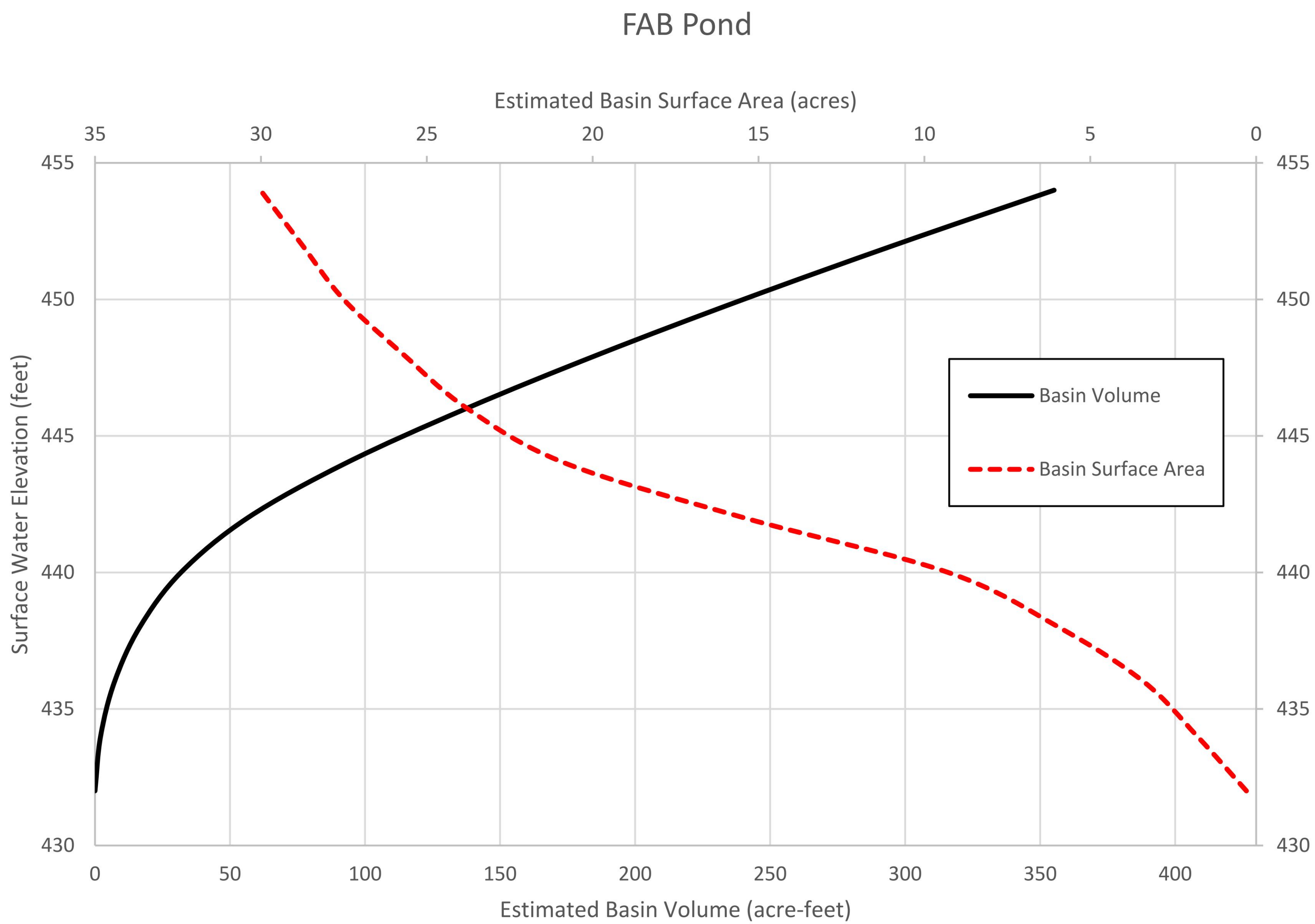
Notes: It is noted that some parameters may be combined with others within the same container.
* - The result for pH is obtained in the field and is not submitted to the laboratory.
** - Combined Radium 226/228
mL - milliliters
L - liters
°C - degrees Celsius
HNO_3 - Nitric Acid
NS- No Standard

Table 9-7. Proposed Site-Specific Groundwater Protection Standards - Powerton Former Ash Basin

Upgradient Well(s)	Parameter	Section 845.600 Standards	Interwell Background Prediction Limit	**Proposed GWPS**
MW-01 & MW-10	Antimony	0.006	0.003	**0.006**
MW-10	Arsenic	0.01	0.04	**0.04**
MW-01	Barium	2	0.08	**2**
MW-01 & MW-10	Beryllium	0.004	0.001	**0.004**
MW-01	Boron	2.0	1.086	**2**
MW-01 & MW-10	Cadmium	0.005	0.0015	**0.005**
MW-01 & MW-10	Chloride	200	63.49	**200**
MW-01 & MW-10	Chromium	0.1	0.063	**0.1**
MW-10	Cobalt	0.006	0.143	**0.143**
MW-01	Combined Radium 226 + 228 (pCi/L)	5.0	0.953	**5.0**
MW-01	Fluoride	4.0	0.279	**4.0**
MW-10	Lead	0.0075	0.1164	**0.1164**
MW-01 & MW-10	Lithium	0.04	0.032	**0.04**
MW-01 & MW-10	Mercury	0.002	0.0002	**0.002**
MW-01 & MW-10	Molybdenum	0.10	0.01	**0.1**
MW-01 & MW-10	pH (standard units)	6.5-9.0	6.45 - 7.78	**6.5 - 9.0**
MW-10	Selenium	0.05	0.007	**0.05**
MW-01 & MW-10	Sulfate	400	89.86	**400**
MW-01 & MW-10	Thallium	0.002	0.002	**0.002**
MW-01 & MW-10	Total Dissolved Solids	1200	644.5	**1200**
MW-01 & MW-10	Calcium	NE	139	**139**
MW-10	Turbidity (NTU)	NE	581.2	**581.2**

All values are in mg/L (ppm) unless otherwise noted.
NE - Not Established
Bold - Site-specific Groundwater Protection Standard based on Section 845.600(a)(2)

<u>CONSTRUCTION PERMIT FIGURES</u>



NOTES:

1. BASIN VOLUME SHOWN IS REMAINING VOLUME ONLY. APPROX. 500,000 yd3 OF CCR IS PLACED BELOW NOTED ELEVATIONS.
2. AREA-CAPACITY CURVE CREATED BY GEOSYNTEC AS PART OF COMPLETING THE HISTORY OF CONSTRUCTION IN ACCORDANCE WITH 40 CFR PART 257.

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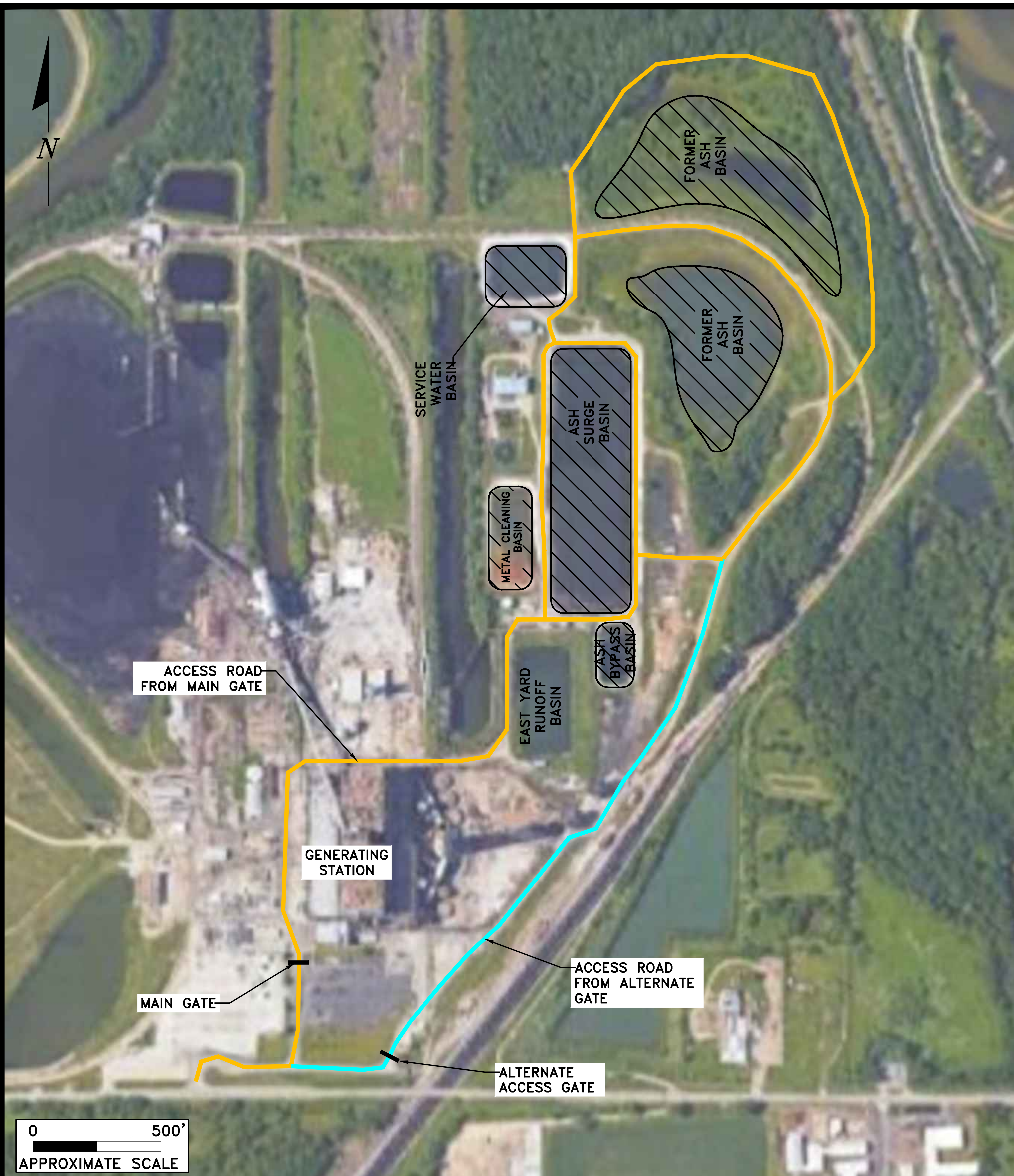
FORMER ASH BASIN AREA-CAPACITY CURVE	
POWERTON GENERATING STATION PEKIN, ILLINOIS	
Scale: NTS	Date: September 15, 2021
KPRG Project No. 19520.1	FIGURE 1

W:\projects\midwest generation\operating-constructing permits\joliet 29\area-capacity curve.dwg



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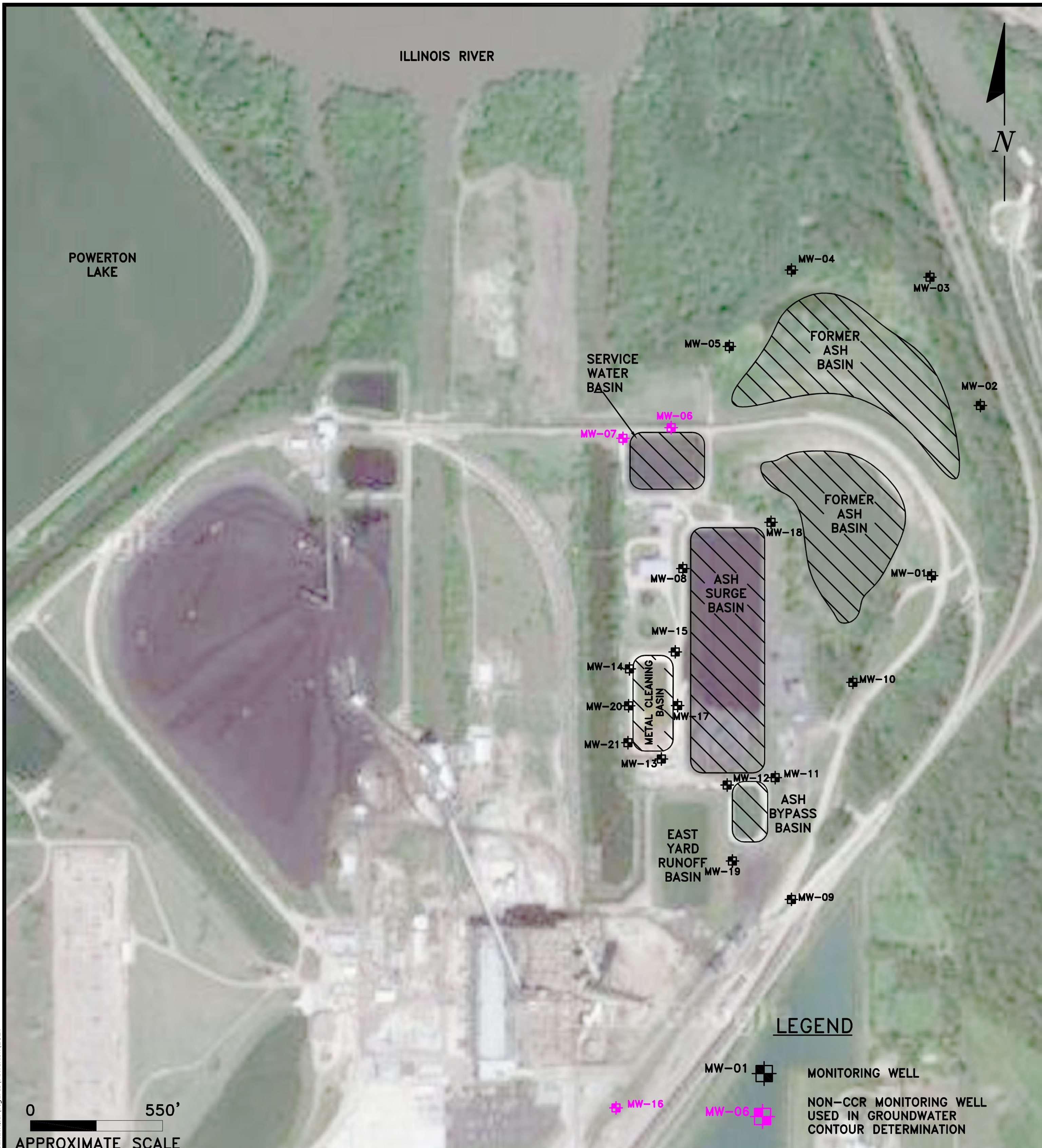
TRANSPORTATION SITE MAP

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 500'	Date: October 26, 2022
KPRG Project No. 19620.1	FIGURE 2

W:\projects\midwest gen\operating and construct permits - various stations\POWERTON\POWERTON station-FAB.dwg



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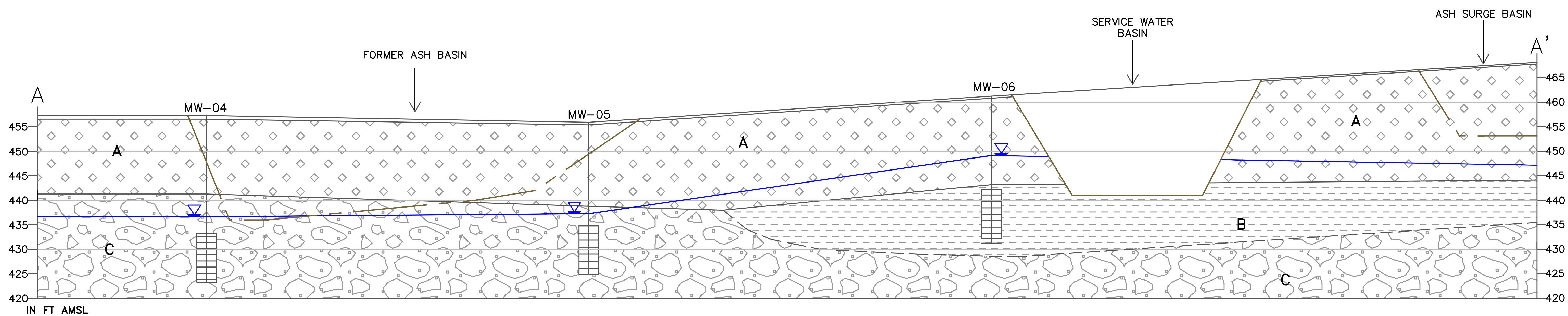
MONITORING WELL MAP

POWERTON STATION
PEKIN, ILLINOIS

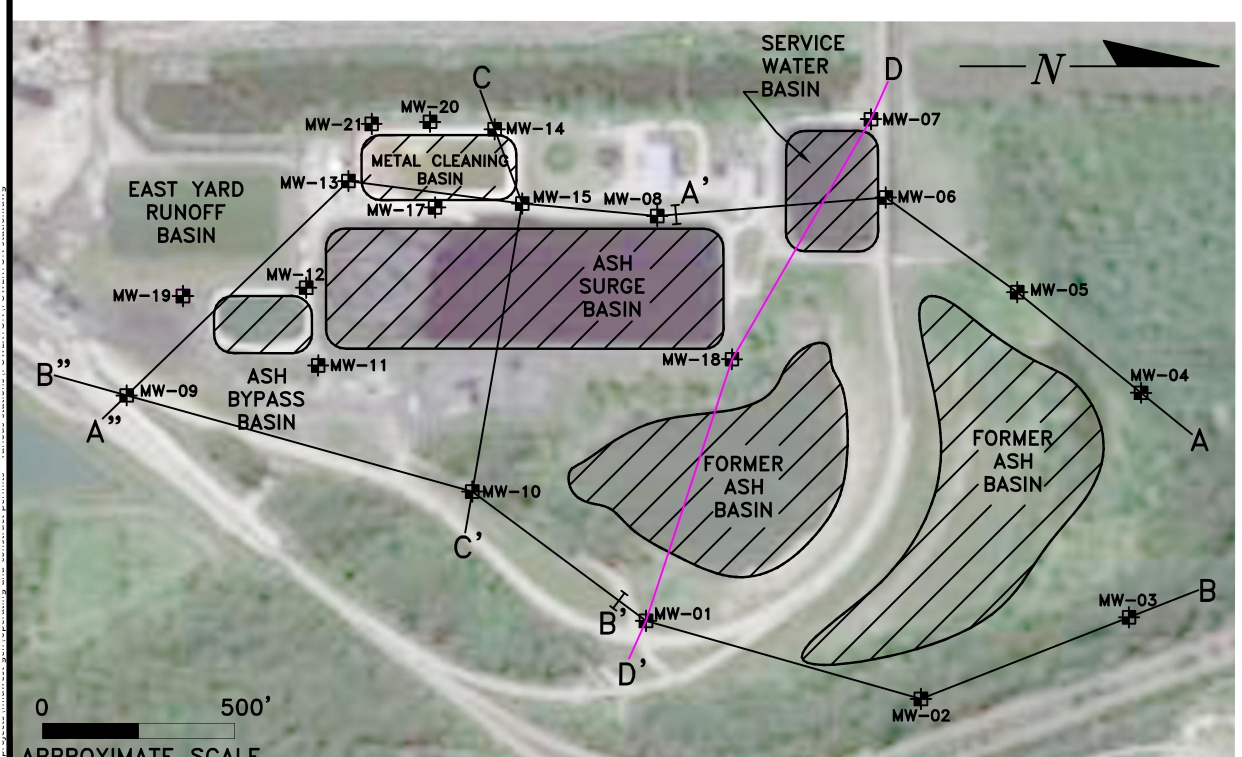
Scale: 1" = 550'	Date: August 31, 2021
KPRG Project No. 19520.1	FIGURE 9-1

W:\Projects\Midwest Generation\12313 Ash Pond Groundwater\Figures\Powerton\2021



A	FILL: CONSISTING OF TAN, BROWN AND BLACK FINE TO MEDIUM SAND WITH SOME GRAVEL AND CLAY SEAMS. SEVERAL LOCATIONS ALSO INCLUDED BLACK CINDERS AND BRICK FRAGMENTS.
B	CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS).
C	SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.
▽	WATER LEVEL (5/21)
— — —	PROJECTED POND OUTLINE
——	POND OUTLINE

20'
0
100'
APPROXIMATE SCALE



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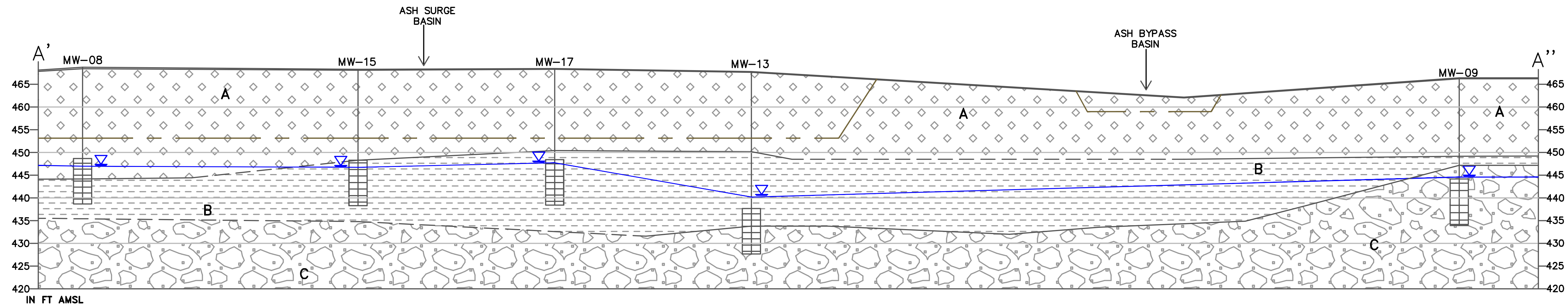
CROSS SECTION A-A'

POWERTON STATION
PEKIN, ILLINOIS

SEE SCALE	Date: October 4, 2021
KPRG Project No. 19520.1	FIGURE 9-2



FILL: CONSISTING OF TAN, BROWN AND BLACK FINE TO MEDIUM SAND WITH SOME GRAVEL AND CLAY SEAMS. SEVERAL LOCATIONS ALSO INCLUDED BLACK CINDERS AND BRICK FRAGMENTS.

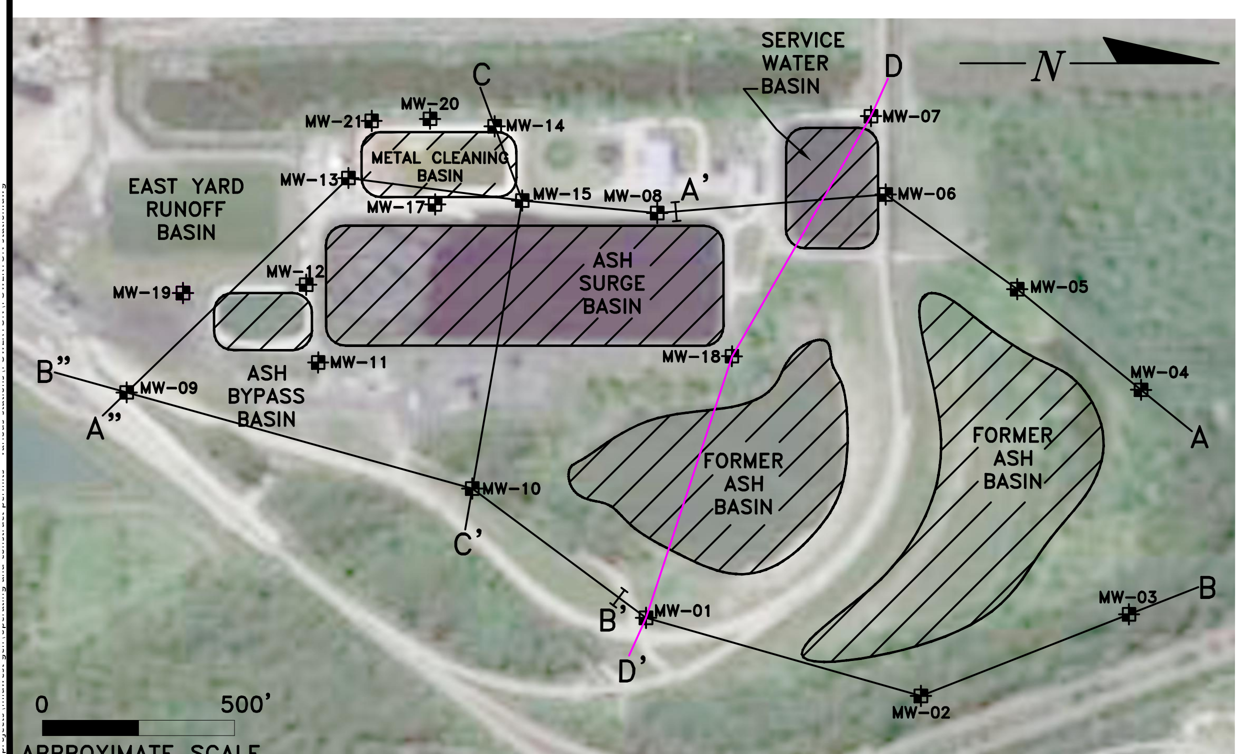
CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS).

SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.

WATER LEVEL (5/21)

PROJECTED POND OUTLINE

25'
125'
0
APPROXIMATE SCALE



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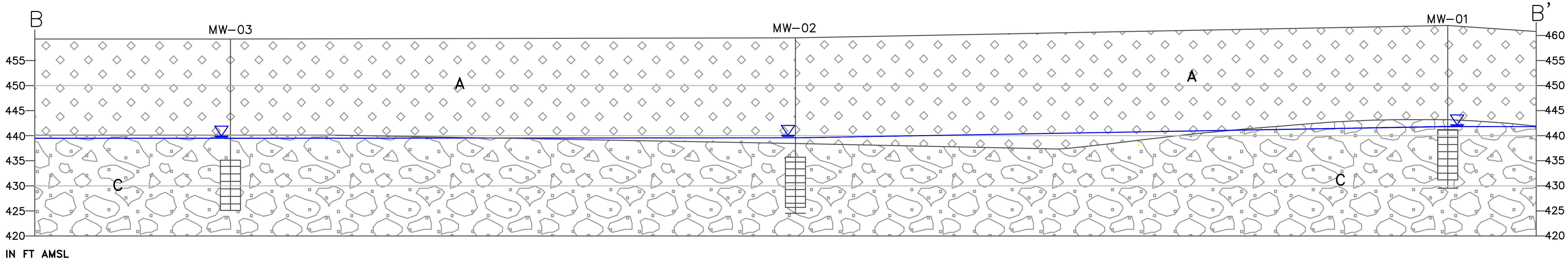
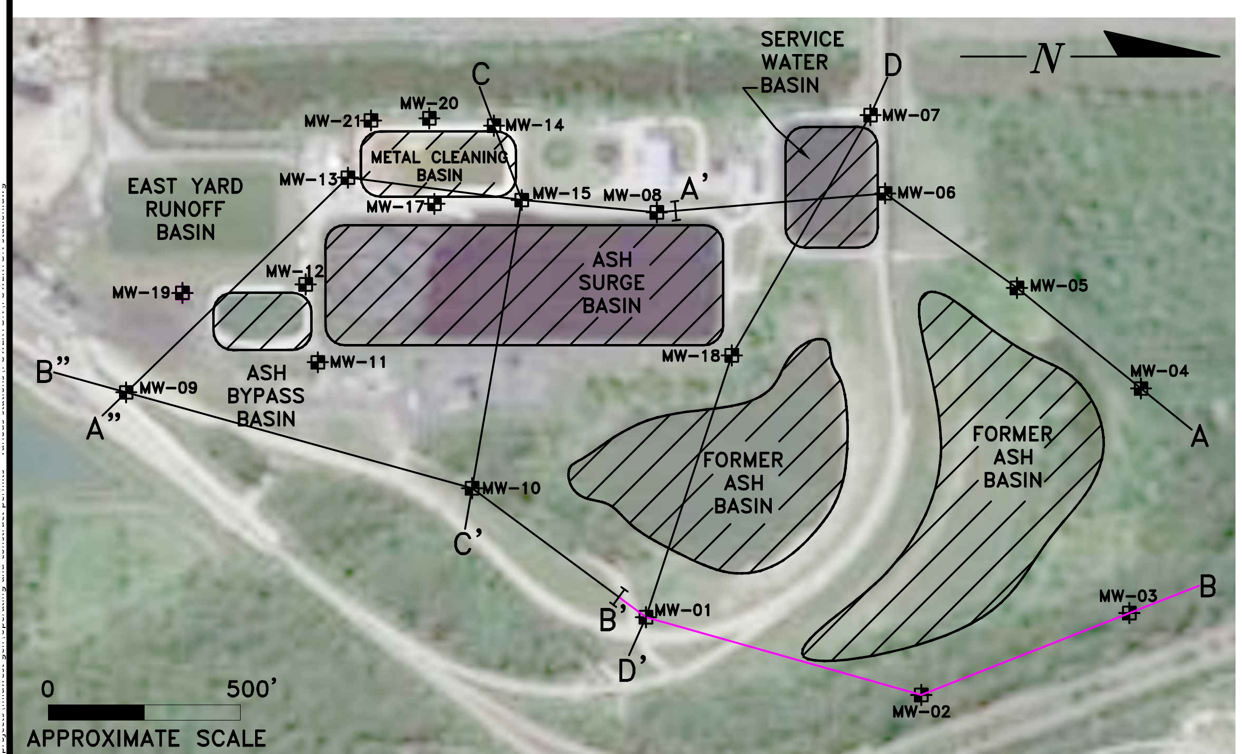
CROSS SECTION A'–A"	
POWERTON STATION PEKIN, ILLINOIS	
SEE SCALE	Date: October 4, 2021
KPRG Project No. 19520.1	FIGURE 9–3





A — FILL: CONSISTING OF TAN, BROWN AND BLACK FINE TO MEDIUM SAND WITH SOME GRAVEL AND CLAY SEAMS. SEVERAL LOCATIONS ALSO INCLUDED BLACK CINDERS AND BRICK FRAGMENTS.

B — CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS).

C — SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.

▽ WATER LEVEL (5/21)

20'
0
100'
APPROXIMATE SCALE

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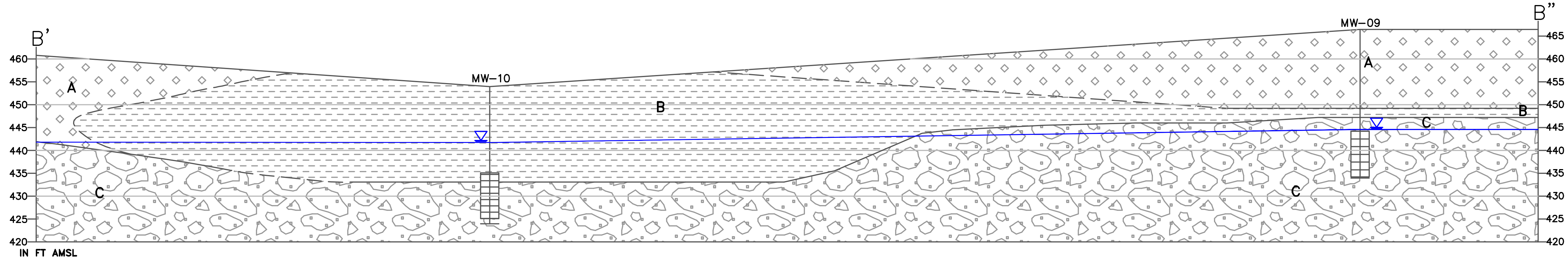
CROSS SECTION B–B'	
POWERTON STATION PEKIN, ILLINOIS	
SEE SCALE	Date: August 17, 2021
KPRG Project No. 19520.1	FIGURE 9–4

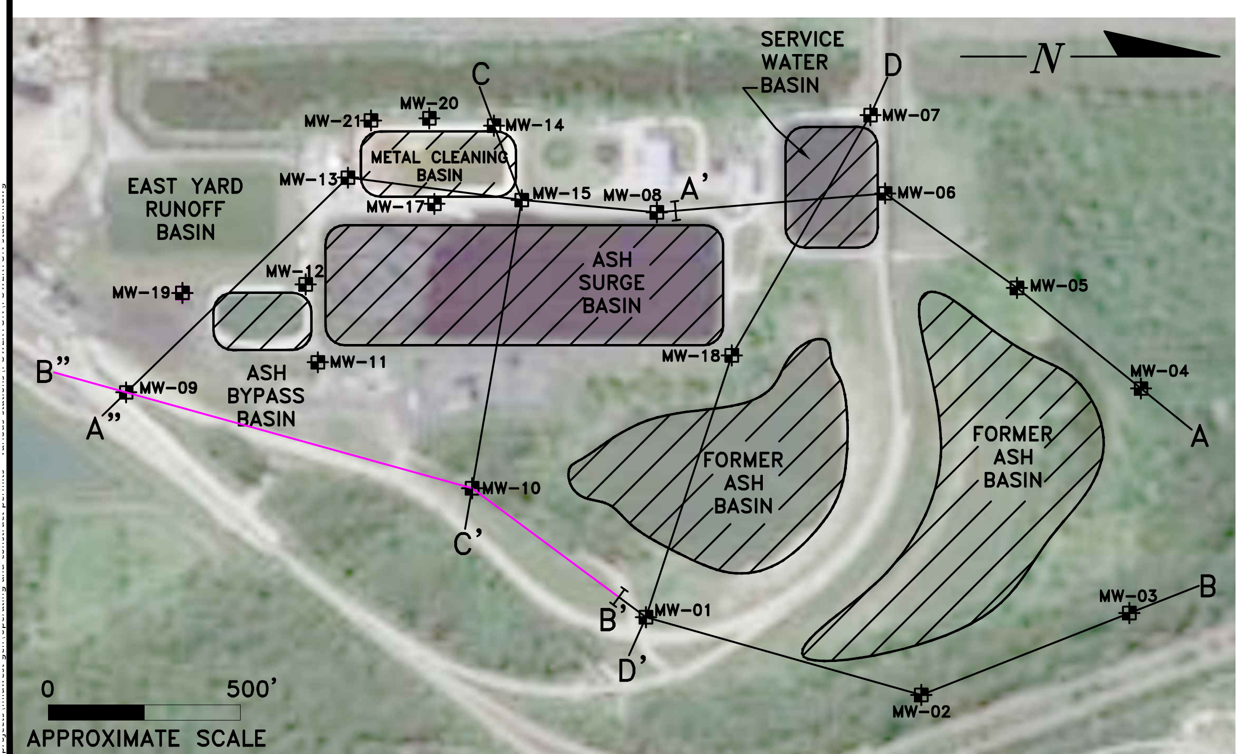


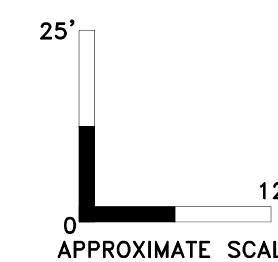
A — FILL: CONSISTING OF TAN, BROWN AND BLACK FINE TO MEDIUM SAND WITH SOME GRAVEL AND CLAY SEAMS. SEVERAL LOCATIONS ALSO INCLUDED BLACK CINDERS AND BRICK FRAGMENTS.

B — CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS).

C — SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.

▽ WATER LEVEL (5/21)





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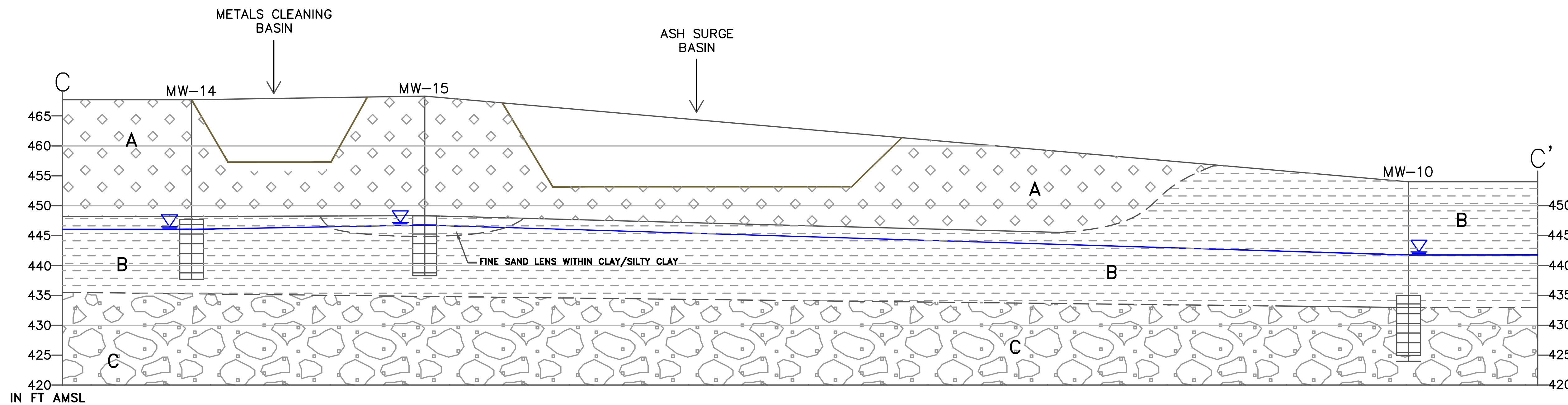
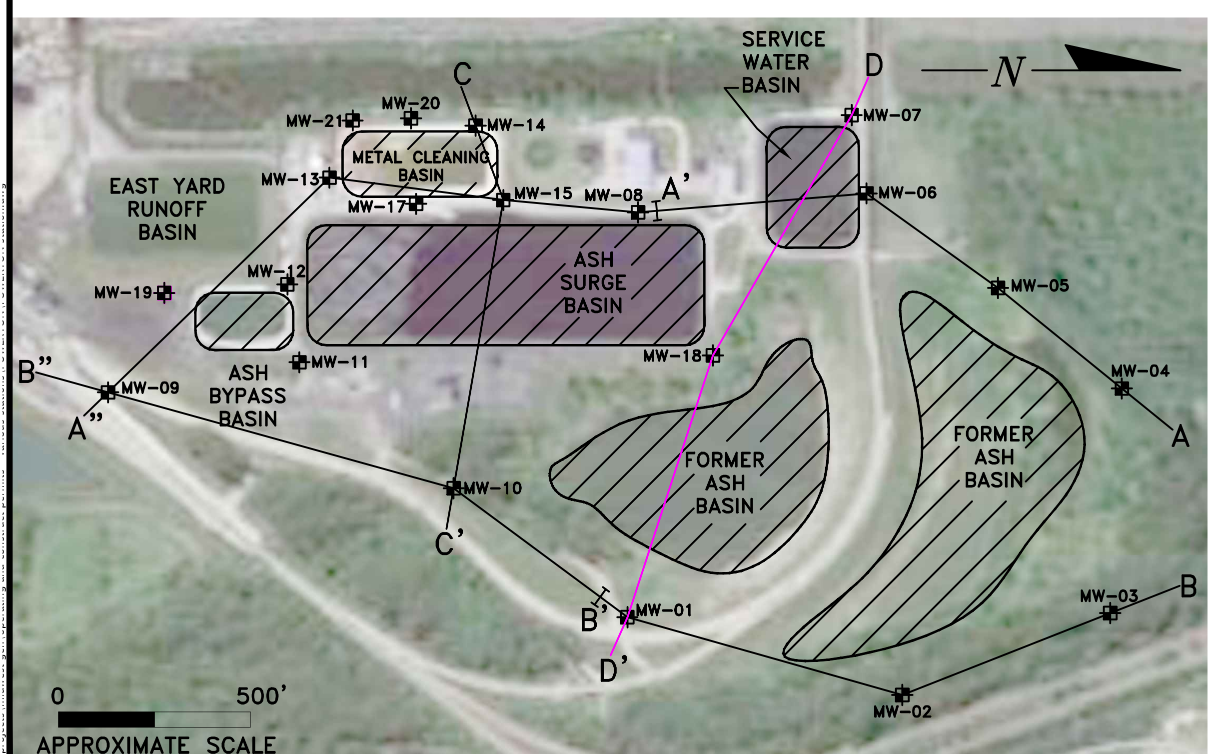
CROSS SECTION B'–B"	
POWERTON STATION PEKIN, ILLINOIS	
SEE SCALE	Date: August 17, 2021
KPRG Project No. 19520.1	FIGURE 9–5





FILL: CONSISTING OF TAN, BROWN AND BLACK FINE TO MEDIUM SAND WITH SOME GRAVEL AND CLAY SEAMS. SEVERAL LOCATIONS ALSO INCLUDED BLACK CINDERS AND BRICK FRAGMENTS. (A)

CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS). (B)

SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS. (C)

WATER LEVEL (5/21)

POND OUTLINE

20' / 0 / 100' APPROXIMATE SCALE

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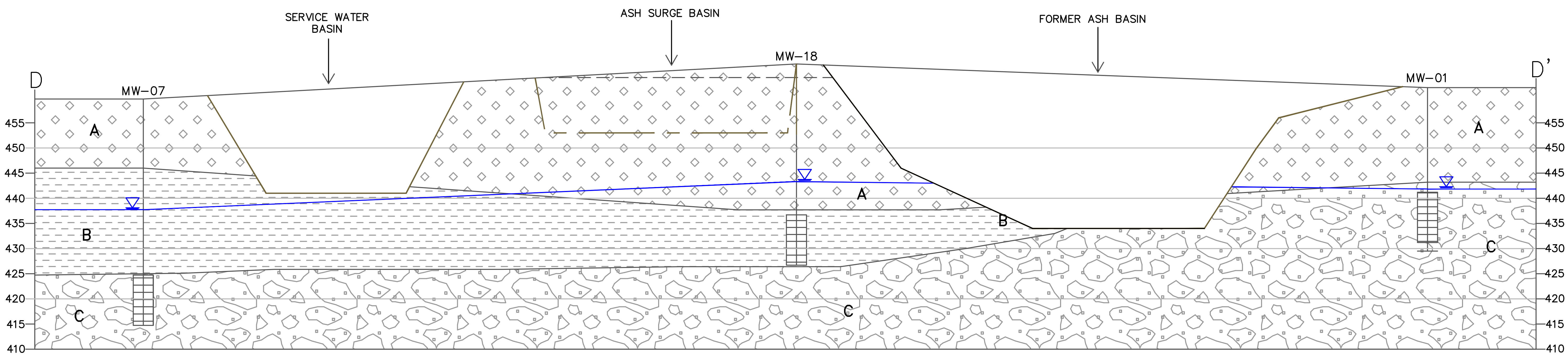
CROSS SECTION C–C'	
POWERTON STATION PEKIN, ILLINOIS	
SEE SCALE	Date: October 4, 2021
KPRG Project No. 19520.1	FIGURE 9–6



FILL: CONSISTING OF TAN, BROWN AND BLACK FINE TO MEDIUM SAND WITH SOME GRAVEL AND CLAY SEAMS. SEVERAL LOCATIONS ALSO INCLUDED BLACK CINDERS AND BRICK FRAGMENTS. (A)

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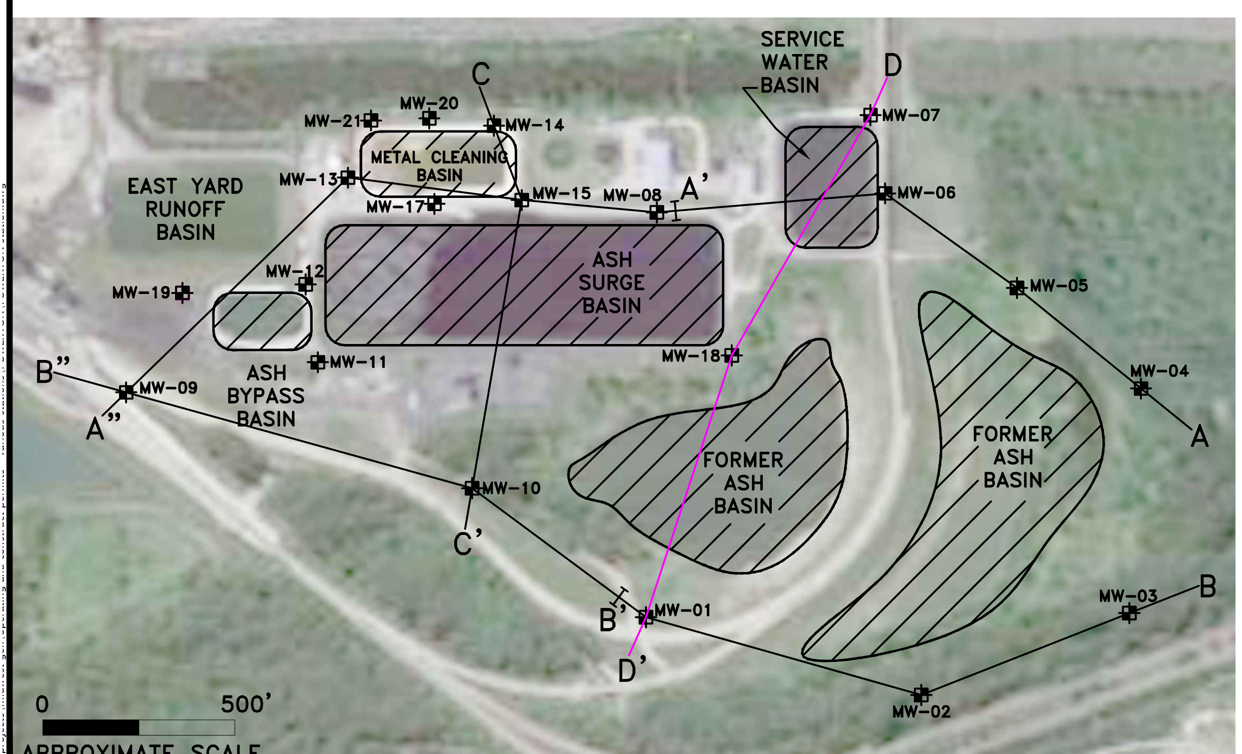
SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS. (C)

WATER LEVEL (5/21)

PROJECTED POND OUTLINE

POND OUTLINE

20'
0
100'
APPROXIMATE SCALE



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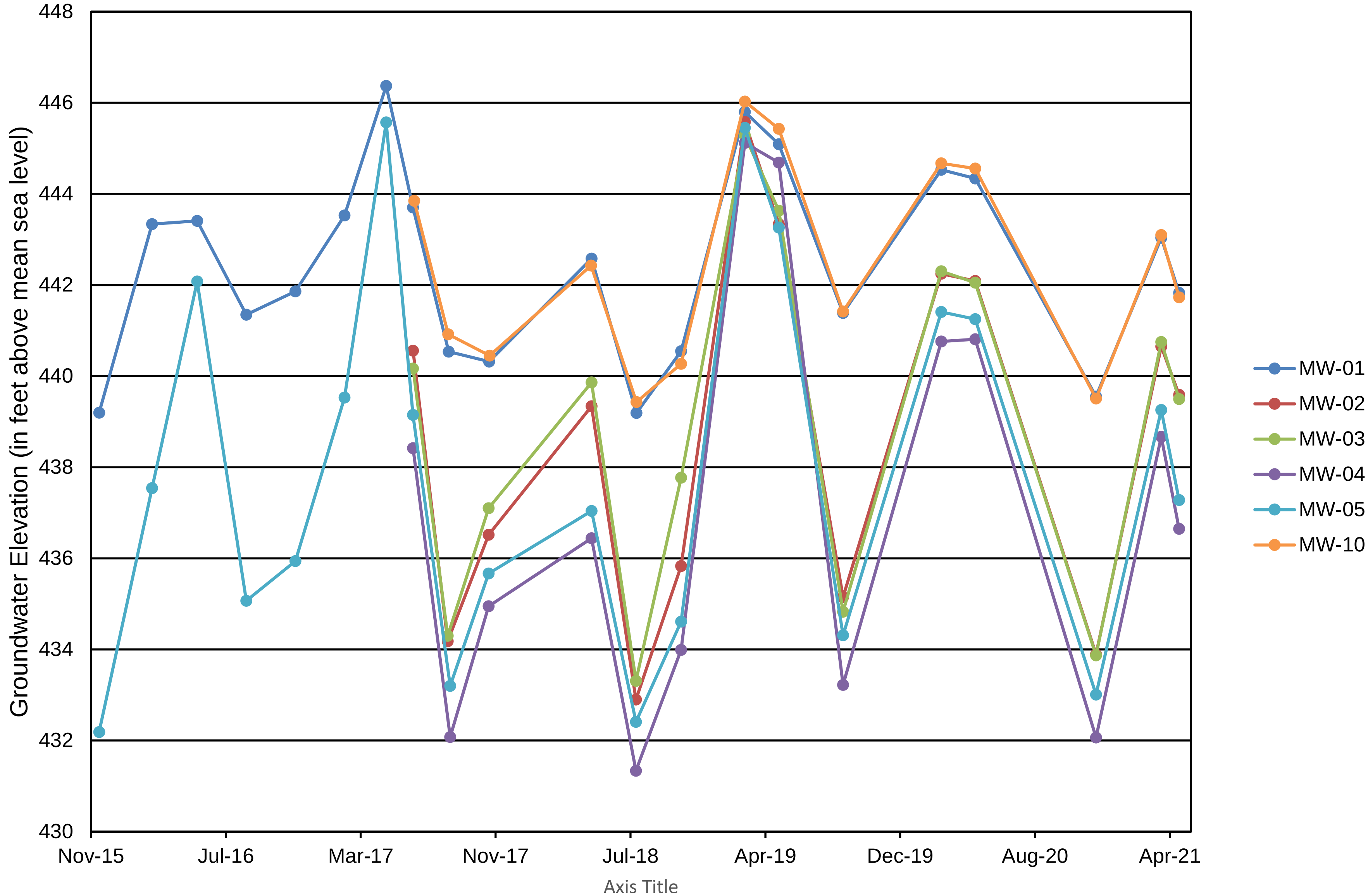
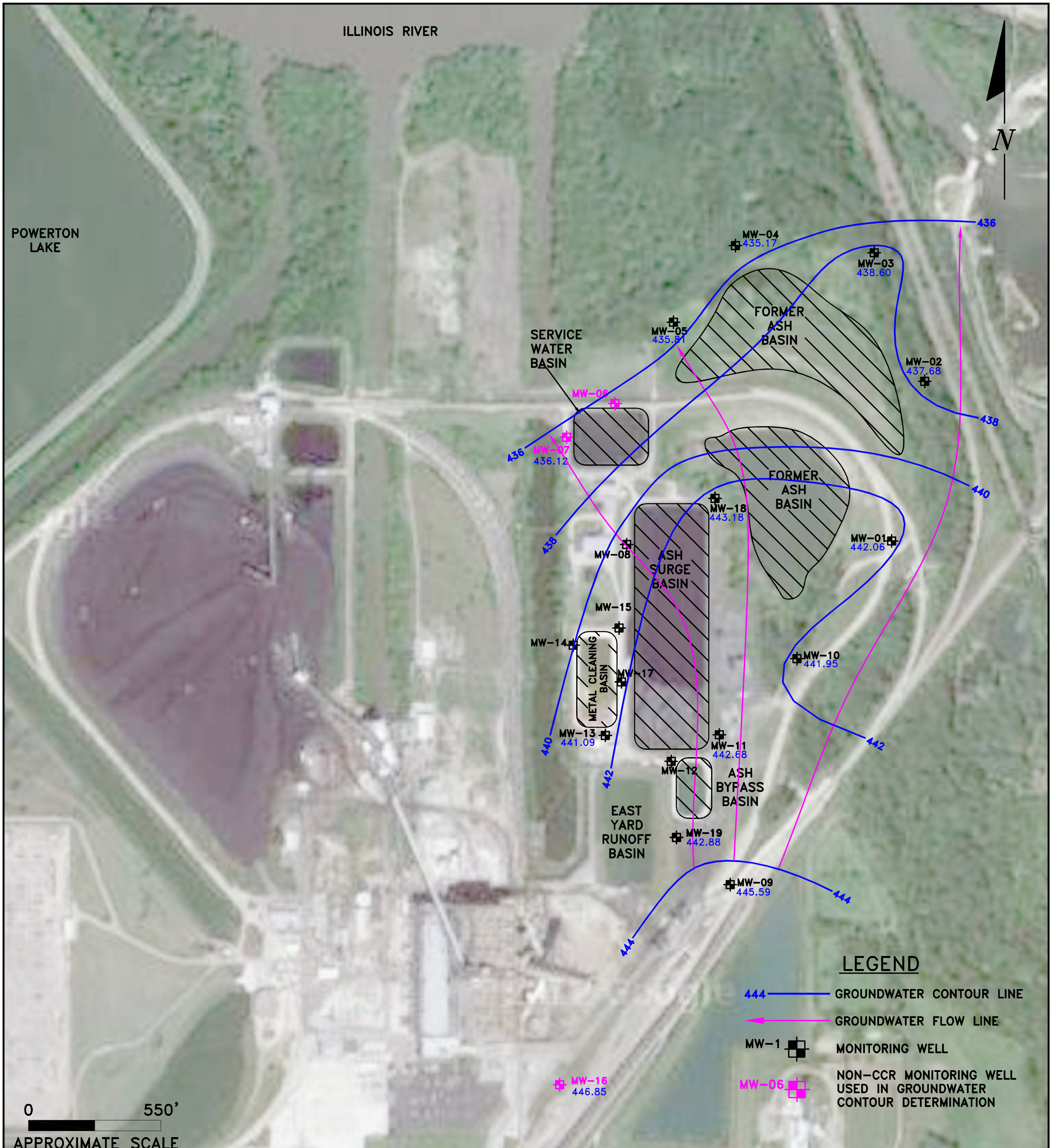
CROSS SECTION D-D'	
POWERTON STATION PEKIN, ILLINOIS	
SEE SCALE	Date: October 4, 2021
KPRG Project No. 19520.1	FIGURE 9-7

Midwest Generation Powerton Station, Pekin, IL.
Figure 9-8. Former Ash Basin Hydrograph





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GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 08/2020

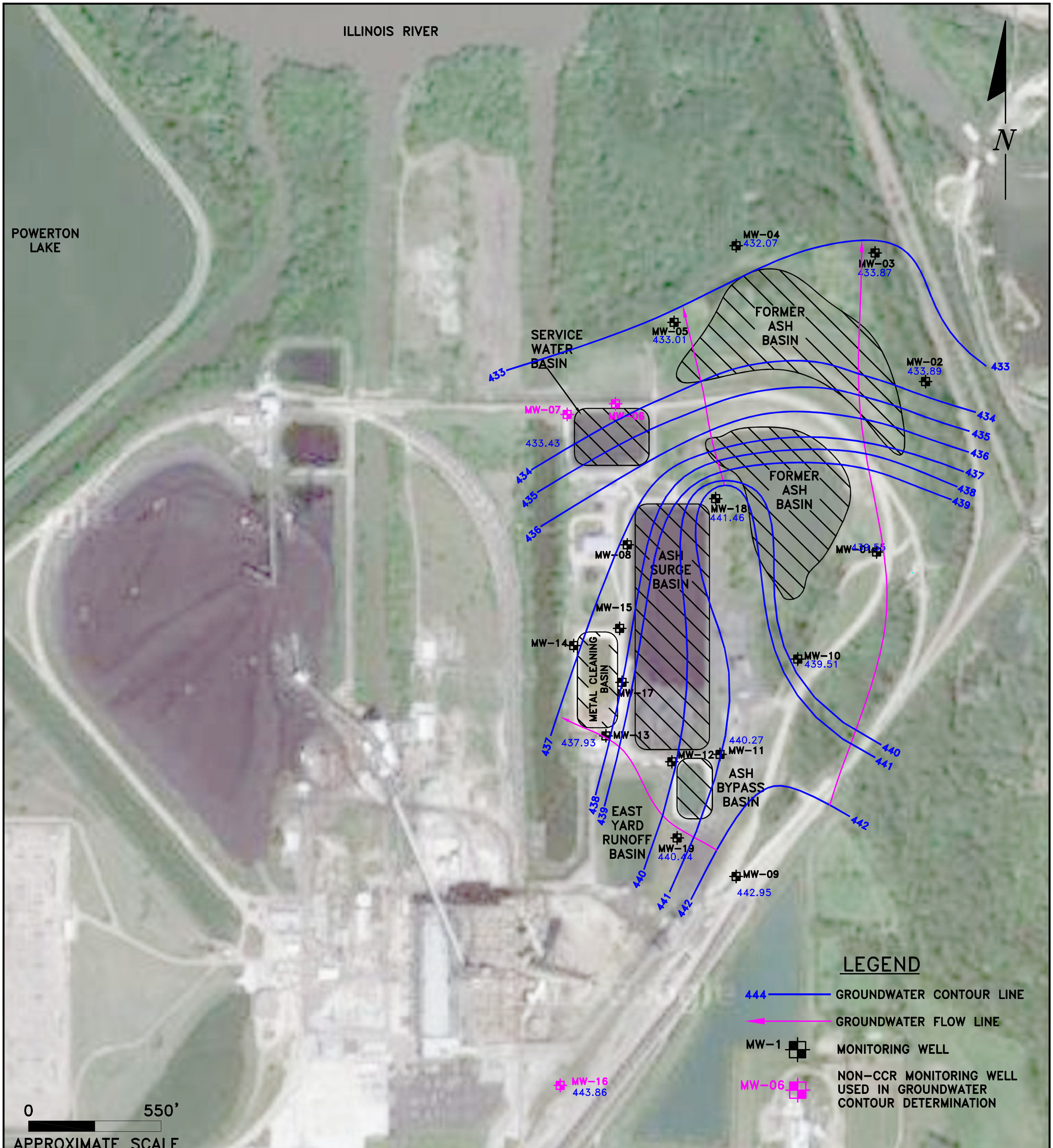
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: August 31, 2021

KPRG Project No. 19520.1

FIGURE 9-9



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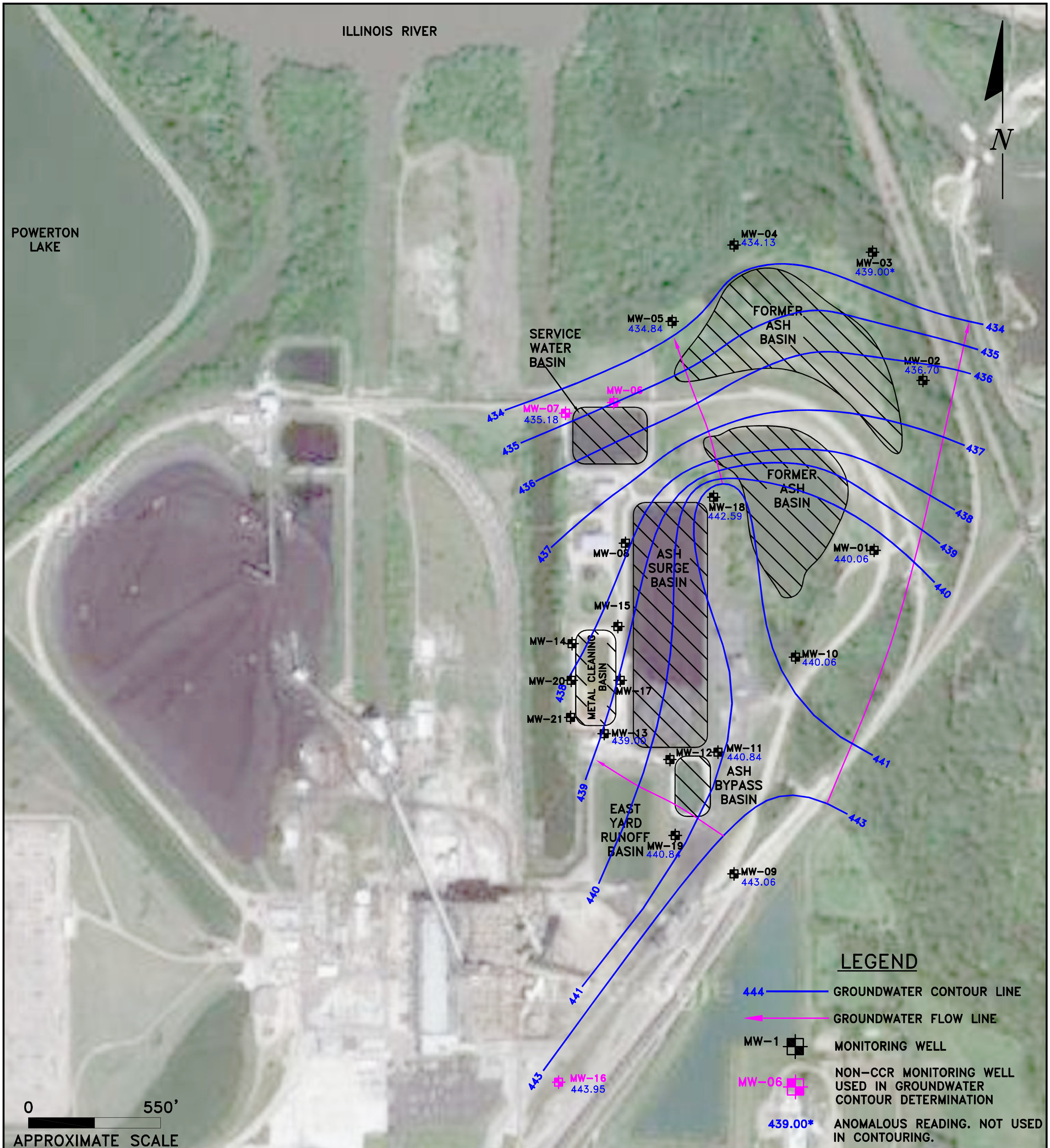
GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 12/2020

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'	Date: August 31, 2021
KPRG Project No. 19520.1	FIGURE 9-10



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GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 02/2021

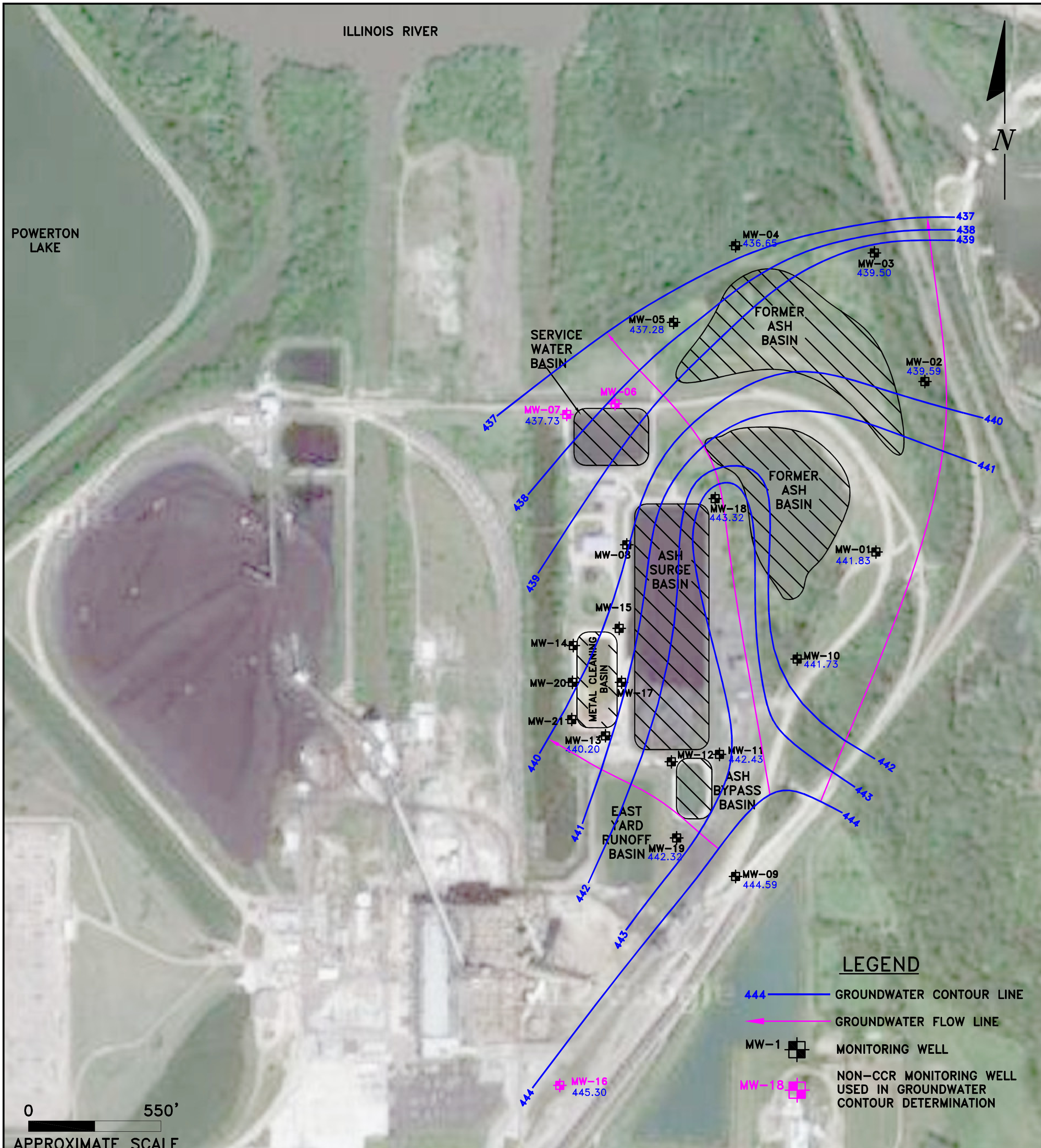
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'

Date: August 31, 2021

KPRG Project No. 19520.1

FIGURE 9-11



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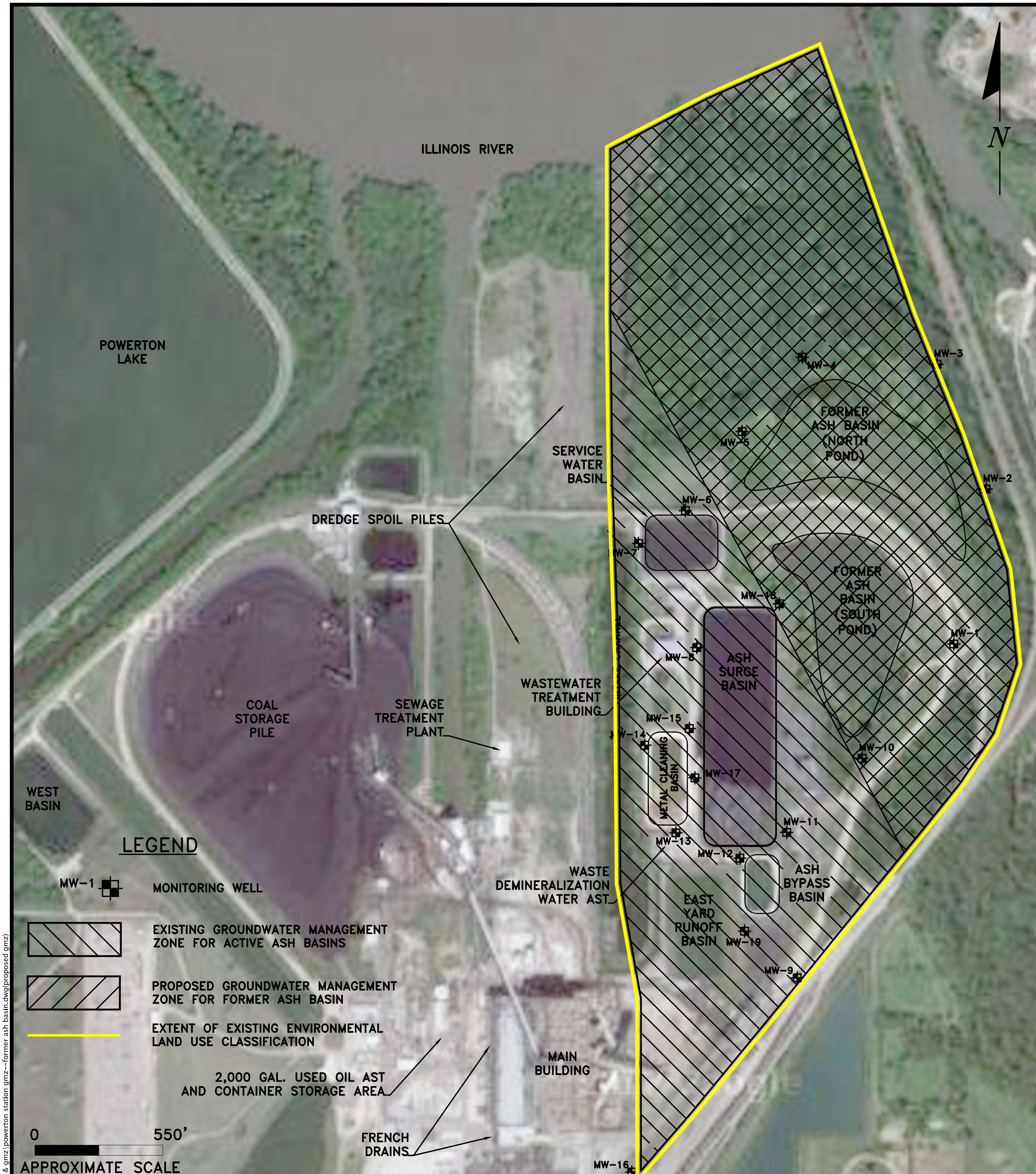
GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 05/2021

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'	Date: August 31, 2021
KPRG Project No. 19520.1	FIGURE 9-12



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GROUNDWATER MANAGEMENT ZONE & ENVIRONMENTAL LAND USE CLASSIFICATION FOR CCR SURFACE IMPOUNDMENTS

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 550'	Date: October 13, 2021
KPRG Project No. 19520.1	Figure 9-13

W:\projects\midwest generation\ash pond issues\eluc & gmz\powerton station gmz--former ash basin.dwg(proposed gmz)

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

2500' RADIUS POTABLE WELL MAP

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 800'	Date: August 31, 2021
KPRG Project No. 19520.1	FIGURE 9-14

W:\projects\midwest gen\operating and construct permits - various stations\POWERTON\POWERTON station.dwg

CONSTRUCTION PERMIT ATTACHMENTS

ATTACHMENT 1
HISTORY OF CONSTRUCTION

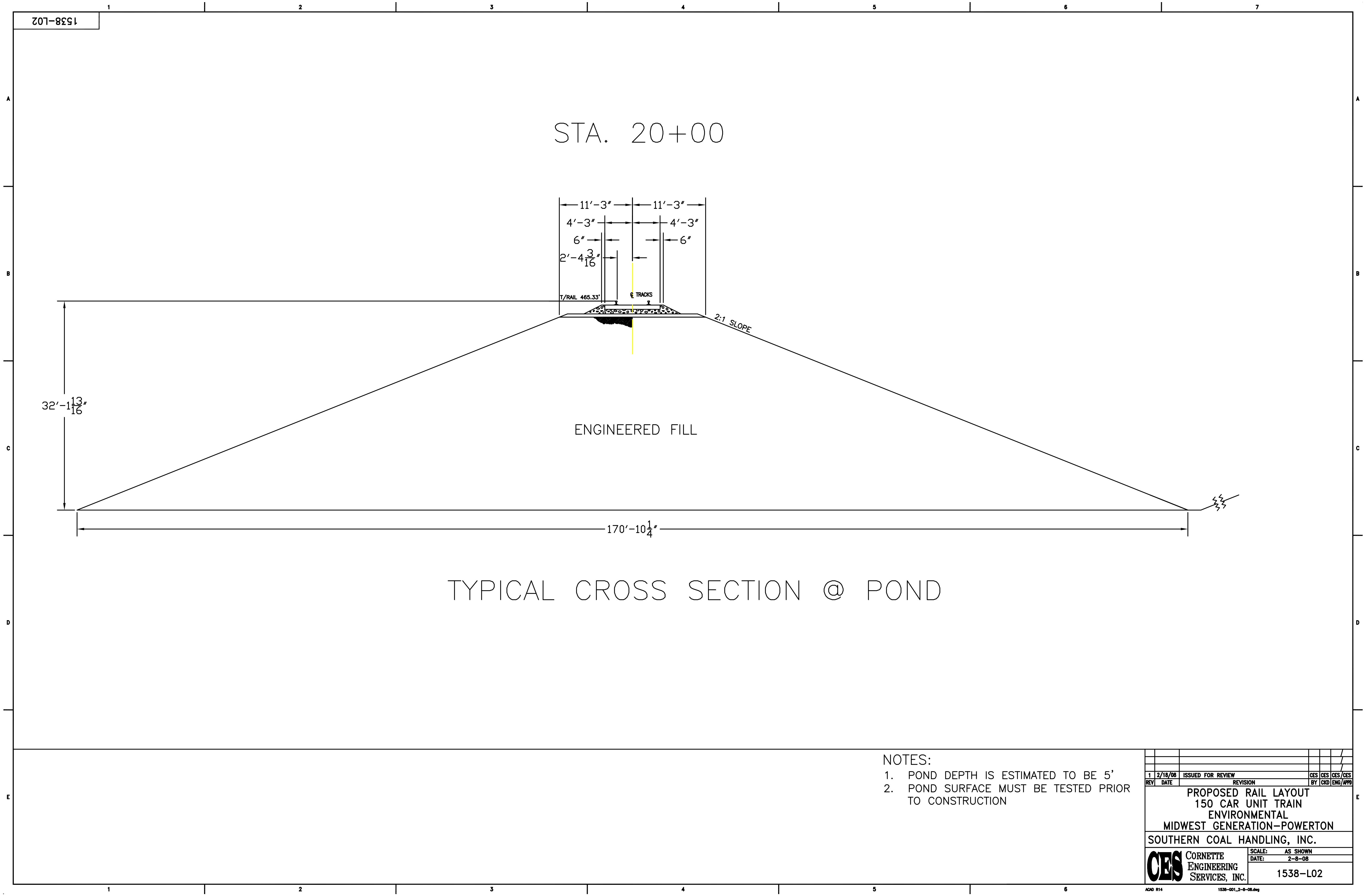


FIGURE 3 - RAIL LAYOUT CROSS SECTION

ATTACHMENT 2
NARRATIVE DESCRIPTION OF THE FACILITY

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-201436-1
Client Project/Site: Ash

For:
Midwest Generation EME LLC
13082 E Manito Road
Pekin, Illinois 61554

Attn: Joseph Kotas

Authorized for release by:
7/12/2021 3:51:25 PM

Diana Mockler, Project Manager I
(219)252-7570
Diana.Mockler@Eurofinset.com

The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

1 2 3 4 5 6 7 8 9 10 11 12 13

Job ID: 500-201436-1

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-201436-1

Comments
No additional comments.

Receipt
The samples were received on 6/24/2021 3:35 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 4.6º C.

Metals
Method 6010B: The following samples were diluted due to the abundance of non-target analytes: ASH BASIN (500-201436-2) and METALS CB (500-201436-3). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Method Summary

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	TAL CHI
7471A	Mercury (CVAA)	SW846	TAL CHI
9056A	Anions, Ion Chromatography	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI
SM 4500 Cl- E	Chloride, Total	SM	TAL CHI
SM 4500 F C	Fluoride	SM	TAL CHI
300_Prep	Anions, Ion Chromatography, 10% Wt/Vol	MCAWW	TAL CHI
3050B	Preparation, Metals	SW846	TAL CHI
7471A	Preparation, Mercury	SW846	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

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.

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
500-201436-1	FAB	Solid	06/23/21 13:30	06/24/21 15:35	
500-201436-2	ASH BASIN	Solid	06/23/21 14:23	06/24/21 15:35	
500-201436-3	METALS CB	Solid	06/23/21 15:00	06/24/21 15:35	

Client Sample ID: FAB
Date Collected: 06/23/21 13:30
Date Received: 06/24/21 15:35

Lab Sample ID: 500-201436-1
Matrix: Solid

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<2.0		2.0		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Arsenic	**1.8**		0.99		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Barium	**88**		0.99		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Beryllium	**1.9**		0.40		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Boron	**64**		4.9		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Cadmium	<0.20		0.20		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Calcium	**13000**		20		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Chromium	**34**		0.99		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Cobalt	**5.2**		2.5		mg/Kg		07/08/21 08:24	07/09/21 11:48	5
Lead	**4.1**		0.49		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Lithium	**10**		0.99		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Molybdenum	**2.4**		0.99		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Selenium	<0.99		0.99		mg/Kg		07/08/21 08:24	07/09/21 11:25	1
Thallium	<0.99		0.99		mg/Kg		07/08/21 08:24	07/09/21 11:25	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.032**		0.016		mg/Kg		07/06/21 14:50	07/07/21 07:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	**52**		2.0		mg/Kg		07/12/21 11:07	07/12/21 12:47	1
Chloride	**27**		20		mg/Kg		07/05/21 13:55	07/05/21 16:18	1
Fluoride	**1.3**		1.0		mg/Kg		07/05/21 13:55	07/05/21 17:39	1

Client Sample Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

Client Sample ID: ASH BASIN

Date Collected: 06/23/21 14:23
Date Received: 06/24/21 15:35

Lab Sample ID: 500-201436-2

Matrix: Solid

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<8.6		8.6		mg/Kg		07/08/21 08:24	07/09/21 11:51	5
Arsenic	**2.2**		0.86		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Barium	**1800**		4.3		mg/Kg		07/08/21 08:24	07/09/21 11:51	5
Beryllium	**0.90**		0.34		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Boron	**46**		4.3		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Cadmium	<0.17		0.17		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Calcium	**39000**		17		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Chromium	**16**		0.86		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Cobalt	<11		11		mg/Kg		07/08/21 08:24	07/09/21 12:04	25
Lead	**5.5**		0.43		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Lithium	**12**		0.86		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Molybdenum	**1.0**		0.86		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Selenium	<0.86		0.86		mg/Kg		07/08/21 08:24	07/09/21 11:28	1
Thallium	**1.2**		0.86		mg/Kg		07/08/21 08:24	07/09/21 11:28	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.094**		0.015		mg/Kg		07/06/21 14:50	07/07/21 07:02	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	**230**		9.7		mg/Kg		07/12/21 11:07	07/12/21 13:42	5
Chloride	**88**		20		mg/Kg		07/05/21 13:55	07/05/21 16:18	1
Fluoride	**4.7**		1.0		mg/Kg		07/05/21 13:55	07/05/21 17:42	1

Client Sample Results

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

Client Sample ID: METALS CB

Date Collected: 06/23/21 15:00
Date Received: 06/24/21 15:35

Lab Sample ID: 500-201436-3
Matrix: Solid

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<1.8		1.8		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Arsenic	**7.6**		0.89		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Barium	**1900**		8.9		mg/Kg		07/08/21 08:24	07/09/21 12:00	10
Beryllium	**1.5**		0.36		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Boron	**100**		4.5		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Cadmium	**4.3**		0.18		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Calcium	**120000**		180		mg/Kg		07/08/21 08:24	07/09/21 12:00	10
Chromium	**52**		0.89		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Cobalt	<22		22		mg/Kg		07/08/21 08:24	07/09/21 12:27	50
Lead	**66**		0.45		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Lithium	**16**		0.89		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Molybdenum	**5.3**		0.89		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Selenium	**7.1**		0.89		mg/Kg		07/08/21 08:24	07/09/21 11:32	1
Thallium	**4.0**		0.89		mg/Kg		07/08/21 08:24	07/09/21 11:32	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.26**		0.015		mg/Kg		07/06/21 14:50	07/07/21 07:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	**21000**		2000		mg/Kg		07/12/21 11:07	07/12/21 14:09	1000
Chloride	**110**		20		mg/Kg		07/05/21 13:55	07/05/21 16:18	1
Fluoride	**22**		0.99		mg/Kg		07/05/21 13:55	07/05/21 17:49	1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

QC Association Summary

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

Metals

Prep Batch: 607902

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	7471A	
500-201436-2	ASH BASIN	Total/NA	Solid	7471A	
500-201436-3	METALS CB	Total/NA	Solid	7471A	
MB 500-607902/12-A	Method Blank	Total/NA	Solid	7471A	
LCS 500-607902/13-A	Lab Control Sample	Total/NA	Solid	7471A	

Analysis Batch: 608143

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	7471A	607902
500-201436-2	ASH BASIN	Total/NA	Solid	7471A	607902
500-201436-3	METALS CB	Total/NA	Solid	7471A	607902
MB 500-607902/12-A	Method Blank	Total/NA	Solid	7471A	607902
LCS 500-607902/13-A	Lab Control Sample	Total/NA	Solid	7471A	607902

Prep Batch: 608328

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	3050B	
500-201436-2	ASH BASIN	Total/NA	Solid	3050B	
500-201436-3	METALS CB	Total/NA	Solid	3050B	
MB 500-608328/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 500-608328/2-A	Lab Control Sample	Total/NA	Solid	3050B	

Analysis Batch: 608625

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	6010B	608328
500-201436-1	FAB	Total/NA	Solid	6010B	608328
500-201436-2	ASH BASIN	Total/NA	Solid	6010B	608328
500-201436-2	ASH BASIN	Total/NA	Solid	6010B	608328
500-201436-2	ASH BASIN	Total/NA	Solid	6010B	608328
500-201436-3	METALS CB	Total/NA	Solid	6010B	608328
500-201436-3	METALS CB	Total/NA	Solid	6010B	608328
500-201436-3	METALS CB	Total/NA	Solid	6010B	608328
MB 500-608328/1-A	Method Blank	Total/NA	Solid	6010B	608328
LCS 500-608328/2-A	Lab Control Sample	Total/NA	Solid	6010B	608328

General Chemistry

Analysis Batch: 606811

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	Moisture	
500-201436-2	ASH BASIN	Total/NA	Solid	Moisture	
500-201436-3	METALS CB	Total/NA	Solid	Moisture	

Prep Batch: 607760

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	300_Prep	
500-201436-2	ASH BASIN	Total/NA	Solid	300_Prep	
500-201436-3	METALS CB	Total/NA	Solid	300_Prep	
MB 500-607760/1-A	Method Blank	Total/NA	Solid	300_Prep	
LCS 500-607760/2-A	Lab Control Sample	Total/NA	Solid	300_Prep	
LCSD 500-607760/3-A	Lab Control Sample Dup	Total/NA	Solid	300_Prep	

1 2 3 4 5 6 7 8 9 10 11 12 13

General Chemistry

Analysis Batch: 607876

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	SM 4500 F C	607760
500-201436-2	ASH BASIN	Total/NA	Solid	SM 4500 F C	607760
500-201436-3	METALS CB	Total/NA	Solid	SM 4500 F C	607760
MB 500-607760/1-A	Method Blank	Total/NA	Solid	SM 4500 F C	607760
LCS 500-607760/2-A	Lab Control Sample	Total/NA	Solid	SM 4500 F C	607760
LCSD 500-607760/3-A	Lab Control Sample Dup	Total/NA	Solid	SM 4500 F C	607760

Analysis Batch: 607925

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	SM 4500 Cl- E	607760
500-201436-2	ASH BASIN	Total/NA	Solid	SM 4500 Cl- E	607760
500-201436-3	METALS CB	Total/NA	Solid	SM 4500 Cl- E	607760
MB 500-607760/1-A	Method Blank	Total/NA	Solid	SM 4500 Cl- E	607760
LCS 500-607760/2-A	Lab Control Sample	Total/NA	Solid	SM 4500 Cl- E	607760
LCSD 500-607760/3-A	Lab Control Sample Dup	Total/NA	Solid	SM 4500 Cl- E	607760

Prep Batch: 608902

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	300_Prep	
500-201436-2	ASH BASIN	Total/NA	Solid	300_Prep	
500-201436-3	METALS CB	Total/NA	Solid	300_Prep	
MB 500-608902/1-A	Method Blank	Total/NA	Solid	300_Prep	
LCS 500-608902/2-A	Lab Control Sample	Total/NA	Solid	300_Prep	

Analysis Batch: 608919

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-201436-1	FAB	Total/NA	Solid	9056A	608902
500-201436-2	ASH BASIN	Total/NA	Solid	9056A	608902
500-201436-3	METALS CB	Total/NA	Solid	9056A	608902
MB 500-608902/1-A	Method Blank	Total/NA	Solid	9056A	608902
LCS 500-608902/2-A	Lab Control Sample	Total/NA	Solid	9056A	608902

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 500-608328/1-A
Matrix: Solid
Analysis Batch: 608625

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 608328

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<2.0		2.0		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Arsenic	<1.0		1.0		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Barium	<1.0		1.0		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Beryllium	<0.40		0.40		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Boron	<5.0		5.0		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Cadmium	<0.20		0.20		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Calcium	<20		20		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Chromium	<1.0		1.0		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Cobalt	<0.50		0.50		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Lead	<0.50		0.50		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Lithium	<1.0		1.0		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Molybdenum	<1.0		1.0		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Selenium	<1.0		1.0		mg/Kg		07/08/21 08:24	07/09/21 10:31	1
Thallium	<1.0		1.0		mg/Kg		07/08/21 08:24	07/09/21 10:31	1

Lab Sample ID: LCS 500-608328/2-A
Matrix: Solid
Analysis Batch: 608625

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 608328

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	50.0	48.6		mg/Kg		97	80 - 120
Arsenic	10.0	9.39		mg/Kg		94	80 - 120
Barium	200	194		mg/Kg		97	80 - 120
Beryllium	5.00	4.65		mg/Kg		93	80 - 120
Boron	100	85.0		mg/Kg		85	80 - 120
Cadmium	5.00	4.62		mg/Kg		92	80 - 120
Calcium	1000	967		mg/Kg		97	80 - 120
Chromium	20.0	18.8		mg/Kg		94	80 - 120
Cobalt	50.0	47.4		mg/Kg		95	80 - 120
Lead	10.0	9.35		mg/Kg		94	80 - 120
Lithium	50.0	50.9		mg/Kg		102	80 - 120
Molybdenum	100	97.0		mg/Kg		97	80 - 120
Selenium	10.0	8.53		mg/Kg		85	80 - 120
Thallium	10.0	9.13		mg/Kg		91	80 - 120

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 500-607902/12-A
Matrix: Solid
Analysis Batch: 608143

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 607902

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.017		0.017		mg/Kg		07/06/21 14:50	07/07/21 06:11	1

Method: 7471A - Mercury (CVAA) (Continued)

Lab Sample ID: LCS 500-607902/13-A | **Client Sample ID: Lab Control Sample**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 608143 | **Prep Batch: 607902**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.167	0.174		mg/Kg		105	80 - 120

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 500-608902/1-A | **Client Sample ID: Method Blank**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 608919 | **Prep Batch: 608902**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	<2.0		2.0		mg/Kg		07/12/21 11:07	07/12/21 12:20	1

Lab Sample ID: LCS 500-608902/2-A | **Client Sample ID: Lab Control Sample**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 608919 | **Prep Batch: 608902**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	50.0	53.7		mg/Kg		107	80 - 120

Method: SM 4500 Cl- E - Chloride, Total

Lab Sample ID: MB 500-607760/1-A | **Client Sample ID: Method Blank**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 607925 | **Prep Batch: 607760**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<20		20		mg/Kg		07/05/21 13:55	07/05/21 16:17	1

Lab Sample ID: LCS 500-607760/2-A | **Client Sample ID: Lab Control Sample**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 607925 | **Prep Batch: 607760**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	200	205		mg/Kg		103	85 - 115

Lab Sample ID: LCSD 500-607760/3-A | **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 607925 | **Prep Batch: 607760**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	200	206		mg/Kg		103	85 - 115	0	20

Method: SM 4500 F C - Fluoride

Lab Sample ID: MB 500-607760/1-A | **Client Sample ID: Method Blank**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 607876 | **Prep Batch: 607760**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<1.0		1.0		mg/Kg		07/05/21 13:55	07/05/21 17:23	1

Method: SM 4500 F C - Fluoride (Continued)

Lab Sample ID: LCS 500-607760/2-A
Matrix: Solid
Analysis Batch: 607876

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 607760

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	100	112		mg/Kg		112	80 - 120

Lab Sample ID: LCSD 500-607760/3-A
Matrix: Solid
Analysis Batch: 607876

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 607760

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	100	112		mg/Kg		112	80 - 120	1	20

Client Sample ID: FAB

Lab Sample ID: 500-201436-1

Date Collected: 06/23/21 13:30
Matrix: Solid
Date Received: 06/24/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			608328	07/08/21 08:24	BDE	TAL CHI
Total/NA	Analysis	6010B		1	608625	07/09/21 11:25	JJB	TAL CHI
Total/NA	Prep	3050B			608328	07/08/21 08:24	BDE	TAL CHI
Total/NA	Analysis	6010B		5	608625	07/09/21 11:48	JJB	TAL CHI
Total/NA	Prep	7471A			607902	07/06/21 14:50	MJG	TAL CHI
Total/NA	Analysis	7471A		1	608143	07/07/21 07:00	MJG	TAL CHI
Total/NA	Prep	300_Prep			608902	07/12/21 11:07	PSP	TAL CHI
Total/NA	Analysis	9056A		1	608919	07/12/21 12:47	EAT	TAL CHI
Total/NA	Analysis	Moisture		1	606811	06/29/21 16:58	LWN	TAL CHI
Total/NA	Prep	300_Prep			607760	07/05/21 13:55	MS	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	607925	07/05/21 16:18	MS	TAL CHI
Total/NA	Prep	300_Prep			607760	07/05/21 13:55	MS	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	607876	07/05/21 17:39	MS	TAL CHI

Client Sample ID: ASH BASIN

Lab Sample ID: 500-201436-2

Date Collected: 06/23/21 14:23
Matrix: Solid
Date Received: 06/24/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			608328	07/08/21 08:24	BDE	TAL CHI
Total/NA	Analysis	6010B		1	608625	07/09/21 11:28	JJB	TAL CHI
Total/NA	Prep	3050B			608328	07/08/21 08:24	BDE	TAL CHI
Total/NA	Analysis	6010B		5	608625	07/09/21 11:51	JJB	TAL CHI
Total/NA	Prep	3050B			608328	07/08/21 08:24	BDE	TAL CHI
Total/NA	Analysis	6010B		25	608625	07/09/21 12:04	JJB	TAL CHI
Total/NA	Prep	7471A			607902	07/06/21 14:50	MJG	TAL CHI
Total/NA	Analysis	7471A		1	608143	07/07/21 07:02	MJG	TAL CHI
Total/NA	Prep	300_Prep			608902	07/12/21 11:07	PSP	TAL CHI
Total/NA	Analysis	9056A		5	608919	07/12/21 13:42	EAT	TAL CHI
Total/NA	Analysis	Moisture		1	606811	06/29/21 16:58	LWN	TAL CHI
Total/NA	Prep	300_Prep			607760	07/05/21 13:55	MS	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	607925	07/05/21 16:18	MS	TAL CHI
Total/NA	Prep	300_Prep			607760	07/05/21 13:55	MS	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	607876	07/05/21 17:42	MS	TAL CHI

Client Sample ID: METALS CB

Lab Sample ID: 500-201436-3

Date Collected: 06/23/21 15:00
Matrix: Solid
Date Received: 06/24/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			608328	07/08/21 08:24	BDE	TAL CHI
Total/NA	Analysis	6010B		1	608625	07/09/21 11:32	JJB	TAL CHI
Total/NA	Prep	3050B			608328	07/08/21 08:24	BDE	TAL CHI
Total/NA	Analysis	6010B		10	608625	07/09/21 12:00	JJB	TAL CHI

Client Sample ID: METALS CB
Lab Sample ID: 500-201436-3
Date Collected: 06/23/21 15:00
Matrix: Solid
Date Received: 06/24/21 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			608328	07/08/21 08:24	BDE	TAL CHI
Total/NA	Analysis	6010B		50	608625	07/09/21 12:27	JJB	TAL CHI
Total/NA	Prep	7471A			607902	07/06/21 14:50	MJG	TAL CHI
Total/NA	Analysis	7471A		1	608143	07/07/21 07:04	MJG	TAL CHI
Total/NA	Prep	300_Prep			608902	07/12/21 11:07	PSP	TAL CHI
Total/NA	Analysis	9056A		1000	608919	07/12/21 14:09	EAT	TAL CHI
Total/NA	Analysis	Moisture		1	606811	06/29/21 16:58	LWN	TAL CHI
Total/NA	Prep	300_Prep			607760	07/05/21 13:55	MS	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	607925	07/05/21 16:18	MS	TAL CHI
Total/NA	Prep	300_Prep			607760	07/05/21 13:55	MS	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	607876	07/05/21 17:49	MS	TAL CHI

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Accreditation/Certification Summary

Client: Midwest Generation EME LLC
Project/Site: Ash

Job ID: 500-201436-1

Laboratory: Eurofins TestAmerica, Chicago

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Illinois	NELAP	IL00035	04-29-22

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park IL 60484
Phone 708-534-5200 Fax. 708-534-5211

Chain of Custody Record

eurofins Environment Testing America

Client Information	Sampler:	Lab PM: Mockler Diana J	Carrier Tracking No(s):	COC No: 500-92457-41195 1
Client Contact: Joseph Kotas	Phone	E-Mail: Diana Mockler@Eurofinset.com	State of Origin	Page: Page 1 of 1
Company: Midwest Generation EME LLC	PWSID:	**Analysis Requested**		Job #: 500-201436
Address: 13082 E Manito Road	**Due Date Requested**			**Preservation Codes**
City: Pekin	**TAT Requested (days)**			
State Zip: IL, 61554	**Compliance Project:** Δ Yes Δ No			
Phone: 815-372-4589(Tel)	PO #: 4502051132			
Email: joseph kotas@nrg com	WO #: 36733393			
Project Name: Powerton Station	Project #: 50000647			
Site:	SSOW#:			Other

500-201436 COC

Preservation Codes:
A HCL, B NaOH, C Zn Acetate, D Nitric Acid, E NaHSO4, F MeOH, G Amchlor, H Ascorbic Acid, I Ice, J DI Water, K EDTA, L EDA, M Hexane, N None, O AsNaO2, P Na2O4S, Q Na2SO3, R Na2S2O3, S H2SO4, T TSP Dodecahydrate, U Acetone, V MCAA, W pH 4-5, Z other (specify)

	Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, 904.0	Ra226Ra228_GFPC - Combined Rad 226/228	4500_F_C, 6010B, 7471A, 9056A, SM4500_Cl_E	Total Number of containers	Special Instructions/Note
					Preservation Code:			N	N	N		
1	FAB	6/23/21	13:30	G	Solid			X		X		
1	FAB2	6/23/21	1330	C	Solid				X			
					Solid							
2	ASH BASIN	6/23/21	14 23	C	Sol				X			
1	ASH 2	6/23/21	14:23	C	Sol			X		X		
3	Metals 2	6/23/21	15:00	C	Sol				X			
1	Metals CB	6/23/21	15.00	C	Sol			X		X		

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ________ Months

Deliverable Requested I II III IV Other (specify)

Special Instructions/QC Requirements

Empty Kit Relinquished by:	Date	Time	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
J N Kotas	6/23/21 4:30		Stephanie Hernandez	6/24/21 1535	ETA-CHI

Custody Seals Intact: Δ Yes Δ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks: 4.9 → 4.6

Ver: 11/01/2020 7/12/2021

ORIGIN ID PIAA (309) 477-5216
JOSEPH KOTAS
MIDWEST GENERATION
POWERTON GENERATING STATION
13082 E MANITO ROAD
PEKIN, IL 61554
UNITED STATES US

SHIP DATE 23JUN21
ACTWGT 30.00 LB
CAD 100275867/INET4340
DIMS 14x12x22 IN

BILL SENDER

TO **ATTN: SAMPLE RECEIVING**
EUROFINS TESTAMERICA, CHICAGO
2417 BOND ST

UNIVERSITY PARK IL 60484
(708) 534-5200 X 153 REF
INV
PO DEPT

500-201436 Wayb

56DJ3/B38/FE4A

FedEx Express

E

J211321033101uv

THU - 24 JUN 4:30P
STANDARD OVERNIGHT

TRK# 0201 **7740 8262 9809**

60484
IL-US **ORD**

UF JOTA

48qt.

fter printing this label
Use the 'Print' button on this page to print your label to your laser or inkjet printer
Fold the printed page along the horizontal line
Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned

arning Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing harges, along with the cancellation of your FedEx account number

se of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com. FedEx will not be responsible r any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher alue, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover om FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether irect, incidental, consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented ss. Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written aims must be filed within strict time limits, see current FedEx Service Guide

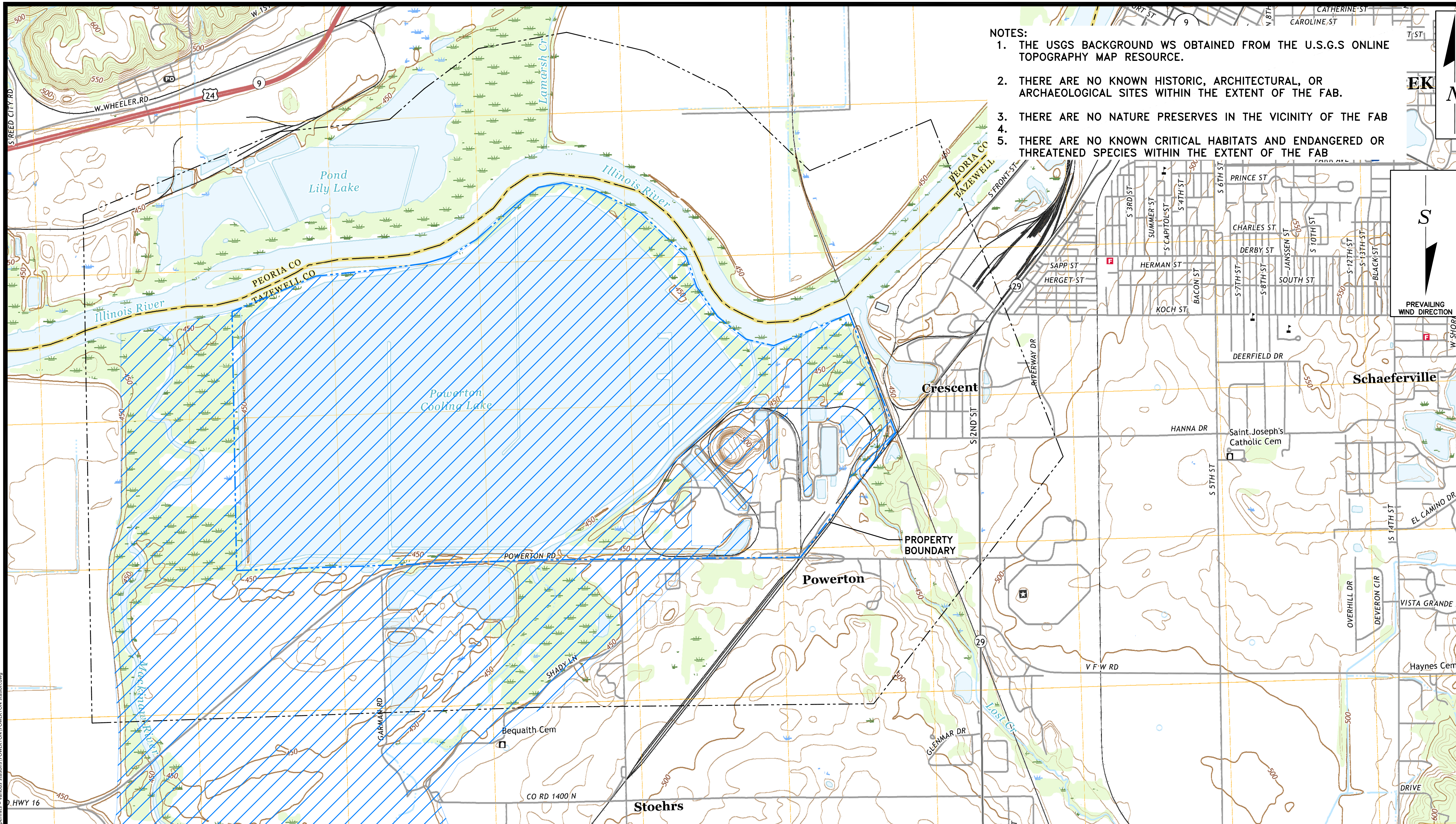
Login Sample Receipt Checklist

Client: Midwest Generation EME LLC　　Job Number: 500-201436-1

Login Number: 201436　　**List Source: Eurofins TestAmerica, Chicago**
List Number: 1
Creator: Hernandez, Stephanie

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are 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	4.6
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 containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	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	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT 3
SITE LOCATION MAP



NOTES:

1. THE USGS BACKGROUND WS OBTAINED FROM THE U.S.G.S ONLINE TOPOGRAPHY MAP RESOURCE.
2. THERE ARE NO KNOWN HISTORIC, ARCHITECTURAL, OR ARCHAEOLOGICAL SITES WITHIN THE EXTENT OF THE FAB.
3. THERE ARE NO NATURE PRESERVES IN THE VICINITY OF THE FAB
4.
5. THERE ARE NO KNOWN CRITICAL HABITATS AND ENDANGERED OR THREATENED SPECIES WITHIN THE EXTENT OF THE FAB

LEGEND

- RADIUS DEPICTING 3,280 FEET (1,000 METERS) FROM FACILITY BOUNDARY
- FACILITY BOUNDARY
- WATER WELLS TAKEN OUT OF SERVICE/ABANDONED

0 800'
APPROXIMATE SCALE

ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG
KPRG and Associates, inc.
14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478
414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

SITE LOCATION MAP

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 2,000'	Date: August 14, 2022
KPRG Project No. 19620.1	SECTION 3

<u>ATTACHMENT 4</u>
<u>SITE PLAN MAPS</u>

W:\projects\midwest gen\operating and construct permits - various stations\POWERTON\POWERTON station-fab.dwg

POND OUTLINE

0 500'

APPROXIMATE SCALE

E N V I R O N M E N T A L   C O N S U L T A T I O N & R E M E D I A T I O N

KPRG

KPRG and Associates, inc.

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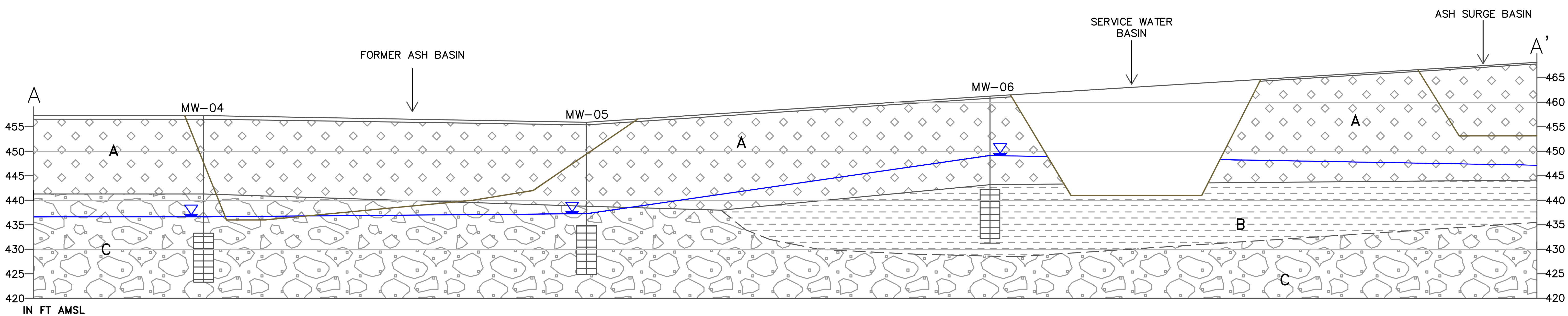
414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

SITE MAP

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 500'	Date: October 26, 2022
KPRG Project No. 19520.1	FIGURE 4-1



FILL: CONSISTING OF TAN, BROWN AND BLACK FINE TO MEDIUM SAND WITH SOME GRAVEL AND CLAY SEAMS. SEVERAL LOCATIONS ALSO INCLUDED BLACK CINDERS AND BRICK FRAGMENTS. (A)

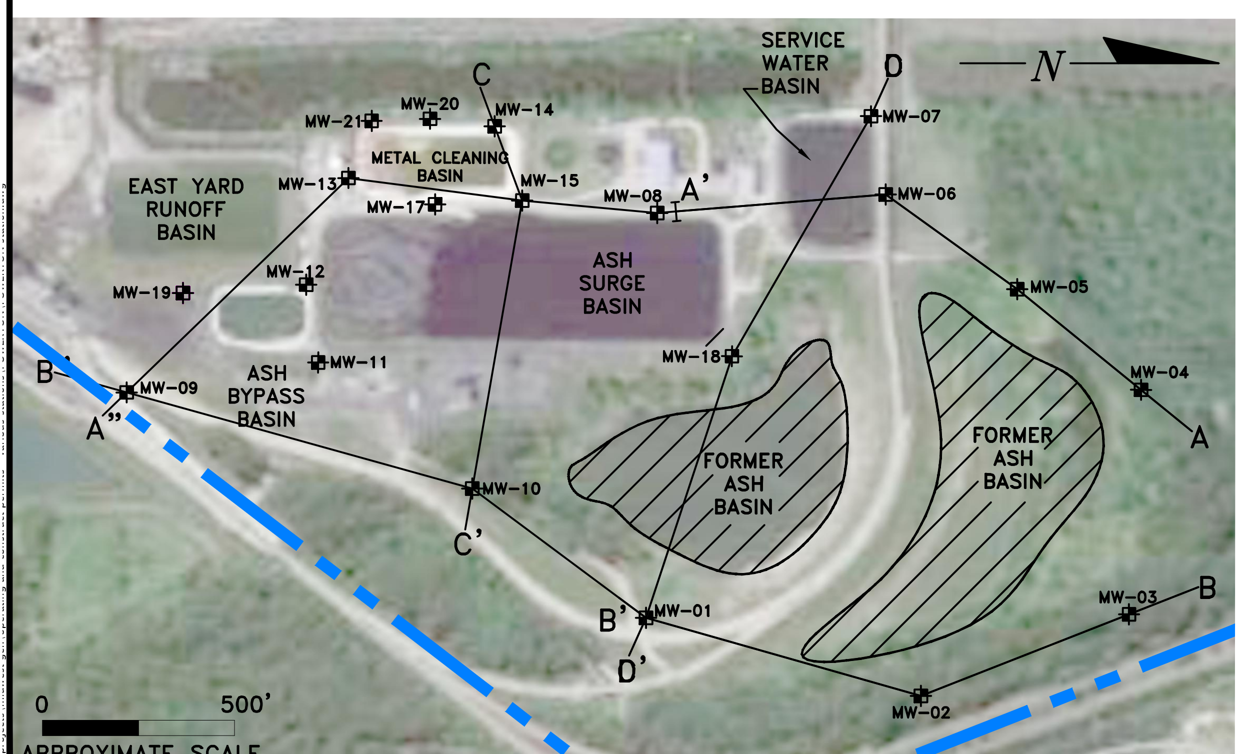
CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS). (B)

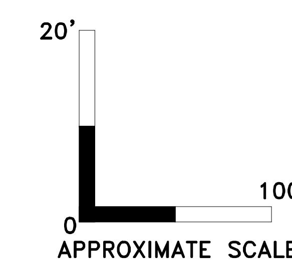
SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS. (C)

WATER LEVEL (5/21)

PROJECTED POND OUTLINE

POND OUTLINE





ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG

KPRG and Associates, inc.

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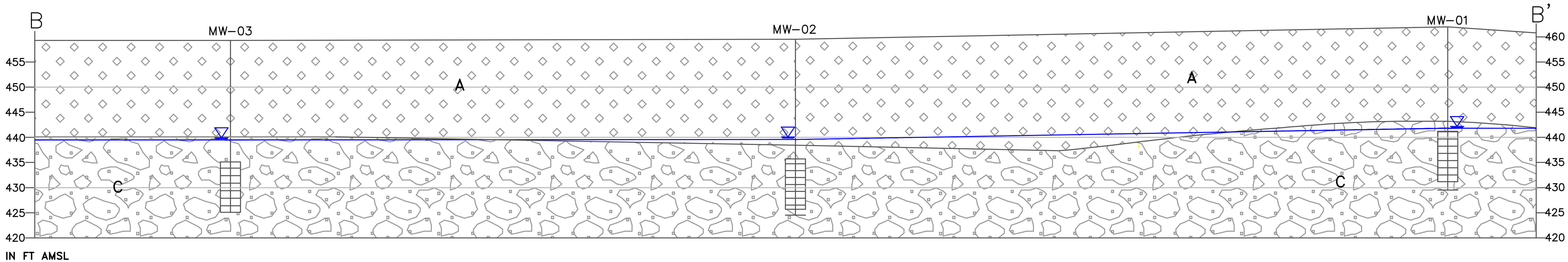
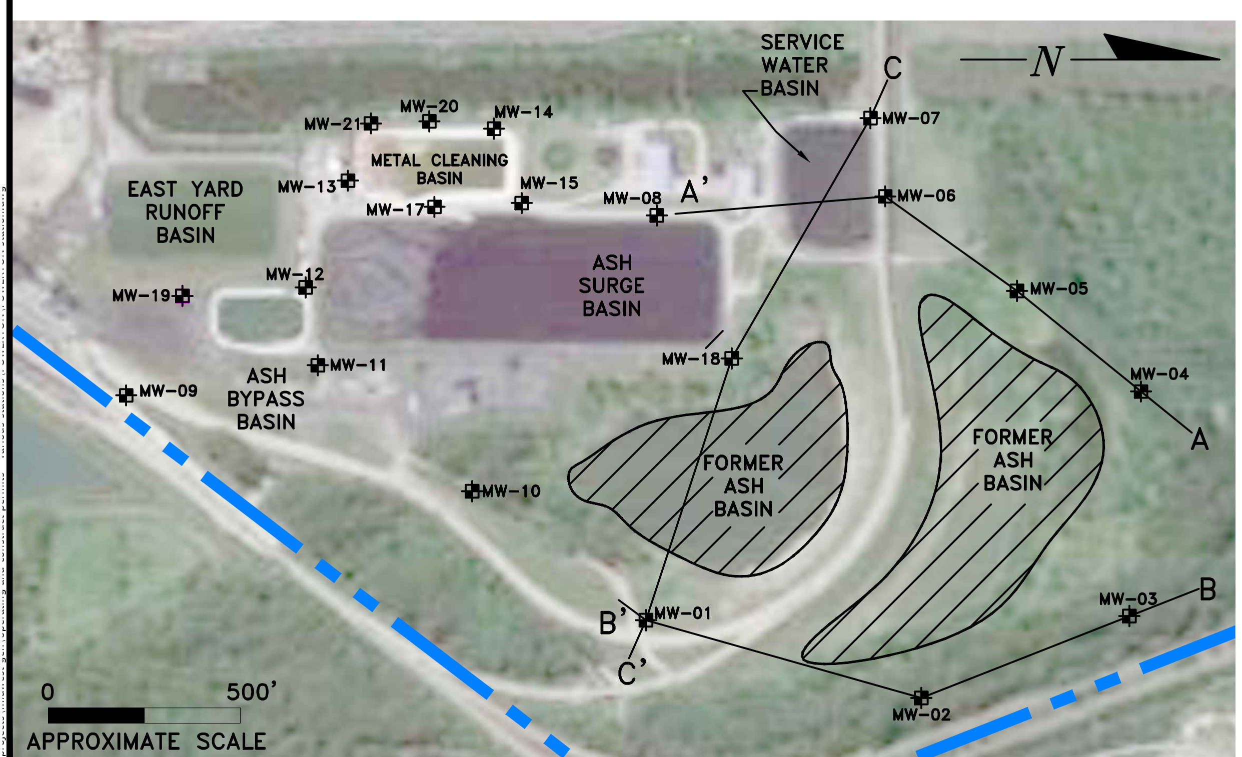
414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

CROSS SECTION A–A'	
POWERTON STATION PEKIN, ILLINOIS	
SEE SCALE	Date: October 26, 2022
KPRG Project No. 19520.1	FIGURE 4–2





A	FILL: CONSISTING OF TAN, BROWN AND BLACK FINE TO MEDIUM SAND WITH SOME GRAVEL AND CLAY SEAMS. SEVERAL LOCATIONS ALSO INCLUDED BLACK CINDERS AND BRICK FRAGMENTS.
B	CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS).
C	SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.
▽	WATER LEVEL (5/21)

20'
100'
0
APPROXIMATE SCALE

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG

KPRG and Associates, inc.

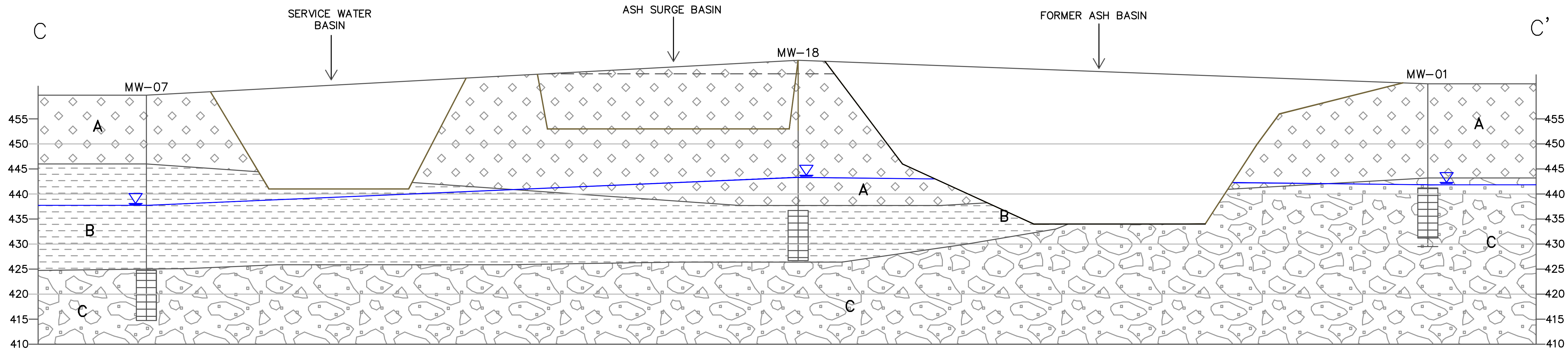
14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

CROSS SECTION B-B'

POWERTON STATION
PEKIN, ILLINOIS

SEE SCALE	Date: October 26, 2022
KPRG Project No. 19520.1	FIGURE 4-3



A — FILL: CONSISTING OF TAN, BROWN AND BLACK FINE TO MEDIUM SAND WITH SOME GRAVEL AND CLAY SEAMS. SEVERAL LOCATIONS ALSO INCLUDED BLACK CINDERS AND BRICK FRAGMENTS.

B — CLAY/SILTY CLAY: CONSISTING OF OLIVE, BROWN AND GRAY CLAYS, SILTS AND SILTY CLAYS WITH SOME MORE ORGANIC RICH LAYERS/PEAT. MAY LOCALLY CONTAIN FINE SILTY SAND AND/OR FINE SAND. THIS UNIT IS NOT MAPPABLE ACROSS THE SITE (I.E. DISCONTINUOUS).

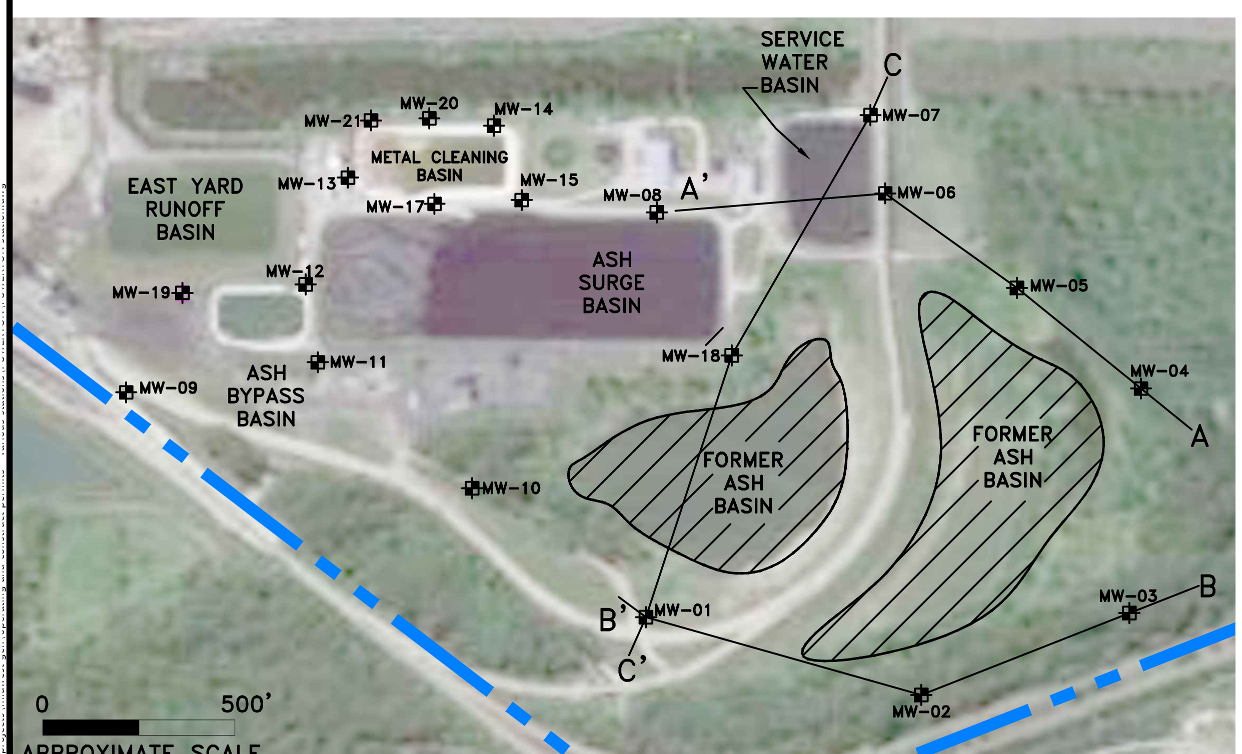
C — SAND AND GRAVEL: CONSISTING OF LIGHT BROWN, BROWN AND/OR GRAY MEDIUM TO COARSE SANDS AND GRAVELS.

WATER LEVEL (5/21)

PROJECTED POND OUTLINE

POND OUTLINE

20'
100'
0
APPROXIMATE SCALE



ENVIRONMENTAL CONSULTATION & REMEDIATION

K P R G

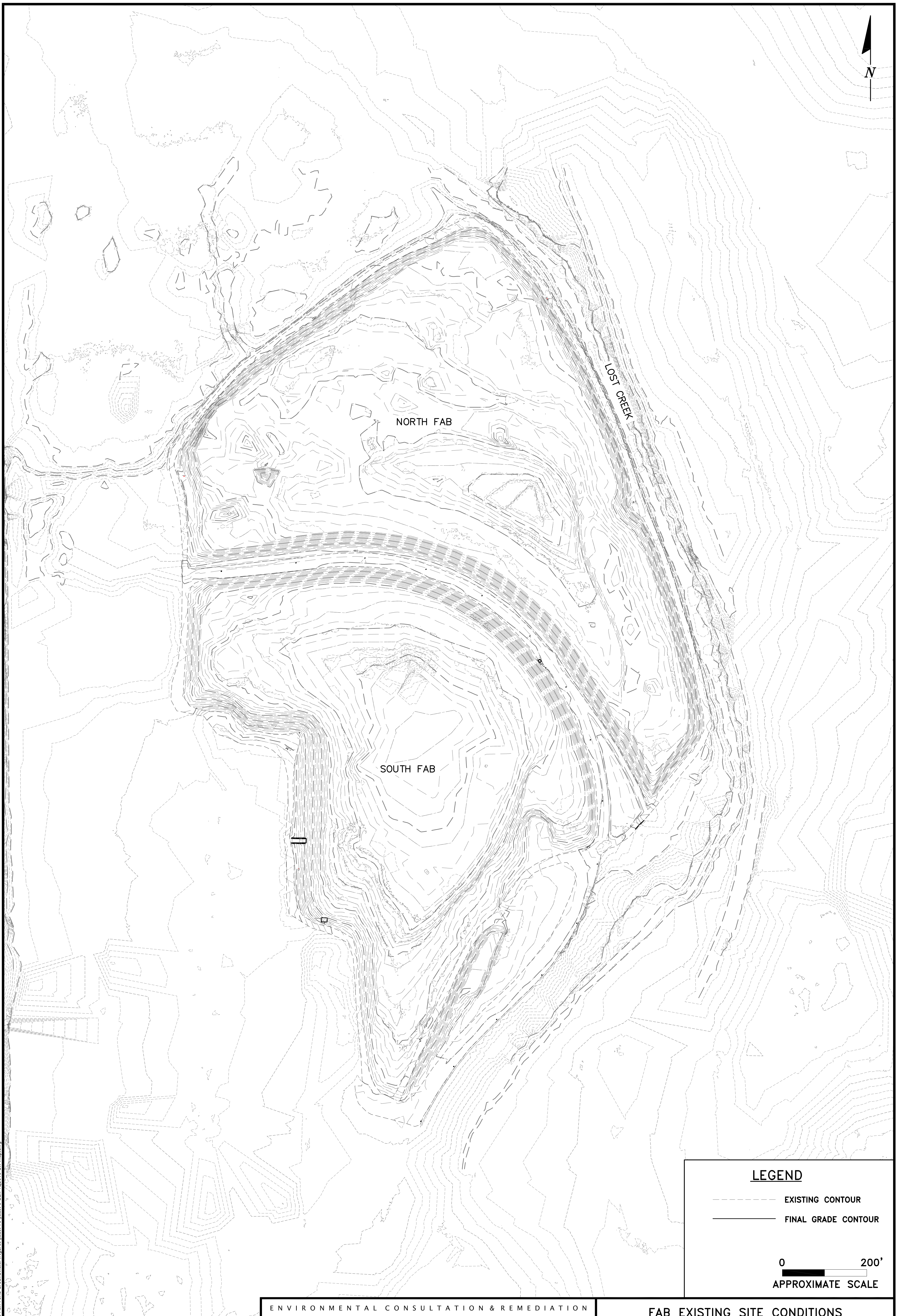
KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

CROSS SECTION C–C'	
POWERTON STATION PEKIN, ILLINOIS	
SEE SCALE	Date: October 26, 2022
KPRG Project No. 19520.1	FIGURE 4–4

ATTACHMENT 5
FAB CLOSURE DRAWINGS AND SPECIFICATIONS



ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

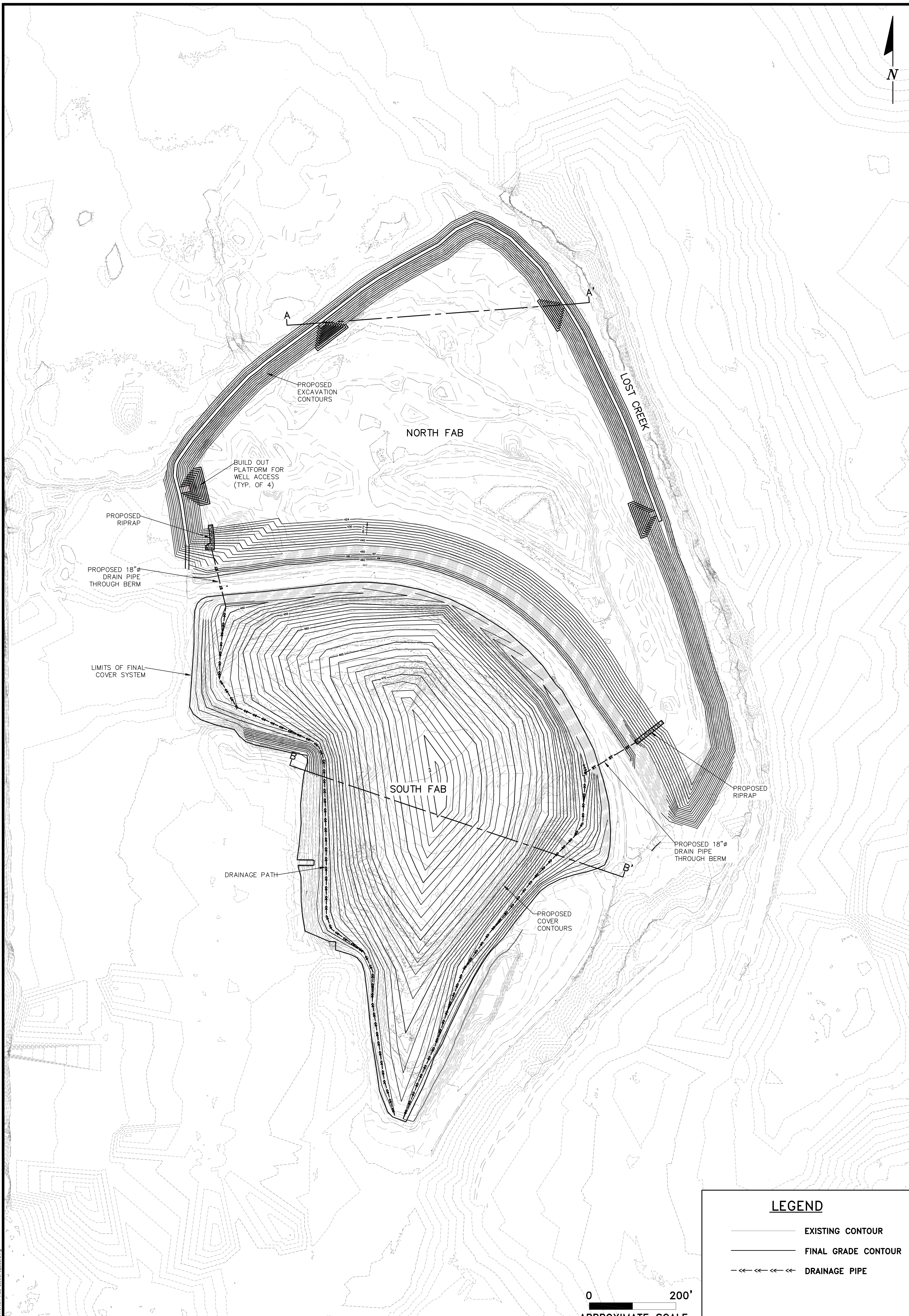
414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

FAB EXISTING SITE CONDITIONS

FORMER ASH BASIN–POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 200'	Date: October 26, 2022
KPRG Project No. 19620.1	FIGURE 1

W:\projects\midwest generation\12313 Ash Pond Groundwater Figures\Joliet #9\Joliet 9 CCR 4Q2019 GW map.dwg



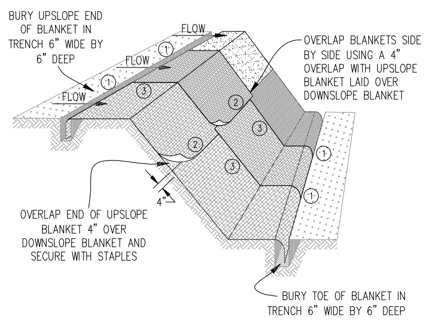
ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG
KPRG and Associates, inc.
14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478
414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

CLOSURE IN PLACE BY CONSOLIDATION WITH COVER SITE MAP

FORMER ASH BASIN–POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 200'	Date: October 26, 2022
KPRG Project No. 19620.1	FIGURE 2

W:\projects\midwest generation\operating permits\powerton fab closure_aca.dwg



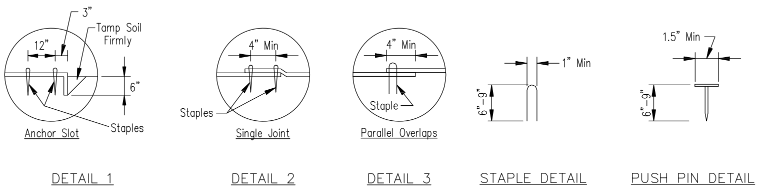
NOTES:

STAPLES SHALL BE PLACED IN A DIAMOND PATTERN AT 2 PER S.Y. FOR STITCHED BLANKETS, NON-STITCHED SHALL USE 4 STAPLES PER S.Y. OF MATERIAL. THIS EQUATES TO 200 STAPLES WITH STITCHED BLANEKT AND 400 STAPLES WITH NON-STITCHED BLANKET PER 100 S.Y. OF MATERIAL.

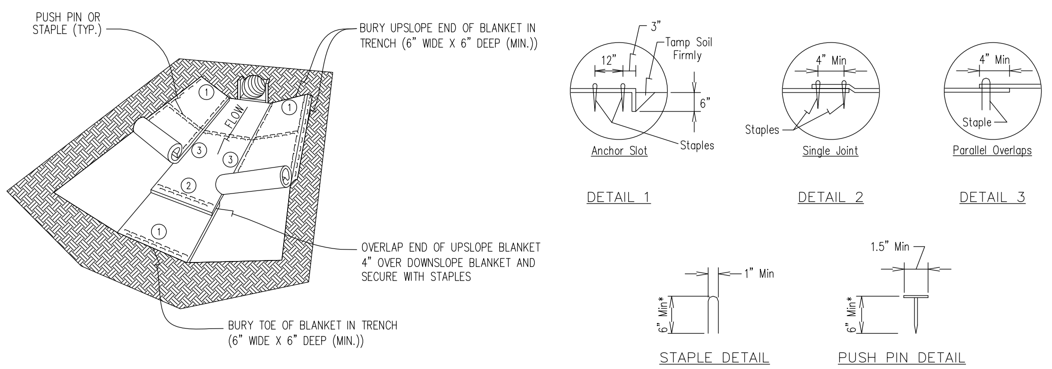
STAPLE OR PUSH PIN LENGTHS SHALL BE SELECTED BASED ON SOIL TYPE AND CONDITIONS (MINIMUM STAPLE LENGTH IS 6").

EROSION CONTROL MATERIAL SHALL BE PLACED IN CONTACT WITH THE SOIL OVER A PREPARED SEEDBED.

ALL ANCHOR SLOTS SHALL BE STAPLED AT APPROXIMATELY 12" INTERVALS.

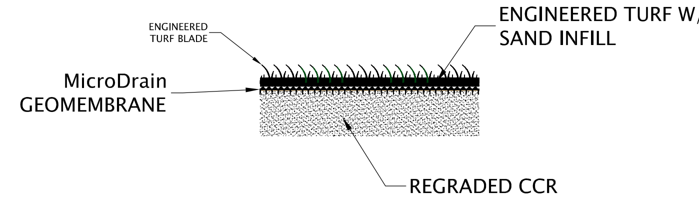


EROSION CONTROL BLANKET
INSTALLATION DETAILS
ILLINOIS URBAN MANUAL 530

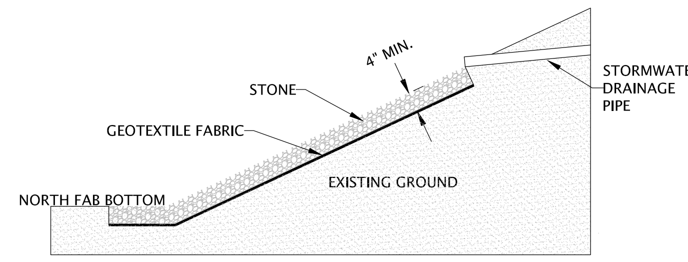


*Note:
1. For sandy soil conditions, staple or push pin shall be a minimum 8 inches.

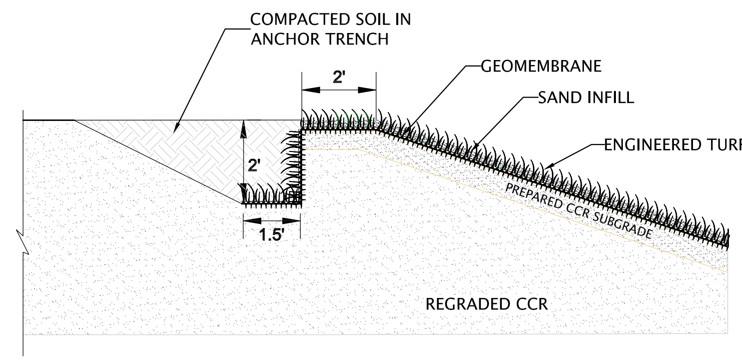
EROSION CONTROL BLANKET-TURF REINFORCEMENT MAT (TRM)
ILLINOIS URBAN MANUAL 531



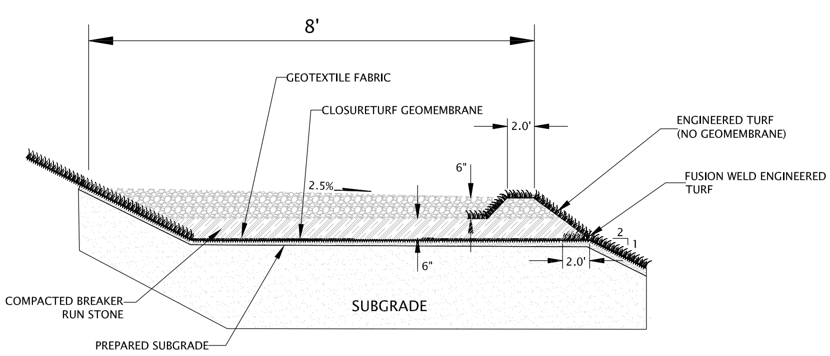
ClosureTurf COVER SYSTEM DETAIL



A
-
STORMWATER RIPRAP PROTECTION DETAIL
N.T.S.

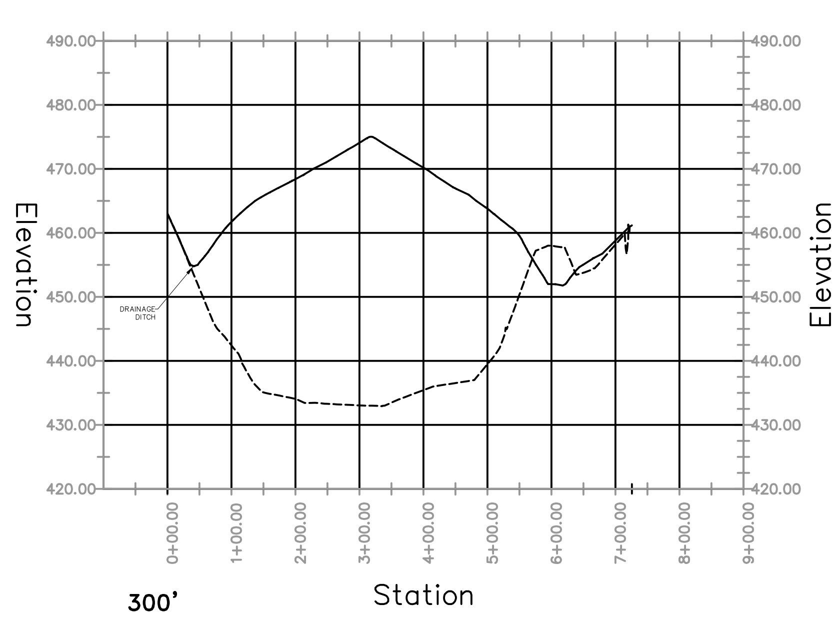


B
-
ClosureTurf ANCHOR TRENCH



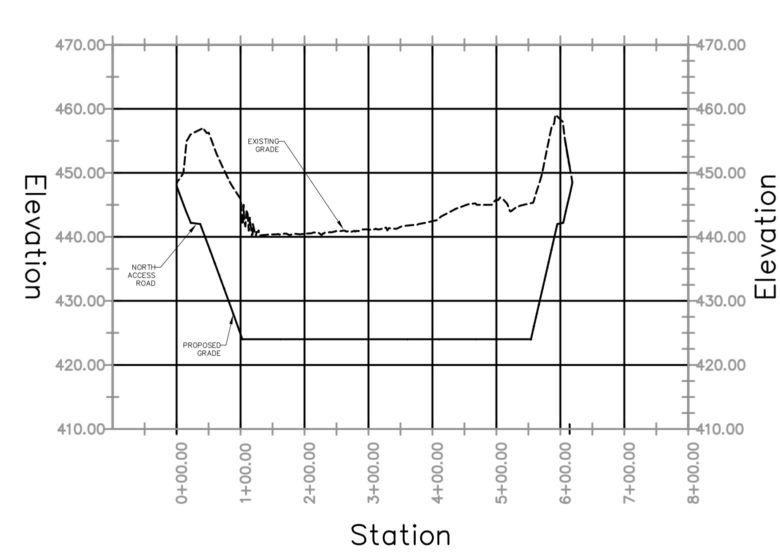
C
-
NORTH ACCESS ROAD DETAIL
N.T.S.

Section B—B'



0 300'
APPROXIMATE SCALE

Section A—A'



0 300'
APPROXIMATE SCALE

E N V I R O N M E N T A L C O N S U L T A T I O N & R E M E D I A T I O N

KPRG

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

CLOSURE DETAILS	
FORMER ASH BASIN—POWERTON STATION PEKIN, ILLINOIS	
Scale: 1" = 200'	Date: October 26, 2022
KPRG Project No. 19620.1	FIGURE 3

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MIDWEST GENERATION
POWERTON GENERATION STATION
FORMER ASH BASIN CLOSURE

IEPA Site No. 1798010008-05

CLOSURE SPECIFICATIONS

SECTION 01011 SUMMARY OF WORK

1.0 INTRODUCTORY INFORMATION

1.1 Project Title: Former Ash Basin Closure

1.2 Owner: Midwest Generation, LLC

1.3 Work Location: Powerton Generating Station
1601 S. Manito Road, Pekin, IL

1.4 Owner's Representative: KPRG and Associates, Inc.

1.5 Contracting agent: Midwest Generation, LLC

2.0 SCOPE OF WORK

The Contractor shall furnish all supervision, labor, materials, equipment, services, personnel, testing services, fuel and consumable supplies to complete scope of work as detailed in this specification, other information disseminated during the bid meeting/walk down, and any addendums. This scope includes all work to mobilize, setup, execute, cleanup and demobilize Contractor's equipment The work is broken down and described in the Specifications and Drawings and generally includes but is not limited to the following:

- Dewatering of the north and south portions of the Former Ash Basin (FAB), as necessary;
- Clear and grub, which includes trees and grass/brush, the north and south portion of the FAB;
- Remove and stockpile topsoil from the north portion of the FAB to expose CCR material below;
- Excavation of the existing CCR material from the north portion of the FAB and disposal in the south portion of the FAB;
- Extension of the west access road;
- Installation of ClosureTurf cover system and components;
- Regrade stockpiled topsoil/clay over the regraded portion of the east side of the WFA;
- Rebuild east access road along east side of the property.

3.0 MATERIAL AND EQUIPMENT

3.1 EROSION CONTROL MATERIALS

A. The following Illinois Urban Manual (IUM) documents were used as references:

1. Practice Standard
   a. Erosion blanket 830;
   b. Erosion Blanket: Turf Reinforcement Mat (TRM) 831;

c. Mulching for Seeding and Soil Stabilization 875;
d. Permanent Vegetation 880.

2. Material Specification
   a. Coconut Blankets 800;
   b. Jute Netting 801;
   c. Wood Fiber Blankets 802;
   d. Straw Blankets 803.

B. Mulch shall comply with Illinois Urban Manual (IUM) Practice Standard 875 with straw mulch consisting of oats, wheat, rye, or barley and hydraulic mulch consisting of wood, cotton, straw, or paper – or a combination of the four. If compost is used it shall be thoroughly decomposed organic waste. Chemical mulch bonder shall be approved as safe for the ecosystem.

C. The erosion control blanket shall comply with IUM Practice Standard Erosion Control Blanket 830 and shall be coconut blankets, jute netting, wood fiber blankets, straw blankets, or an approved equal.

3.2 SUPPORT ROAD MATERIALS

A. The material used to construct any support roads shall be IDOT gradation CA6 and shall conform to the following limits when tested by means of laboratory sieves:

CA6	
Sieve Size	**Total Percent Passing by Weight**
1 1/2 inch	100
1 inch	95±5
½ inch	75±15
No. 4	43±13
No. 16	25±15
No. 200	8±4

B. The material used to repair the access roads, as needed, shall be IDOT gradation CA10 and shall conform to the following limits when tested by means of laboratory sieves:

CA10	
Sieve Size	**Total Percent Passing by Weight**
1 inch	100
3/4 inch	95±5
1/2 inch	80±15
No. 4	50±10
No. 16	30±15
No. 200	9±4

4.0 GENERAL NOTES

4.1 General requirements for the performance of various phases of the Work are given in this Specification and the Drawings referred to herein. Contractor shall be governed by these requirements. If for any reason it is necessary to deviate there from, written permission shall first be obtained from Owner's Representative.

4.2 Contractor shall perform the Work in a manner consistent with recognized good practice for construction service and in accordance with such detailed instructions as may be submitted by Owner.

4.3 Contractor shall be held responsible and bear any and all expense for rework and/or additional work required due to Contractor's acts of commission or omission.

4.4 Existing railroad tracks, power lines, shrubbery, fences, water pipes, conduits, ditches, embankments and other structures in the vicinity of the work not authorized to be removed shall be supported and protected from damage by the CONTRACTOR during the construction and until completion of the work affecting them. The CONTRACTOR shall be liable for all damages done to such existing facilities and structures, as herein provided and he shall save the OWNER from any liability or expense for injuries, damages, or repairs to such facilities.

4.5 When required, the CONTRACTOR shall submit certified gradation test data verifying that the material and gradation of imported materials meet the requirements of these Specifications. Particle size analysis of soils and aggregates shall be determined in accordance with ASTM D422.

4.6 The CONTRACTOR is responsible for the stability of slopes during construction. Excavation and fill operations, as necessary to execute the Work, shall be coordinated with water control and stabilization measures to prevent unstable conditions. Water shall be clean and free from harmful substances. The amount of water used in compaction shall be sufficient to obtain the percent of compaction required.

4.7 CONTRACTOR shall be responsible to ensure that the material brought in from offsite meets the requirements of these Specifications. Any off site material that does not conform to these Specifications will be rejected by the OWNER'S REPRESENTATIVE and/or the CQA OFFICER and shall be replaced by the Contractor with material that conforms to these Specifications at no cost to the OWNER.

4.8 Where material is required to be compacted, the soil shall be mechanically compacted to an acceptable level to prevent settling. Where granular, cohesionless material is required to be compacted, the material shall be adequately compacted mechanically to prevent settling. If necessary, field density tests will be performed in accordance with ASTM D1556, ASTM D2922, or by other means acceptable to the CQA OFFICER.

4.9 The CONTRACTOR shall be responsible to ensure that CCR and stone placed and compacted shall conform to the dimensions, lines, grades, and sections indicated on the Drawings and in this Section. Any grades and compaction that does not conform to this Section will be rejected by the OWNER'S REPRESENTATIVE and/or the CQA OFFICER and shall be reworked by the CONTRACTOR at no cost to the OWNER.

5.0 CONTRACT SCHEDULE

The CONTRACTOR shall submit a schedule for construction upon awarding of the contract.

6.0 WORK SHIFTS

6.1 Contractor's Supervisory and Technical Personnel may work other shift schedules and durations as approved by Owner. However, CONTRACTOR, in performing the Work, shall adequately man and equip the job and work such hours and days as may be necessary to meet the Schedule. CONTRACTOR shall have sufficient infrastructure to complete any other Work on schedule requested by OWNER'S REPRESENTATIVE. CONTRACTOR shall bear all costs that may be incurred in procuring and/or maintaining the necessary labor force and equipment for the Work, including, but not limited to, such items as transportation and living expenses. No overtime will be worked unless preapproved by OWNER'S REPRESENTATIVE.

6.2 In the event CONTRACTOR determines it necessary to schedule his work force more than the normal work week, or to change his Work schedule, Contractor shall consult in advance with the OWNER'S REPRESENTATIVE to make certain that the proposed schedule will not conflict with other work being carried on and shall obtain written approval of the revised schedule prior to making the change.

6.3 CONTRACTOR shall take into consideration work by other contractors or by Owner's personnel that may be in progress at or near the site of the Work. CONTRACTOR shall cooperate with Owner's Representative in scheduling the performance of the Work in such a manner as to avoid interference with any other work being performed at the Premises.

7.0 STAFF PERSONNEL

7.1 As a minimum, CONTRACTOR shall supply and include in his pricing a Project Manager and/or Project Superintendent for this Project. The Project Manager and/or Project Superintendent shall be full time salaried employees of the Contractor. The Project Manager/Project Superintendent shall be responsible for the complete administration of the Contract for the Contractor. The primary responsibility shall be coordination between Contractor's home office support and field operations and with interface with the Owner.

7.2 Owner or Owner’s Representative will not incur any Supervision, General Foreman, Foreman, Union Steward, Tool room man, Technician, Quality Assurance Representative, Welding Engineer, Home or Field Office Clerical, etc. charges for Time and Material, Cost Plus, or Out of Scope work unless the Work is performed outside the Contractor's established work schedule, or in the case of increased staffing, an additional foreman is required. Owner will not accept any charges for the above unless authorized by the Owner's Representative. Out of Scope, Time and Material and Cost Plus work is to be completed in the established period of the Contract unless the Owner’s Representative grants an extension.

8.0 CONSTRUCTION QUALITY ASSURANCE OFFICER

The work being performed shall be monitored by the Construction Quality Assurance Officer (CQA OFFICER) and shall include documentation of the work. Documentation will include but is not limited to note taking and photography.

9.0 OWNER’S REPRESENTATIVE(S)

The following personnel represent the Owner in the subject matter indicated:

PERSONNEL	NAME	PHONE NUMBER
Owner’s Representative	XXX XXXXXX	XXX-XXX-XXXX
Owner’s Technical Representative	Josh Davenport	262-781-0475 or 262-389-1655
Construction Quality Assurance (CQA) Officer	TBD	TBD
CQA Officer Agent	TBD	TBD
CQA Officer Agent	TBD	TBD

END OF SECTION

SECTION 01060 ClosureTurf PRODUCT & INSTALLATION

Part 1 GENERAL

1.1 SCOPE

This specification covers the technical requirements for the manufacturing and installation of HDPE and LLDPE MicroSpike®, Super Gripnet®, and MicroDrain® (GEOMEMBRANE). All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D792 Method B, Density and Specific Gravity of Plastics by Displacement
2. D1004 Initial Tear Resistance of Plastic Film and Sheeting
3. D1238 Flow Rates of Thermoplastics by Extrusion Plastometer
4. D3895 Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
5. D4218 Determination of Carbon Black in Polyethylene Compounds
6. D4833 Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
7. D5199 Measuring Nominal Thickness of Geotextiles and Geomembranes
8. D5397 Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
9. D5596 Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
10. D5994 Measuring Core Thickness of Textured Geomembranes
11. D6392 Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
12. D6693 Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes
13. D7466 Measuring Asperity Height of Textured Geomembranes

B. Geosynthetic Research Institute

1. GRI GM 13 Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
2. GRI GM 17 Test Properties, Test Properties and Testing Frequency for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

1.3 DEFINITIONS

A. Lot - A quantity of resin (usually a rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

B. Construction Quality Assurance Consultant (CONSULTANT) - Party, independent from

MANUFACTURER and INSTALLER that is responsible for observing and documenting activities related to quality assurance during the lining system construction.

C. ENGINEER- The individual or firm responsible for the design and preparation of the project's Contract Drawings and Specifications.

D. Geomembrane Manufacturer (MANUFACTURER) - The party responsible for manufacturing the geomembrane rolls.

E. Geosynthetic Quality Assurance Laboratory (TESTING LABORATORY) - Party, independent from the OWNER, MANUFACTURER and INSTALLER, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the OWNER.

F. INSTALLER- Party responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams.

G. Panel - Area of a geomembrane that will be seamed in the field that is larger than 100 ft2.

H. Patch - Area of a geomembrane that will be seamed in the field that is less than 100 ft2.

I. Subgrade Surface - Soil layer surface, which immediately underlies the geosynthetic material(s).

1.4 SUBMITTALS POST-AWARD

A. Furnish the following product data, in writing, to ENGINEER prior to installation of the geomembrane material:
   1. Resin Data shall include the following.
      a. Certification stating that the resin meets the specification requirements (see Table 2.1).
   2. Geomembrane Roll
      a. Statement certifying no recycled polymer and no more than 10% rework of the same type of material is added to the resin (product run may be recycled).

B. The INSTALLER shall furnish the following information to the ENGINEER and OWNER prior to installation:
   1. Installation layout drawings
      a. Must show proposed panel layout including field seams and details
      b. Must be approved prior to installing the geomembrane
   2. Approved drawings will be for concept only and actual panel placement will be determined by site conditions.
   3. Installer's Geosynthetic Field Installation Quality Assurance Plan

C. The INSTALLER will submit the following to the ENGINEER upon completion of installation:

1. Certificate stating the geomembrane has been installed in accordance with the Contract Documents
2. Material and installation warranties
3. As-built drawings showing actual geomembrane placement and seams including typical anchor trench detail and location of repairs.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with these Specifications and the CQA Plan.

B. Friction Angle Requirements and Testing
   1. The effective interface shear strength envelope at the interface between the geomembrane and the materials in direct contact with the geomembrane shall be verified by the CQA Officer by performing interface friction testing on representative materials to be used for construction of the liner system.
   2. The interface frictional resistance shall be determined by direct shear tests in general accordance with ASTM D5321.
   3. The interface frictional resistance for interfaces including GCLs shall be determined by direct shear tests in general accordance with ASTM D 6243.
   4. The interfaces and/or soil shall be tested saturated with water.

C. The Manufacturer shall sample and test the HDPE geomembrane material, at minimum frequencies specified. General manufacturing procedures shall be performed in accordance with the Manufacturer's internal quality control guide and/or documents.

D. All non-conductive geomembrane sheets shall be continuously spark tested during manufacturing.
   1. The spark tester shall be capable of detecting defects or pinholes less than 10 mils in diameter.
   2. All necessary repairs to the geomembrane shall be made by the manufacturer at the factory before shipment.
   3. The manufacturer shall provide written certification to the Owner and/or Engineer that all the geomembrane rolls delivered to the project were continuously spark tested and do not contain pinhole defects.

E. The Engineer shall examine the rolls upon delivery to the site and report any deviations from these Specifications to the Contractor.

F. If a geomembrane sample fails to meet the quality control requirements of this Section, the Contractor and/or Engineer shall require that the Geomembrane Manufacturer sample and test each roll manufactured in the same lot or batch, or at the same time, as the failing roll. Additional sampling and testing shall be completed at no additional cost to the Owner. Sampling and testing of rolls shall continue until a pattern of acceptable test results is established.

G. Any geomembrane sample that does not comply with this Section shall result in rejection of the roll from which the sample was obtained. The Contractor shall replace any rejected rolls at no additional cost to Owner. At the Geomembrane Manufacturer's discretion and expense, additional testing of individual rolls may be performed to more closely identify noncomplying rolls and to qualify individual rolls.

1.6 QUALIFICATIONS

A. MANUFACTURER

1. Geomembrane shall be manufactured by the following:
    a. AGRU America, Inc.
    b. approved equal
2. MANUFACTURER shall have manufactured a minimum of 10,000,000 square feet of polyethylene geomembrane during the last year.

B. INSTALLER

1. INSTALLER shall have installed a minimum of 5,000,000 square feet of HDPE geomembrane during the 5 last years.
2. INSTALLER shall have worked in a similar capacity on at least 10 projects similar in complexity to the project described in the contract documents, and with at least 250,000 square feet of HDPE geomembrane installation on each project.
3. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents.
4. The INSTALLER shall provide a minimum of one Master Seamer for work on the project. a. Must have completed a minimum of 1,000,000 square feet of geomembrane seaming work using the type of seaming apparatus proposed for the use on this Project.

1.7 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling - Each roll of geomembrane delivered to the site shall be labeled by the MANUFACTURER. The label will identify:
    a. manufacturer's name
    b. product identification
    c. thickness
    d. length
    e. width
    f. roll number

B. Delivery - Rolls of liner will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

C. Storage - The on-site storage location for geomembrane material, provided by the CONTRACTOR to protect the geomembrane from punctures, abrasions and excessive dirt and moisture for should have the following characteristics:

a. level (no wooden pallets)
b. smooth
c. dry
d. protected from theft and vandalism
e. adjacent to the area being lined

D. Handling- Materials are to be handled to prevent damage.

1.8 WARRANTY

A. Material shall be warranted, on a pro-rata basis against Manufacturer's defects for a period of 1 year from the date of geomembrane installation.

B. Installation shall be warranted against defects in workmanship for a period of 1 year from the date of geomembrane completion.

Part 2 PRODUCTS

2.1 GEOMEMBRANE PROPERTIES

A. Material shall be smooth, textured or structured polyethylene geomembrane as shown on the drawings. Geomembrane shall be flat die-cast extruded.

B. Resin
1. Resin shall be new, first quality, compounded and manufactured specifically for producing geomembrane.
2. Natural resin (without carbon black) shall meet the following requirements:

C. Geomembrane Rolls
1. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.
2. Geomembrane shall be free of holes, pinholes as verified by on-line electrical detection, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.
3. Geomembrane material is to be supplied in roll form. Each roll is to be identified with labels indicating roll number, thickness, length, width and MANUFACTURER.
4. All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical property requirements listed in section 2.1 D and be tested by an acceptable method of inspecting for pinholes.
5. All geomembrane shall contain edge markings, which shall denote the name of the manufacturer, the product thickness, the year of manufacture and the length of the roll. Theses marking shall occur at uniformly spaced intervals throughout the entire length of the roll.

D. Smooth surfaced geomembrane shall not be used.

E. Textured surface and structured surface geomembrane shall contain a smooth surface on each edge. Otherwise, texturing shall be uniform from edge to edge and roll to roll. Textured geomembrane shall be manufactured with an embossed surface to ensure uniformity of texture. Textured and/or structured geomembrane shall meet the requirements shown in the following tables:
   1. Table 2.2 for HDPE AGRU MicroSpike®
   2. Table 2.3 for HDPE AGRU Super Gripnet Liner
   3. Table 2.4 for HDPE AGRU MicroDrain
   4. Table 2.5 for LLDPE AGRU MicroSpike®
   5. Table 2.6 for LLDPE AGRU Super GripNet Liner
   6. Table 2.7 for LLDPE AGRU MicroDrain

F. Extrudate Rod or Bead
   1. Extrudate material shall be made from same type resin as the geomembrane.
   2. Additives shall be thoroughly dispersed.
   3. Materials shall be free of contamination by moisture or foreign matter.

Part 3 EXECUTION

3.1 EQUIPMENT

A. Welding equipment and accessories shall meet the following requirements:
   1. Gauges showing temperatures in apparatus such as extrusion welder or fusion welder shall be present.
   2. An adequate number of welding apparati shall be available to avoid delaying work.
   3. Power source must be capable of providing constant voltage under combined line load.

3.2 DEPLOYMENT

A. Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.

B. Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.

C. Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:
   1. Geomembranes shall be installed according to site-specific specifications.
   2. Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket).
   3. Place ballast (commonly sandbags) on geomembrane, which will not damage geomembrane to prevent wind uplift.

4. Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.
5. Do not allow heavy vehicular traffic directly on geomembrane. Low ground pressure, rubber-tired vehicles are acceptable.
6. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.

D. Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material.

3.3 FIELD SEAMING

A. Seams shall meet the following requirements:

1. To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.
2. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.
3. Slope seams (panels) shall extend a minimum of five-feet beyond the grade break into the flat area.
4. Use a sequential seam numbering system compatible with panel numbering system that is agreeable to the CONSULTANT and INSTALLER.
5. Align seam overlaps consistent with the requirements of the welding equipment being used. A 6-inch overlap is commonly suggested.

B. During Welding Operations

1. Provide at least one Master Seamer who shall provide direct supervision over other welders as necessary.

C. Extrusion Welding

1. Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.
2. Clean geomembrane surfaces by disc grinder or equivalent.
3. Purge welding apparatus of heat-degraded extrudate before welding.
4. On materials 80 mil and thicker, bevel the top edge of liner to be welded to avoid air pockets.

D. Hot Wedge Welding

1. Welding apparatus shall be a self-propelled device equipped with an electronic controller, which displays applicable temperatures.
2. Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.
3. Protect against moisture build-up between sheets.

E. Trial Welds

1. Perform trial welds on geomembrane samples to verify welding equipment is operating properly.
2. Make trial welds under the same surface and environmental conditions as the production

welds, i.e., in contact with subgrade and similar ambient temperature.

3. Minimum of two trial welds per day, per welding apparatus, one made prior to the start of work and one completed at mid shift.
4. Cut four, one-inch wide by six-inch long test strips from the trial weld.
5. Quantitatively test specimens for peel adhesion, and then for shear strength.
6. Trial weld specimens shall pass when the results shown in the following tables for HDPE and LLDPE are achieved in both peel and shear test.
7. Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.
8. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.
9. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. INSTALLER shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.

G. Defects and Repairs

1. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.
2. Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

3.4 FIELD QUALITY ASSURANCE

A. MANUFACTURER and INSTALLER shall participate in and conform to all terms and requirements of the Owner’s quality assurance program. CONTRACTOR shall be responsible for assuring this participation.

B. Quality assurance requirements are as specified in this Section and in the Field Installation Quality Assurance Manual if it is included in the contract.

C. Field Testing

1. Non-destructive testing may be carried out as the seaming progresses or at completion of all field seaming.
   a. Vacuum Testing
      1) Shall be performed in accordance with ASTMD5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
   b. Air Pressure Testing
      1) Shall be performed in accordance with ASTMD5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
   c. Other approved methods.
2. Destructive Testing (performed by CONSULTANT with assistance from INSTALLER)
   a. Location and Frequency of Testing
      1) Collect destructive test samples at a frequency of one per every 500 lineal feet of seam length.

2) Test locations will be determined after seaming.
3) Exercise Method of Attributes as described by GRI GM-14 (Geosynthetic Research Institute, http://www. geosynthetic-institute.org) to minimize test samples taken.

b. Sampling Procedures are performed as follows:
1) INSTALLER shall cut samples at locations designated by the CONSULTANT as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.
2) CONSULTANT will number each sample, and the location will be noted on the installation as-built.
3) Samples shall be twelve (12) inches wide by minimal length with the seam centered lengthwise.
4) Cut a 2-inch wide strip from each end of the sample for field-testing.
5) Cut the remaining sample into two parts for distribution as follows:
   a) One portion for INSTALLER, 12-inches by 12 inches
   b) One portion for the Third Party laboratory, 12-inches by 18-inches
   c) Additional samples may be archived if required.
6) Destructive testing shall be performed in accordance with ASTMD6392, Standard Test Method for Determing the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
7) INSTALLER shall repair all holes in the geomembrane resulting from destructive sampling.
8) Repair and test the continuity of the repair in accordance with these Specifications.
9) CQA activities should not to be more than one day behind deployment.

3. Failed Seam Procedures

a) If the seam fails, INSTALLER shall follow one of two options:
1) Reconstruct the seam between any two passed test locations.
2) Trace the weld to intermediate location at least 10 feet minimum or where the seam ends in both directions from the location of the failed test.

b) The next seam welded using the same welding device is required to obtain an additional sample

c) If sample passes, then the seam shall be reconstructed or capped between the test sample locations.

d) If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

3.5 REPAIR PROCEDURES

A. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.

B. Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.

C. INSTALLER shall be responsible for repair of defective areas.

D. Agreement upon the appropriate repair method shall be decided between CONSULTANT and INSTALLER by using one of the following repair methods:

1. Patching- Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
2. Abrading and Re-welding- Used to repair short section of a seam.
3. Spot Welding- Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.
4. Capping- Used to repair long lengths of failed seams.
5. Remove the unacceptable seam and replace with new material.

E. The following procedures shall be observed when a repair method is used:

1. All geomembrane surfaces shall be clean and dry at the time of repair.
2. Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.
3. Extend patches or caps at least 6 inches for extrusion welds and 4 inches for wedge welds beyond the edge of the defect, and around all corners of patch material.

F. Repair Verification

1. Number and log each patch repair (performed by CONSULTANT).
2. Non-destructively test each repair using methods specified in this Specification.

Part 4 MEASUREMENT AND PAYMENT

A. Payment for geomembrane installation will be as per contract unit price per square foot, including designed anchor trench material and is based upon net lined area.

B. Net lined area is defined to be the true area of all surfaces to be lined plus designed burial in all anchor trenches, rubsheets, and sacrificial layers.

C. Prices shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals.

D. Prices also include doing all the work involved in performing geomembrane installation completely as shown on the drawing, as specified herein, and as directed by the ENGINEER.

Part 2 PRODUCTS SUPPLEMENT

2.1GEOMEMBRANE PROPERTIES TABLES

Table 2.1: Raw Material Properties

Property	Test Method	HDPE	LLDPE
Density (g/cc)	ASTM D792, Method B	≥0.932	≥0.915
Melt Flow Index (g/10 min)	ASTM D 1238 (190/2.16)	≤1.0	≤1.0

Table 2.2: AGRU HDPE MicroSpike® Textured geomembrane

Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	**60 mil**	**80 mil**	**100 mil**
Thickness, (min. average) mil (mm) Lowest individual reading (-10%)	ASTM D5994	every roll	40 (1.0) 36 (0.90)	60 (1.5) 54 (1.35)	80 (2.0) 72 (1.8)	100 (2.5) 90 (2.25)
Density, g/cm^3	ASTM D792 Method B	200,000 lb	0.94	0.94	0.94	0.94
Tensile Properties (each direction) Strength at Break, lb/in-width (N/mm) Strength at Yield, lb/in-width (N/mm) Elongation at Break, % Elongation at Yield, %	ASTM D6693, Type IV Dumbell, 2 ipm G.L. 2.0 in (51 mm) G.L. 1.3 in (33 mm)	20,000 lb	88 (15) 88 (15) 350 12	132 (23) 132 (23) 350 12	176 (31) 176 (31) 350 12	220 (38) 220 (38) 350 12
Tear Resistance, lb (N)	ASTM D1004	45,000 lb	30 (133)	45 (200)	60 (267)	72 (320)
Puncture Resistance, lb (N)	ASTM D4833	45,000 lb	90 (400)	120 (534)	150 (667)	180 (801)
Carbon Black Content, % (Range)	ASTM D4218	20,000 lb	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	45,000 lb	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mil (mm)	ASTM D7466	second roll	20 (0.5)	20 (0.5)	18 (0.45)	18 (0.45)
Notched Constant Tensile Load, hr	ASTM D5397, App.	200,000 lb	500	500	500	500
Oxidative Induction Time, min	ASTM D 3895, 200° C; O2, 1 atm	200,000 lb	>140	>140	>140	>140

NOTES:

- (1)Dispersion only applies to near spherical agglomerates. 10 views shall be Category 1 or 2.
- All AGRU geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.

Table 2.3: AGRU HDPE Super Gripnet® Liner

Tested Property	Test Method	Frequency	Minimum Average Value			
			50 mil	**60 mil**	**80 mil**	**100 mil**
Thickness, (Nominal) mil (mm) Thickness, (average) mil (mm) Lowest individual reading 8 of 10 (-10%) Lowest Individual 2 of 10	ASTM D5994	every roll	50 (1.25) 47.5 (1.18) 45 (1.12) 42.5 (1.06)	60 (1.5) 57 (1.43) 54 (1.35) 51 (1.28)	80 (2.0) 76 (1.9) 72 (1.8) 68 (1.7)	100 (2.5) 95 (2.4) 90 (2.3) 85 (2.1)
Drainage Stud Height, mil (mm)	ASTM D7466	second roll	130 (3.3)	130 (3.3)	130 (3.3)	130 (3.3)
Friction Stud Height, mil (mm)	ASTM D7466	second roll	175 (4.45)	175 (4.45)	175 (4.45)	175 (4.45)
Density, g/cm^3	ASTM D792, Method B	200,000 lb	0.94	0.94	0.94	0.94
Tensile Properties (each direction) Strength at Break, lb/in-width (N/mm) Strength at Yield, lb/in-width (N/mm) Elongation at Break, % Elongation at Yield, %	ASTM D6693, Type IV Dumbell, 2 ipm G.L. 2.0 in (51 mm) G.L. 1.3 in (33 mm)	20,000 lb	110 (19) 110 (19) 200 12	132 (23) 132 (23) 200 12	176 (30) 176 (30) 200 12	220 (38) 220 (38) 200 12
Tear Resistance, lb (N)	ASTM D1004	45,000 lb	38 (169)	42 (187)	56 (249)	70 (312)
Puncture Resistance, lb (N)	ASTM D4833	45,000 lb	80 (356)	90 (400)	120 (534)	150 (667)
Carbon Black Content, % (Range)	ASTM D4218	20,000 lb	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	45,000 lb	Note(1)	Note(1)	Note(1)	Note(1)
Notched Constant Tensile Load, hr	ASTM D5397, Appendix	200,000 lb	500	500	500	500
Oxidative Induction Time, min	ASTM D3895, 200°C; O_2, 1 atm	200,000 lb	>140	>140	>140	>140

NOTES:

- (1)Dispersion only applies to near spherical agglomerates. 10 views shall be Category 1 or 2.
- All AGRU geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.

Table 2.4: AGRU HDPE MicroDrain® Liner

Tested Property	**Test Method**	**Frequency**	**Minimum Average Value**			
			50 mil	**60 mil**	**80 mil**	**100 mil**
Thickness, (Nominal) mil (mm) Thickness, (average) mil (mm) Lowest individual reading 8 of 10 (-10%) Lowest Individual 2 of 10	ASTM D5994	every roll	50 (1.25) 47.5 (1.18) 45 (1.12) 42.5 (1.06)	60 (1.5) 57 (1.43) 54 (1.35) 51 (1.28)	80 (2.0) 76 (1.9) 72 (1.8) 68 (1.7)	100 (2.5) 95 (2.4) 90 (2.3) 85 (2.1)
Drainage Stud Height, mil (mm)	ASTM D7466	second roll	130 (3.3)	130 (3.3)	130 (3.3)	130 (3.3)
MicroSpike® Asperity Height, mil (mm)	ASTM D7466	second roll	20 (0.51)	20 (0.51)	18 (0.46)	18 (0.46)
Density, g/cm^3	ASTM D792, Method B	200,000 lb	0.94	0.94	0.94	0.94
Tensile Properties (each direction) Strength at Break, lb/in-width (N/mm) Strength at Yield, lb/in-width (N/mm) Elongation at Break, % Elongation at Yield, %	ASTM D6693, Type IV Dumbell, 2 ipm G.L. 2.0 in (51 mm) G.L. 1.3 in (33 mm)	20,000 lb	110 (19) 110 (19) 300 12	132 (23) 132 (23) 300 12	176 (30) 176 (30) 300 12	220 (38) 220 (38) 300 12
Tear Resistance, lb (N)	ASTM D1004	45,000 lb	38 (169)	42 (200)	56 (267)	70 (300)
Puncture Resistance, lb (N)	ASTM D4833	45,000 lb	80 (356)	95 (422)	126 (560)	158 (703)
Carbon Black Content, % (Range)	ASTM D4218	20,000 lb	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	45,000 lb	Note(1)	Note(1)	Note(1)	Note(1)
Notched Constant Tensile Load, hr	ASTM D5397, Appendix	200,000 lb	500	500	500	500
Oxidative Induction Time, min	ASTM D3895, 200°C; O2, 1 atm	200,000 lb	>140	>140	>140	>140

NOTES:

- (1)Dispersion only applies to near spherical agglomerates. 10 views shall be Category 1 or 2.
- All AGRU geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.

Table 2.5: AGRU LLDPE MicroSpike® Textured Geomembrane

Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	**60 mil**	**80 mil**	**100 mil**
Thickness, (min. average) mil (mm) Lowest individual reading (-10%)	ASTM D5994	every roll	40 (1.0) 36 (0.9)	60 (1.5) 54 (1.35)	80 (2.0) 72 (1.8)	100 (2.5) 90 (2.25)
Density, g/cm^3 – maximum	ASTM D792 Method B	200,000 lb	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width (N/mm) Elongation at Break, %	ASTM D6693, Type IV Dumbell, 2 ipm G.L. 2.0 in (51 mm)	20,000 lb	112 (20) 400	168 (29) 400	224 (39) 400	280 (49) 400
Tear Resistance, lb (N)	ASTM D1004	45,000 lb	25 (111)	36 (160)	50 (222)	60 (267)
Puncture Resistance, lb (N)	ASTM D4833	45,000 lb	50 (222)	70 (310)	90 (400)	115 (512)
Carbon Black Content, % (Range)	ASTM D421 8	20,000 lb	2.0-3.0	2.0-3.0	2.0-3.0	2.0-3.0
Carbon Black Dispersion	ASTM D5596	45,000 lb	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mil (mm)	ASTM D7466	second roll	20 (0.5)	20 (0.5)	18 (0.45)	18 (0.45)
Oxidative Induction Time, min	ASTM D3895, 200° C; O_2,1 atm	200,000 lb	>140	>140	>140	>140

NOTES:

- (1)Dispersion only applies to near spherical agglomerates. 10 views shall be Category 1 or 2.
- All AGRU geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.

Table 2.6: AGRU LLDPE Super Gripnet® Liner

Tested Property	Test Method	Frequency	Minimum Average Value			
			50 mil	60 mil	80 mil	100 mil
Thickness, (Nominal) mil (mm) Thickness, (average) mil (mm) Lowest individual reading 8 of 10 (-10%) Lowest Individual 2 of 10	ASTM D5994	every roll	50 (1.25) 47.5 (1.18) 45 (1.12) 42.5 (1.06)	60 (1.5) 57 (1.43) 54 (1.35) 51 (1.28)	80 (2.0) 76 (1.9) 72 (1.8) 68 (1.7)	100 (2.5) 95 (2.4) 90 (2.3) 85 (2.1)
Drainage Stud Height, mil (mm)	ASTM D7466	second roll	130 (3.3)	130 (3.3)	130 (3.3)	130 (3.3)
Friction Stud Height, mil (mm)	ASTM D7466	second roll	175 (4.45)	175 (4.45)	175 (4.45)	175 (4.45)
Density, g/cm^3 – maximum	ASTM D792, Method B	200,000 lb	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width (N/mm) Elongation at Break, %	ASTM D6693, Type IV Dumbell, 2 ipm G.L. 2.0 in (51 mm)	20,000 lb	105 (18) 300	126 (22) 300	168 (29) 300	210 (36) 300
Tear Resistance, lb (N)	ASTM D1004	45,000 lb	30 (133)	40 (178)	53 (236)	65 (285)
Puncture Resistance, lb (N)	ASTM D4833	45,000 lb	55 (245)	70 (311)	90 (400)	110 (489)
Carbon Black Content, % (Range)	ASTM D4218	20,000 lb	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	45,000 lb	Note(1)	Note(1)	Note(1)	Note(1)
Oxidative Induction Time, min	ASTM D3895, 200°C; O_2, 1 atm	200,000 lb	>140	>140	>140	>140

NOTES:

- (1)Dispersion only applies to near spherical agglomerates. 10 views shall be Category 1 or 2.
- All AGRU geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.

Table 2.7: AGRU LLDPE MicroDrain® Liner

Tested Property	Test Method	Frequency	Minimum Average Value			
			50 mil	60 mil	80 mil	100 mil
Thickness, (Nominal) mil (mm) Thickness, (average) mil (mm) Lowest individual reading 8 of 10 (-10%) Lowest Individual 2 of 10	ASTM D5994	every roll	50 (1.25) 47.5 (1.18) 45 (1.12) 42.5 (1.06)	60 (1.5) 57 (1.43) 54 (1.35) 51 (1.28)	80 (2.0) 76 (1.9) 72 (1.8) 68 (1.7)	100 (2.5) 95 (2.4) 90 (2.3) 85 (2.1)
Drainage Stud Height, mil (mm)	ASTM D7466	second roll	130 (3.3)	130 (3.3)	130 (3.3)	130 (3.3)
MicroSpike® Asperity Height, mil (mm)	ASTM D7466	second roll	20 (0.51)	20 (0.51)	18 (0.46)	18 (0.46)
Density, g/cm^3 – maximum	ASTM D792, Method B	200,000 lb	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width (N/mm) Elongation at Break, %	ASTM D6693, Type IV Dumbell, 2 ipm G.L. 2.0 in (51 mm)	20,000 lb	105 (18) 300	126 (22) 300	168 (29) 300	210 (36) 300
Tear Resistance, lb (N)	ASTM D1004	45,000 lb	30 (133)	40 (178)	53 (236)	67 (298)
Puncture Resistance, lb (N)	ASTM D4833	45,000 lb	55 (245)	70 (311)	90 (400)	110 (489)
Carbon Black Content, % (Range)	ASTM D4218	20,000 lb	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	45,000 lb	Note[(1)]	Note [(1)]	Note [(1)]	Note [(1)]
Oxidative Induction Time, min	ASTM D3895, 200°C; O_2, 1 atm	200,000 lb	>140	>140	>140	>140

NOTES:

- [(1)]Dispersion only applies to near spherical agglomerates. 10 views shall be Category 1 or 2.
- All AGRU geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.

Table 2.12.A: Minimum Weld Values for HDPE Geomembranes

Property	Test Method	30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)	120 (3.0)
Peel Strength (fusion), ppi (kN/m) Peel Strength (extrusion), ppi (kN/m)	ASTM D 6392 ASTM D 6392	45 (197) 39 (170)	60 (263) 52 (225)	91 (398) 78 (340)	121 (530) 104 (445)	151 (661) 130 (570)	181 (793) 156 (680)
Shear Strength (fusion & ext.), ppi (kN/m)	ASTM D 6392	57 (250)	80 (350)	120 (525)	160 (701)	200 (876)	240 (1050)

Table 2.12.B: Minimum Weld Values for LLDPE Geomembranes

Property	Test Method	30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Peel Strength (extrusion), ppi (kN/m) Peel Strength (fusion), ppi (kN/m)	ASTM D 6392 ASTM D 6392	38 (166) 34 (150)	50 (219) 44 (190)	75 (328) 66 (290)	100 (438) 88 (385)	125 (547) 114 (500)
Shear Strength (fusion & ext.), ppi (kN/m)	ASTM D 6392	45 (197)	60 (263)	90 (394)	120 (525)	150 (657)

a. The break, when peel testing, occurs in the liner material itself, not through peel separation (FTB).
b. The break is ductile.

SECTION 31022 GRADING

1.0 GRADING SCOPE OF WORK

1.1 The work covered in this Section shall include, but is not necessarily limited to the following:

1. Moving, placing, and compacting CCR;
2. Grading the Former Ash Basin (FAB) north portion slopes;
3. Grading the CCR in the south portion of the FAB;
4. Rebuild the north portion access road; and
5. Install the riprap drainage channels on the north side of the railroad berm.

1.2 CONTRACTOR shall perform the required field and laboratory CQC tests described in this Section.

1.3 If Work is interrupted for reasons other than inclement weather, then the CONTRACTOR shall notify the OWNER’S REPRESENTATIVE and CQA OFFICER a minimum of 24 hours prior to the resumption of Work.

2.0 GRADING QUALITY ASSURANCE

2.1 All field density testing shall be done by an approved geotechnical firm at the CONTRACTOR’S expense.

2.2 Field density testing shall be performed in accordance with ASTM D6938 and occur with one (1) test performed every 10,000 square feet (sf) per lift (1 test/10,000 sf/lift). A special testing frequency will be used at the discretion of the OWNER’S REPRESENTATIVE or the CQA OFFICER when visual observations of construction performance indicate a potential problem.

1. Additional testing will be considered when:
   - a. The rollers slip during rolling operation;
   - b. The lift thickness is greater than specified;
   - c. The soil is at improper and/or variable moisture content;
   - d. Fewer than the specified number of roller passes is made;
   - f. The rollers do not have optimum ballast; or
   - g. The degree of compaction is doubtful.
2. During construction, the frequency of testing may also be increased by the OWNER’S REPRESENTATIVE or the CQA OFFICER in the following situations:
   - a. Adverse weather conditions;
   - b. Breakdown of equipment;
   - c. At the start and finish of grading;
   - d. If the material fails to meet specifications; or
   - e. The work area is reduced.

2.3 The CQA OFFICER shall monitor the placement and compaction of CCR, soils, and construction materials in accordance with the Specifications and Drawings. If a defective area is discovered, the following will occur:

1. The CQA OFFICER will notify the CONTRACTOR who shall proceed to determine the extent and nature of the defect.
2. If the defect is indicated by an unsatisfactory test result, then the CONTRACTOR will determine the extent of the defective area by additional tests, observations, a review of records, or other means that the CONTRACTOR deems appropriate.
3. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, then the CONTRACTOR will define the limits and nature of the defect.
4. After the extent and nature of a defect has been determined, the CONTRACTOR shall correct the deficiency to the satisfaction of the OWNER'S REPRESENTATIVE and the CQA OFFICER. The cost of corrective actions shall be borne by the CONTRACTOR.
5. Additional testing will be performed by the CONTRACTOR to verify that the defect has been corrected. This additional testing will be performed and submitted to the OWNER'S REPRESENTATIVE before any additional work is allowed in the area of deficiency.

3.0 MATERIALS

3.1 All material anticipated to be graded shall be considered CCR or unclassified soil; it is anticipated that bedrock will not be encountered. CCR or Unclassified soil grading shall include the removal and subsequent handling of any and all overburden materials and substances encountered in performance of the work, regardless of the type, character, composition, or condition thereof. Bedrock is considered the material that cannot be removed with standard grading techniques (hereby defined as grading with a CAT D9T bulldozer) or with standard excavation techniques (hereby defined as excavation with a CAT 315 excavator with standard teeth).The existing CCR in the north and south portions of the FAB shall be used for grading.

3.2 All material brought in from offsite shall be approved before use. Material brought in from offsite shall be free from rubbish, large stones, clods, roots, brush, debris, frozen lumps of earth, or other objectionable material, and shall be moistened as required.

1. CCR MATERIAL

1. Soil boring logs from previously completed wells at the site are available upon request.
2. With exception to the above-mentioned data, there has been no additional investigation into the types of subsurface materials to be encountered in the proposed areas of CCR grading.

2. NON-CCR MATERIAL

1. The non-CCR material that will be encountered may consist of gravel and topsoil present along the current north portion access road and the area surrounding the FAB.

2. Any topsoil or gravel removed will be used in constructing the north portion access road and to re-establish vegetation, as needed.
3. The vegetation for restoration will consist of native grasses that thrive in wet environments. All seed shall be of high quality and comply with Illinois Seed and Weed Laws.

3. EROSION CONTROL MATERIAL

Acceptable erosion control materials are as follows:

1. Mulch shall comply with Illinois Urban Manual Practice Standard 875 with straw mulch consisting of oats, wheat, rye, or barley and hydraulic mulch consisting of wood, cotton, straw, or paper – or a combination of the four. If compost is used it shall be thoroughly decomposed organic waste. Chemical mulch bonder shall be approved as safe for the ecosystem.
2. The erosion control blanket shall comply with IUM Practice Standard Erosion Control Blanket 830 and shall be coconut blankets, jute netting, wood fiber blankets, straw blankets, or an approved equal.
3. The turf reinforcement mat (TRM) shall comply with IUM Material Specification Turf Reinforcement Mat 805 and shall be equal or greater to Landlok 435 or Enkamat 7020 brand TRMs or an approved equal.

4.0 MATERIAL PLACEMENT AND COMPACTION

4.1 Load, transport, place, and compact a minimum 12-inch thick CCR layer for materials compacted by heavy equipment and not more than 6 inches for materials compacted by hand equipment. Hand compaction of material shall be used in locations where larger compaction is inappropriate due to limited area.

4.2 Clod size must be reduced by construction disc or similar equipment. Remove materials greater than 3 inches in diameter.

4.3 Any cut CCR material will be compacted to 95% of its maximum dry density as determined by ASTM D698 with corresponding moisture content to within +/-5% of the optimum moisture content as determined by ASTM D2216.

4.4 Fill layers will be compacted to at least 95% of the maximum theoretical density as determined by ASTM D698. Moisture content shall be within +/-2% of optimum as determined by ASTM D2216.

4.4 Grading Tolerances are as follows:

1. Horizontal grading points, plus or minus 0.2 feet.
2. Vertical grading elevations, plus or minus 0.1 feet.

4.5 Compact final lift to the elevations shown on the Drawings. Final finish grades must not exceed the maximum grades and elevations shown on the Drawings unless specifically approved by the OWNER'S REPRESENTATIVE and/or CQA OFFICER.

4.6 Maintain stability of graded areas. Prevent surface and subsurface water from accumulating on areas that had been graded and areas that require grading.

4.7 Remove foreign materials (i.e., sticks, sharp objects, etc.) from finished surface

4.8 Protect newly graded areas from traffic and erosion. Recompact and regrade settled, disturbed and damaged areas as necessary to restore quality, appearance, and condition of work.

4.9 Protect newly graded areas from damage from stormwater. Recompact and regrade settled, disturbed and damaged areas as necessary to restore quality, appearance, and condition of work.

4.10 Compaction shall be performed using a vibratory soil compactor and/or tamping foot compactor, unless other equipment is approved by the OWNER'S REPRESENTATIVE.

4.11 Scarify and knead the interface of different material layers to facilitate adherence when compacting.

4.12 Place material when ambient temperature is above freezing.

4.13 Control erosion to prevent runoff that will cause damage to sloped or surfaced areas.

4.14 CONTRACTOR shall finish each day's work with a smooth-drum roller to create a smooth surface, free from ruts or indentations, which will minimize moisture penetration. The area shall be left in a manner to promote runoff at the end of each day.

4.15 Prior to continuing construction from the previous day's work, CONTRACTOR shall scarify the surface to provide a bond between the layers.

4.16 Control dust to prevent hazards to adjacent properties and vehicles. Immediately repair or remedy damage caused by dust including air filters in equipment and vehicles. Clean soiled surfaces.

4.17 Compacted properties will be verified from periodic in place nuclear density testing in accordance with ASTM D6938.

5.0 NORTH PORTION ACCESS ROAD CONSTRUCTION

5.1 The material used to construct the north portion access road shall consist of Mirafi 140/N fabric or an approved equal and IDOT gradation CA6 base course or an approved equal. The IDOT gradation CA base course material shall conform to the following limits when tested by means of laboratory sieves:

CA6	
Sieve Size	**Total Percent Passing by Weight**
1 1/2 inch	100
1 inch	95±5
½ inch	75±15
No. 4	43±13
No. 16	25±15
No. 200	8±4

5.2 Compacted base course should be free of deleterious materials and placed in 6-inch lifts compacted to achieve at least 95% standard proctor density as determined by in-place density testing performed in accordance with ASTM D6938. Material should be graded and placed properly to avoid any open voids after compaction.

5.3 CONTRACTOR shall finish each day's work with a smooth-drum roller to create a smooth surface, free from ruts or indentations, which will minimize moisture penetration. The area shall be left in a manner to promote runoff at the end of each day.

5.4 Prior to continuing construction from the previous day's work, CONTRACTOR shall scarify the surface to provide a bond between the layers.

6.0 SUBGRADE PREPARATION

6.1 The subgrade is defined as the material that will be placed and compacted for the final one (1) foot lift that is necessary to achieve the final elevations shown on the Drawings. The surface of the subgrade will be in direct contact with the ClosureTurf System.

6.2 Load, transport, place, and compact the final one foot of subgrade in two (2) 6-inch thick lifts. Heavy equipment shall be used for compaction. Hand compaction of material shall be used in locations where larger compaction is inappropriate due to limited area.

6.3 The subgrade shall be moved, placed, and compacted to conform to the final grades indicated on the Drawings and to ensure the subgrade is acceptable for the placement of the ClosureTurf System.

6.4 Subgrade will be substantially smooth, uniform, firm and free from rocks or other debris.

6.5 No rocks or protrusions greater than 1 inch in diameter will be exposed at the subgrade surface.

6.6 Grading Tolerances are plus or minus 0.1 feet.

6.7 Smooth roll final surface to eliminate irregularities. The surface will be substantially free of foreign and organic material, sharp objects, particles or other deleterious material.

7.0 SUBGRADE EXAMINATION

7.1 The CQA OFFICER and the CONTRACTOR shall monitor the placement and compaction of CCR before and during deployment of the ClosureTurf components in accordance with the Specifications and Drawings. If a defective area is discovered, the CONTRACTOR shall complete the necessary actions to correct the defective area.

7.2 Responsibilities for the approval and maintenance of the subgrade are as follows:

1. OWNER'S REPRESENTATIVE:
   a. Verify in writing that the surface on which the geomembrane component will be installed is acceptable.
   b. Approved subgrade to be capable of supporting the weight of geosynthetics installation equipment.
2. GEOSYNTHETICS INSTALLER:
   a. Keep the accepted subgrade surface in a condition conducive to the deployment of all ClosureTurf components.
   b. Subgrade acceptance is determined when the deployment of the geomembrane component begins.
   c. Maintain the previously accepted subgrade.
   d. Identify any part of the subgrade that becomes non-compliant to the specifications during the course of construction.
   e. Timely submission to the OWNER'S REPRESENTATIVE of subgrade acceptance certificates.

7.3 Daily evaluations shall occur to show no changes have occurred that would render the subgrade unacceptable.

8.0 GRADING WATER CONTROL AND DEWATERING

8.1 For all areas requiring grading activities, the CONTRACTOR shall provide suitable equipment to remove water, and the areas shall be kept dewatered so that grading activities can be carried out under dewatered conditions.

8.2 Prevent surface and subsurface water from accumulating on areas that had been graded and areas that require grading.

8.3 Water shall be disposed of in a suitable manner without damage to adjacent property or without being a menace to public health and convenience. No water shall be drained into work built or under construction without prior consent of the OWNER'S REPRESENTATIVE.

8.4 Control erosion to prevent runoff that will cause damage to sloped or surfaced areas.

8.5 Dewatering shall be accomplished by well points, pumping, or any other acceptable method which will ensure the areas requiring grading are dewatered sufficiently, so that the areas can dry to allow the CONTRACTOR'S operations to not be interrupted. Any dewatering method shall be subject to the approval of the OWNER'S REPRESENTATIVE.

9.0 REMOVAL OF UNSUITABLE MATERIAL

9.1 In areas where unsuitable or unstable material is encountered, the CONTRACTOR shall remove the unsuitable material and backfill and compact with material approved by the OWNER'S REPRESENTATIVE. Removal and replacement of unsuitable material will be done only upon authorization by the OWNER. Payment for authorized work will be negotiated by Change Order.

10.0 GENERAL RESTORATION

10.1 STREETS AND ROADWAYS: Any pavements disturbed during construction shall be repaired in accordance with the requirements of the OWNER.

10.2 ACCESS ROADS: Restore the access roads to conditions equal to or exceeding existing conditions if damage occurs during the Work outlined in this Section.

10.3 A mulch application is acceptable for erosion control on areas of slopes of 3H:1V or flatter. Erosion control blankets may be installed as needed instead of straw to prevent erosion. Erosion control blankets shall be installed on slopes flatter than or equal to 1.5H:1V. Turf reinforcement mat will be used in areas with a slope greater than 3H:1V.

11.0 RESTORATION

11.1 The CONTRACTOR may use the stockpiled topsoil for any areas of restoration. The topsoil shall be seeded and then covered to prevent erosion. If additional topsoil is needed, it shall be provided by the contractor from an approved source.

11.2 The topsoil shall not be replaced when the CCR subgrade is frozen or saturated.

11.3 SEEDING TOPSOIL PREPARATION:

1. The grading of the topsoil shall utilize techniques and equipment that minimize soil compaction. If the final graded site consists of subsoil that may have been compacted by heavy equipment during grading activities, the subgrade shall be scarified to a depth of at least four inches by chisel plowing, disking or harrowing.
2. After the grading operation, spread topsoil where needed following Natural Resources Conservation Service (NRCS) Illinois Urban Manual Practice Standard Topsoiling 981.

11.4 SEEDBED PREPARATION:

1. Prior to seeding or planting, the seedbed shall be relatively free of all weeds (> 80% weed free), stones, roots, sticks, rivulets, gullies, crusting and caking, or other debris which may interfere with seeding or planting operations or plant establishment.
2. Prior to seeding or planting the surface shall be disked or raked to a depth of 2-3 inches either by hand or mechanical means to create a smooth uniform seedbed.
3. In areas that have been regraded, which have grown up in weeds, or to be no-till seeded, an herbicide application may be necessary to reduce competition with the desired vegetation. An approved herbicide may be used to treat such areas to kill all existing vegetation. Herbicide application shall be done at least 15 days prior to seeding or planting.

11.5 If needed based upon soil conditions and desired vegetation type, incorporate the lime and fertilizer into the soil with a disk harrow, springtooth harrow, or similar tools to a depth of at least 3 inches. On sloping areas the final operation shall be on the contour.

11.6 Fertilizer or lime is generally not recommended for native vegetation establishment unless soil tests indicate pH < 5.5, P < 15 lb./ac., or K < 150 lb./ac. If levels are below this, apply lime and fertilizer according to a soil test and the needs of the vegetation selected.

11.7 Seeding may be done by conventional drilling, broadcast seeding, hydroseeding, dormant seeding, and/or no-till seeding. Refer to NRCS Illinois Urban Manual Practice Standard Permanent Vegetation 880 for specific requirements for each seeding method.

12.0 MAINTENANCE OF GRADED AREAS

12.1 All graded areas shall be maintained in a satisfactory condition and all places showing signs of settlement shall be filled and maintained during the life of the Contract and for a period of one year following the date of final acceptance of all work performed under the Contract. When the CONTRACTOR discovers or is notified by the OWNER'S REPRESENTATIVE or the OWNER that any graded area does not comply with the provision of this Contract, the CONTRACTOR shall correct such conditions at once. Any utilities and road surfacing damaged by such settlement shall be repaired by the CONTRACTOR to the satisfaction of the OWNER and OWNER'S REPRESENTATIVE. In addition, the CONTRACTOR shall be responsible for the cost to the OWNER of all claims for damages filed with the Court, actions brought against the said OWNER for, and on account of, such damage.

END OF SECTION

ATTACHMENT 6
FACILITY/COMPONENT PLANS AND SPECIFICATIONS

Attachment 6 – No Attachment

<u>ATTACHMENT 7</u>
<u>CLOSURE CONSTRUCTION</u>

Attachment 7-1 FAB Closure Plan

K P R G

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

FINAL CLOSURE PLAN – FORMER ASH BASIN

POWERTON GENERATING STATION
MIDWEST GENERATION, LLC
PEKIN, ILLINOIS

Illinois EPA Site No. 1798010008-05

October 26, 2022

Submitted To:

Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, Illinois 62702

Prepared For:

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1.0 INTRODUCTION [845.720(a)(1)(A)]

The Midwest Generation, LLC (Midwest Generation) Powerton Generating Station is located at 13082 East Manito Road, Pekin, Tazewell County, Illinois. The facility is a coal-fired electric power generating station occupying approximately 1,710 acres. Units 5 and 6 began operating in 1972 and 1975, respectively. Electrical power is transmitted from the site to the area grid through overhead transmission power lines. In conjunction with the station is a man-made perched cooling pond known as Powerton Lake, which occupies approximately 1,440 acres and provides cooling water to the facility.

In conjunction with the ash handling system, the Powerton Station utilizes basins identified as the Ash Bypass Basin and the Ash Surge Basin, which are located on the northeast side of the facility. Settled water is then conveyed to the Service Water Basin for reuse or discharge in accordance with the NPDES permit. An inactive ash basin, referred to as the Former Ash Basin (FAB), is located to the northeast of the existing Ash Surge Basin. The FAB is a 25-acre inactive CCR surface impoundment and has not been used since the 1970's. The FAB was previously one inactive surface impoundment when it was divided by a railroad embankment constructed in 2010. The divided FAB is referred to as the north portion and the south portion in this document for reference purposes. Standing water is present in some areas of the north and south portions along with vegetation and trees that have grown over the CCR due to the length of inactivity.

As required by 845.700(b), Midwest Generation will be closing the FAB. A preliminary closure plan was submitted as part of the Powerton operating permit application and is finalized as part of this construction permit application to execute the closure of the FAB. This final closure plan has been executed in accordance with 845.720(b), which includes completing a closure alternatives analysis. Pursuant to 845.710, a closure alternatives analysis was completed prior to selecting the closure method that will be used for the FAB and described in this final closure plan. The closure alternatives analysis was performed to evaluate the closure methods involving closure by removal and closure in place. The closure alternatives analysis report evaluated four different closure methods. The four different methods evaluated consisted of the following:

- Scenario 1: Closure by removal in accordance with 845.740.
- Scenario 2: Closure in place in both the north and south portions of the FAB and installation of a final cover system.
- Scenario 3: Consolidate the CCR in the southern portion of the FAB and installation of a final cover system.
- Scenario 4: Closure in place via in-situ soil stabilization and installation of a soil cover.

The closure alternatives analysis identified that closure in place provides both short- and long-term protection to groundwater and surface water along with ensuring overall protection to the public health, welfare, and safety. Therefore, Midwest Generation has selected to close the FAB in place and construct an alternative final cover system as the closure method. This closure plan has been prepared in accordance with 35 Ill. Adm. Code 845.720(b) and 845.750 for the FAB and describes the schedule and steps necessary for closure and methods for compliance with closure requirements.

2.0 CLOSURE NARRATIVE [845.720(a)(1)(A)]

The closure of the FAB will be accomplished by consolidating the CCR in place in the southern portion and covering with a final cover system in accordance with 35 Ill. Adm. Code 845.750. The closure will achieve the closure performance standards in accordance with 845.750(a) and listed as follows:

1. Control, minimize, or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;

2. Preclude the probability of future impoundment of water, sediment, or slurry;

3. Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;

4. Minimize the need for further maintenance of the CCR surface impoundment; and

5. Be completed in the shortest amount of time consistent with recognized and generally accepted engineering practices.

3.0 CCR REMOVAL and DECONTAMINATION [845.740(a)]

The CCR from the north portion of the FAB will be either hydraulically dredged into the south portion of the FAB or mechanically excavated and dumped into the south portion of the FAB. The CCR in the north portion averages 16 feet in depth and the groundwater elevation ranges from 434 feet above mean sea level (ft amsl) to 439 ft amsl. Excavation of the north portion CCR may consist of mechanically excavating the CCR above the groundwater elevation, loading onto trucks and transporting to the south portion where they would end dump the CCR into the south portion of the FAB. Dumped CCR material may be stockpiled and allowed to drain, as necessary. The embankment that surrounds the north portion of the FAB would also be excavated and placed in the south portion of the FAB. It is anticipated that the embankment would be mechanically excavated and transported to the south portion via trucks.

Excavation of the CCR below the groundwater elevation may occur through hydraulically dredging the CCR and discharging in the south portion of the FAB. The dredged CCR would be contained, allowing the CCR to settle and the water would be returned into the north portion of the FAB for reuse in the hydraulic dredging process. The water would be returned to the north portion of the FAB by mechanically pumping through a newly installed pipe through the berm that separates the north and south portions. The hydraulic dredging will mix the CCR with the existing standing water in the north portion and/or water from the south portion to create slurry, which will be pumped to the southern portion. This slurry will be pumped into the south portion through one of the culverts that will be directionally drilled and installed underneath the railroad tracks that separate the north portion and the south portion. The culverts are anticipated to be 18”ø high-density polyethylene (HDPE) pipes. The decanted dredge water will be pumped from the south portion through the east culvert back into the north portion where it will be reused to slurry and pump CCR from the north portion. Using the two pipes under the railroad will prevent the need to suspend operations of the railroad during the closure activities.

After CCR removal, the north portion of the FAB will be graded to create a stormwater runoff management area for the south portion of the FAB. Dewatering will be necessary to finish grading the north portion of the FAB after CCR removal. Once grading is complete, a new gravel road will be constructed along the north perimeter to allow for access to the existing monitoring wells and the slopes of the north portion of the FAB will be permanently stabilized.

The gravel road is anticipated to be constructed using breaker run as an initial base to ensure the base of the road is above the groundwater elevation. The breaker run will then be covered with traffic bond or a similar type stone, graded, and compacted.

The amount of CCR that is either mechanically excavated or hydraulically dredged, or whether or not one method is chosen over the other will ultimately be decided by the contractor selected to perform the closure work. Having both methods of CCR removal approved in the construction permit allows flexibility to perform the CCR removal method that will be least impactful to the surrounding environment.

Permanent stabilization of the north portion will consist of installing erosion control blanket and seeding the disturbed areas. Erosion control blanket will be installed on all slopes equal to or greater than a three feet horizontal run to a one-foot vertical rise (3H to 1V). Areas disturbed by the execution of the CCR removal from the north portion will be seeded using grass and plants native to the Pekin area. However, those areas do not include the location of the consolidated CCR material. The stabilization of the consolidated CCR material is discussed in the following section. Fertilizer will be applied as necessary to facilitate grass growth.

4.0 CLOSURE with CCR LEFT IN PLACE [845.720(a)(1)(C)]

Once the CCR material placed in the south portion of the FAB is sufficiently dried, it will be graded to achieve the desired elevations needed for the FCS. The FCS would then be constructed on top of all the consolidated CCR. The south FAB FCS would be sloped to drain stormwater off but not so steep as to cause erosion. In general, the CCR grades will be sloped towards the perimeter to drain stormwater off the south portion FCS. The stormwater will then drain through newly installed pipes through the berm, which will discharge into the north portion of the FAB. This will minimize the potential for ponding and infiltration into the CCR below. As the slopes are constructed, measures will be taken to prevent sloughing and movement of the material and final cover system during the post-closure period. The layer of fill material directly below the geomembrane will be free from large, protruding, or sharp objects that could potentially damage the geomembrane.

The proposed FCS for the south portion of the FAB is the proprietary ClosureTurf cover system created by Watershed Geo, LLC. ClosureTurf consists of a geomembrane low permeability layer that also incorporates a drainage layer. The final protective layer is replaced with engineered synthetic turf that is infilled with sand/small aggregate to provide ballast to the synthetic turf. The infiltration layer will be a 60-mil HDPE geomembrane with a hydraulic conductivity that is no greater than 1x10-7 cm/sec. The engineered synthetic turf is comprised of polyethylene fibers that are tufted through a double layer of woven geotextiles that are highly UV and heat resistant. The engineered synthetic turf is then infilled with small aggregate that is approximately 1/8 inch to 1/4 inch diameter in size. The small aggregate is brushed into the synthetic turf to ensure that it settles to the bottom of the turf, which provides ballast and prevents the turf's movement during wind events.

Section 845.750(c)(1) requires that the low permeability layer must have a permeability less than or equal to the permeability of any bottom liner system present or a hydraulic conductivity no greater than 1 x 10-7 centimeters per second (cm/sec). The FAB does not have a bottom liner system; therefore, the structured geomembrane's permeability for the final cover system must be no greater than 1 x 10-7 cm/sec. As such, the structured geomembrane in the ClosureTurf final cover system will be a 60-mil HDPE structured geomembrane that combines a studded drain surface on the top side and a spiked friction surface on the bottom side into one geomembrane liner. This structured geomembrane has a permeability that has been independently tested at 1.5 x 10-13 cm/sec.

When using a geomembrane as the low permeability layer, it is required by 845.750(c)(1)(B)(i) to have a hydraulic flux equivalent or superior to a 3-foot layer of soil with a hydraulic conductivity of 1 x 10-7 cm/sec. The following table demonstrates that the geomembrane provides a superior performance at reducing the infiltration of liquid when compared to a 3-foot thick layer of earthen material. The following table is created here to demonstrate the geomembrane that will be used as part of the ClosureTurf final cover system is compliant with 845.750(c)(1)(B)(i).

Table – Liquid Flow Rate Comparison Between Low Permeability Layers Constructed Using Geomembrane & Earthen Material

Parameter	Symbol	Value
Liquid Flow Rate Through Earthen Material		
Hydraulic Conductivity	k	1×10^{-7} m/sec
Hydraulic Head Above Layer	h	0.14 m
Layer Thickness	t	3 ft = 0.91 m
Hydraulic Gradient Through Earthen Material	$i = h / t$	0.15
Liquid Flow Rate Through Layer per Acre of Final Cover System	$q = k \times (i + 1)$	1.15×10^{-7} $m^3/sec/m^2$

Liquid Flow Rate Through Geomembrane		
Hole Area in Geomembrane	a	3.1 mm^2 / 4000 m^2
Acceleration Due to Gravity	g	9.81 m/sec^2
Hydraulic Head Above Layer	h	0.14 m
Liquid Flow Rate Through Layer per Unit Area	$q = 0.6a(2gh)^{0.5}$	7.71×10^{-10} $m^3/sec/m^2$

The geomembrane comes in rolls, which will be deployed with the spike side down and the stud side up on top of the graded general fill material. The rolls will be deployed perpendicular to the slope elevation contours and the deployment method will protect the geomembrane as well as the graded material below. Adequate anchoring will be used, such as sand bags, to prevent uplift by wind during the deployment of the geomembrane rolls. The edges of each roll are overlapped in the downgrade direction a minimum of three inches to form the seam that is then welded together. Welding is performed by either extrusion welding or hot wedge welding depending on manufacturer's recommendations and as construction of the geomembrane dictates.

The geomembrane will be covered with engineered synthetic turf and sand/aggregate infill, which will be the final protective layer. The engineered synthetic turf is green and replaces the need for an erosion layer and vegetation while providing a natural look and feel of grass and protecting the geomembrane from extreme weather. The engineered turf will be installed in accordance with the manufacturer's recommendations and equipment used during the installation will not damage the turf or the underlying geomembrane. The engineered synthetic turf also comes in rolls, which will be rolled out on top of the geomembrane starting from the highest slope to the lowest slope. The rolls will be deployed so that the filaments of the engineered turf are pointed upslope and the edges of each roll touch each other so the seams can be joined together. The turf will be laid substantially smooth and it will be secured with sandbags at the top of any slope after it is deployed. The engineered synthetic turf will cover all of the geomembrane and will follow the same slope as the geomembrane. The rolls of the engineered turf are joined together either by sewing with polyester thread or by fusion seaming with a fusion welder.

A specified sand/aggregate infill will be placed between the blades of the engineered synthetic turf after the turf is in place on top of the geomembrane. The sand infill will be spread with a minimum thickness of 0.5 inches and a maximum thickness of 0.75 inches using conveyor systems and/or express blowers. The infill will be driven into the space between the synthetic blades and the sand/aggregate mixture will meet ASTM C-33-03 for fine aggregates. The infill thickness will be checked at approximately 100-foot grid intervals. The sand infill installation will be done as to not damage or displace previously installed ClosureTurf components and the placement will not occur with snow or ice on the engineered turf.

An anchor trench will be used on the perimeter of the FCS to anchor the ClosureTurf system. The anchor trench will bury the edge of the geomembrane and engineered turf beneath two feet of soil to anchor the geomembrane in place. The soil that is placed in the anchor trench will be compacted to prevent the potential pullout of the geomembrane and engineered turf.

QA/QC testing will be performed on the ClosureTurf cover system as part of the installation.

5.0 MAXIMUM INVENTORY of CCR [845.720(a)(1)(D)]

The estimated maximum inventory of CCR on-site contained in the north portion and the south portion is estimated at approximately 465,000 cubic yards (CY) and 240,000 CY, respectively.

6.0 LARGEST AREA of CCR REQUIRING a FINAL COVER [845.720(a)(1)(E)]

The north portion of the FAB will be closed by removing the CCR in accordance with 845.740; therefore, this section is not applicable to the north portion. The south portion of the FAB will be closed with CCR in place and the FCS will cover a maximum area of approximately 15.3 acres.

7.0 CLOSURE SCHEDULE [845.720(a)(1)(F)]

Implementation of closure through removal and closure in place of CCR is estimated to require up to 42 months. However, this closure implementation time may vary because of the estimated time it will take to receive an approved construction permit. The closure activities are anticipated to begin in early 2023 with submittal of the construction permit application and completion is estimated to be by the end of 2026. The initial closure activity is applying for and obtaining an IEPA construction permit and the final closure step is submitting a closure report and closure certification with the closure construction activities occurring in between. Once the closure construction is complete, an acceptance report will be submitted to IEPA. An estimated schedule of anticipated closure activities is summarized in the table below:

Closure Schedule

Activity No.	Closure Activity	Schedule
1	Complete Closure Construction Documents and Obtain IEPA Closure Construction Permit	15 Months
2	Site Clearing & Install of Erosion Control Measures	2 Months
3	North Portion CCR Removal	15 Months
4	South Portion Grading and Compacting of CCR	3 Months
5	Installation of the Final Cover System & Permanent Stabilization	3 Months
6	Closure Certification and Report	4 Months

7.0 INITIATION AND COMPLETION OF CLOSURE ACTIVITIES [845.730 & 845.760]

Closure activities will commence when one or more of the following conditions have occurred:

- No later than 30 days after the date on which the CCR unit received the known final receipt of CCR or non-CCR waste;
- No later than 30 days after the removal of the known final volume of CCR for the purpose of beneficial use;
- Within two years of the last receipt of waste for a unit that has not received CCR or non-CCR waste; or
- Within two years of the last removal of CCR material for the purposes of beneficial use.

Upon completion of the IEPA approved closure activities, a closure report and closure certification will be submitted to IEPA in accordance with 845.760(e). The closure report will contain the following information:

1) Engineering and hydrogeology reports, including monitoring well completion reports and boring logs, all CQA reports, certifications, and designations of CQA officers-in-absentia required by 845.290;

2) Photographs, including time, date and location information of the photographs, of the final cover system, if applicable, and any other photographs relied upon to document construction activities;

3) A written summary of closure requirements and completed activities as stated in the closure plan and in Part 845; and

4) Any other information relied upon by the qualified professional engineer in making the closure certification.

In accordance with 845.760(f), notification of closure of a CCR unit will be made within 30 days of IEPA's approval of the submitted closure report and closure certification. The notification will include certification from a qualified professional engineer, as required by 845.760(e)(2) and will be placed in the facility's operating record.

8.0 CLOSURE PLAN AMENDMENTS [845.720(a)(3) & 845.720(b)(4)]

This Closure Plan may be amended in accordance with 845.720(a)(3) if a change in the operation of the FAB would substantially affect the content of this Closure Plan or if unanticipated events necessitate revision of the plan. If a change in operation requires amendment to the Closure Plan, the plan will be amended no later than 60 days prior to the change in operation being implemented. If an unexpected event occurs that requires amendment of the Closure Plan, the plan will be amended within 60 days of the unexpected event or within 30 days of the unexpected event if the event occurs after closure activities have commenced. Amendments to this Closure Plan will be certified by a professional engineer registered in the State of Illinois in accordance with 845.720(a)(4).

If this final Closure Plan requires revisions after closure activities have started for the FAB, then Midwest Generation will submit a request to modify the construction permit within 60 days following the triggering event.

9.0 PROFESSIONAL ENGINEER'S CERTIFICATION [845.720(a)(4)]

This Closure Plan for the FAB has been prepared to meet the requirements of 845.720(b).

Joshua D. Davenport, P.E.
Illinois Professional Engineer

SEAL

JOSHUA D. DAVENPORT
062-061945
LICENSED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

Attachment 7-2 – Closure Alternatives Analysis

KPRG

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

CCR COMPLIANCE
FINAL CLOSURE ALTERNATIVES ANALYSIS REPORT
POWERTON FORMER ASH BASIN

Midwest Generation, LLC
Powerton Generating Station
13082 East Manito Road
Pekin, Illinois

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October 26, 2022

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ATTACHMENTS

1.0 INTRODUCTION

Midwest Generation, LLC (Midwest Generation) currently operates the coal-fired generating station, referred to as Powerton Generating Station, located in Pekin, Illinois ("site" or "generating station"). As part of generating electricity and managing the coal combustion residuals (CCR), the station operates two active CCR surface impoundments (the Ash Surge Basin (ASB) and Ash Bypass Basin (ABB.)). As part of the earlier historical operations at the station, the Former Ash Basin (FAB) was used for the management/storage of CCR up until approximately the 1970's and has been identified as an inactive CCR surface impoundment with no liquids or wastewater being directed into the basin. See Figure 1 for a site map of the Powerton Station as well as the FAB. The FAB is regulated as an inactive surface impoundment under the newly promulgated Ill. Adm. Code Title 35, Part 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (State CCR Rule).

In accordance with 35 Illinois Administrative Code Part 845.710(b), a Facility (Owner/Operator) is required to initiate and complete a closure alternatives analysis prior to selecting a final closure method.

This Closure Alternative Analysis is structured to provide the following information:

- The proposed closure alternatives that will be analyzed,
- An analysis of the closure alternatives that meets the requirements set forth in Section 845.710(b)(1) through 845.710(b)(4),
- The results of groundwater contaminant modeling including how the modeled closure alternative will comply with the applicable groundwater protection standards, and
- A description of the fate and transport of contaminants associated with each closure alternative over time, including seasonal variations.

This document presents the results of the closure alternatives analysis for the FAB that was completed in accordance with 845.710.

2.0 PHYSICAL SITE CONDITIONS

Due to the age of the FAB, there is no documentation of when it was constructed, the methods used to create it, or the specifications on how it may have been created. The FAB was formally used as a CCR storage area and constructed with fill embankments on the north, east, and west sides; the south side is incised. The ground surface around the FAB ranges from 455 ft above mean sea level (amsl) to 460 ft amsl. An access road is along the perimeter of the FAB in order to access the monitoring wells along the north side of the FAB and the access the other areas of the properties and monitoring wells around the south portion of the FAB. The north and south portions of the FAB were created by the construction of a railroad spur in 2010.

The surface area of the north portion of the FAB is approximately 18 acres. The interior of the north portion of the FAB slopes from the surrounding land to the base of this portion. The side slopes for the north portion are about 2H:1V to an elevation of 445 ft amsl, from which, there is a more gradual slope across the base. The majority of the base of the north portion of the FAB ranges from 444 ft amsl to 441 ft amsl with some low points throughout; the low point of the north portion is approximately 433 ft amsl. The exterior side slopes of the north portion slope gently towards the north and blend into the north low lands. The exterior slopes of the east side of the north FAB slope steeply towards Lost Creek at about 1H:1V. The south embankment of the north portion of the FAB that is adjacent to the railroad spur slopes at about 2.5H:1V.

The surface area of the south portion of the FAB is approximately 13 acres. The interior of the south portion of the FAB slopes from the surrounding land to the base of this portion. The side slopes for the south portion are about 4H:1V to an elevation of 450 ft amsl on the west side, with a lesser slope on the south and east sides. The north side that is adjacent to the railroad spur sloes at about 2.5H:1V. The base slopes gradually away from the base of the embankments, which is elevation 450 ft amsl, to the south portion's low point of 432 ft amsl. The west side of the FAB is adjacent to the Service Water Basin and the Ash Surge Basin, which creates a level surface on this side. The exterior side slopes of the east side slope gently towards Lost Creek at about 6H:1V. The exterior to the south consists of the access road and other necessary equipment.

2.1 Summary of Geology and Hydrogeology

2.1.1 Geology

The physiography of Tazewell County is made up of end moraines, plains (including flood plains), river terraces and valleys, alluvial fans and loess. The Illinois and Mackinaw River Valleys are the prominent landforms. Several small lakes are located near the western border of the county, which is bound by the Illinois River. Tazewell County is in the Till Plaines Section of the Central Lowland Province. Near surface soils in the vicinity of the subject impoundment have been grouped as Orthents, loamy and Urban Land. Urban Land units are primarily covered by pavement, railroad tracks, and buildings, which typically impede infiltration and are subject to surface runoff. The Orthents, loamy soils are fine to moderately coarse textured soils found in areas that have been modified by filling and leveling. Available water capacity is generally high, while permeability is typically high at the surface level and decreases with depth. Organic matter and plant nutrient content is low in the Orthents, loamy soils (Soil Survey of Tazewell County, Illinois).

Regionally, the stratigraphy in the area consists of approximately 100 to 125 feet of unconsolidated deposits consisting mainly of alluvial sands and gravels with some interspersed clays/silty clays. The unconsolidated deposits are underlain by alternating layers of limestone, shale, and coal of the Carbondale Formation. To evaluate local stratigraphy, water and test well logs were obtained for wells in the general vicinity of the Powerton Generating Station. In addition, well logs from 21 monitoring wells that were installed in the vicinity of the subject surface impoundments were evaluated with those borings ranging in depth from 30 feet to 41 feet. Based on an evaluation of this data, the following general site-specific stratigraphy is defined:

- Fill (16’ to 24.5’ thick) – Consisting of tan, brown and black fine to medium sand/silty sand with some gravel and clay seams. Several locations also included black cinders and brick fragments.

- Clay/silty clay/silts (0’ to approximately 18’ thick) – Consisting of olive, brown and gray clays, silts and silty clays with some more organic rich layers. May locally contain fine silty sand and/or fine sand. This unit is not mappable across the site (i.e., discontinuous).

- Sand and gravel (thickness undetermined; borings terminate within unit) – Consisting of light brown, brown and/or gray medium to coarse sands and gravels.

Although no specific borings were extended into the sedimentary bedrock beneath this facility, water well logs obtained for water wells in the vicinity of the Powerton Generating Station indicate shale bedrock is encountered from approximately 35 to 140 feet bgs, depending on the location of the specific well. The boring logs indicate limestone was encountered from approximately 99 to 103 feet below ground surface just northeast of the Powerton Generating Station and in close proximity to the Illinois River.

There are no underground mines beneath the subject CCR surface impoundment.

2.1.2 Hydrogeology

Based on information from the Soil Survey of Tazewell County, the average annual precipitation is approximately 36 inches with about 62% of that total falling between April and September of any given year. The average seasonal snowfall is approximately just over 26 inches. The nearest natural surface water body is the Lost Creek which bends around the eastern edge of the FAB and property boundary. Lost Creek is an ephemeral stream that only flows during and after precipitation events. The Illinois River is located to the north of the subject CCR units. Powerton Lake is located to the west-northwest.

Groundwater beneath the Powerton Generating Station occurs under water table conditions. Saturated conditions are generally encountered between 18 to 32 feet bgs, depending on the well location. The monitoring wells at the station are used to monitor the three basins, Ash Surge Basin, Ash Bypass Basin, and the FAB, present at the Powerton Station. The FAB monitoring well network consists of upgradient monitoring wells MW-01 and MW-10, and downgradient monitoring wells MW-02, MW-03, MW-04, and MW-05. The Ash Bypass Basin/Ash Surge Basin CCR monitoring well network consists of upgradient monitoring wells MW-01, MW-09, and MW-

19, and downgradient monitoring wells MW-08, MW-11, MW-12, MW-15, MW-17, and MW-18.

CCR monitoring wells MW-08, MW-12, MW-15 and MW-17 are screened within the shallow, localized, saturated clay/silt unit. The remaining monitoring wells have deeper screens, within the more extensive sand and gravel unit. All the wells associated with the FAB monitoring network are screened within the extensive sand unit which underlies the area (i.e., the localized shallow clay/silty clay unit does not extend beneath the FAB). Table 1 provides groundwater elevation measurements obtained for the on-site monitoring wells surrounding the FAB (upgradient wells MW-01 and MW-10 and downgradient wells MW-02 thru MW-05). A review of the hydrograph shows some temporal fluctuations with the highest water levels generally occurring within the first or second quarters of the year.

Groundwater elevation data from all wells in the area, including the specific CCR monitoring wells associated with the subject FAB has been collected. The water levels from wells screened in the clay/silt unit and the water levels from monitoring wells screened within the sand unit were evaluated separately and used to determine the flow for each unit. Groundwater flow within the more extensive sand unit, which extends under the FAB, shows general flow in a northerly direction with flow components to the northwest and northeast towards the Illinois River. The groundwater elevation ranges from 442 ft amsl at the south end of the FAB to 438 ft amsl along the north side of the FAB. The groundwater elevations for the FAB monitoring wells are shown in Table 1. The groundwater flows north and discharges into the Illinois River.

The FAB is located within the sandy gravel soil unit. The horizontal hydraulic gradient, flow direction, and an estimated rate of groundwater flow was determined for each groundwater sampling event from 3rd quarter 2015 through 2nd quarter 2021. The average hydraulic gradient over this time is 0.0045 ft/ft with a minimum of 0.0008 ft/ft and a maximum of 0.0147 ft/ft. The average estimated seepage velocity is 1.56 ft/day with a minimum of 0.2745 ft/day and a maximum of 5.97 ft/day. The groundwater flow direction was consistently determined to be north/northwest over this time.

At this time, based on the geology and the site-specific hydrogeology discussions, the groundwater beneath the CCR surface impoundments is considered as Class I Potable Resource Groundwater in accordance with Section 620.210. It is noted, however, that a Groundwater Management Zone (GMZ) and an Environmental Land Use Control ("ELUC") have been established where the CCR surface impoundments are located as part of a Compliance Commitment Agreement (CCA) between Midwest Generation and Illinois EPA. The ELUC states that the groundwater shall not be used as potable water. The GMZ and ELUC occupy the same extent of the Powerton property.

A survey of all potable water sources within a 2,500 feet radius of the Midwest Generation Powerton Generating Station was completed by Natural Resources Technology (NRT) in 2009. As part of the initial operating permit preparation, KPRG evaluated the previously completed water well survey by NRT and reviewed the new Illinois State Geological Survey database and interactive map references as "ILWATER". Twelve wells were identified within a 2,500-foot radius of the Station's subject CCR surface impoundments, which includes the FAB. Two wells were identified off-site to the east and upgradient of the FAB. There were eight wells identified on the Powerton Station property on the ILWATER interactive map all of which were older construction wells installed by previous Ownership. Discussions with facility personnel indicate that all eight of these wells were taken out of service/abandoned. Two wells are at the far western boundary of the 2,500 foot radius and are part of the six water wells currently on the Powerton Station property that are in use (the remaining four wells are located further west, outside the 2,500 foot search radius). These two wells are screened within the sand/gravel aquifer but are not directly downgradient of the surface impoundments and are separated from those units by the intake and outfall channels. They are regularly sampled and analyzed for potable water constituents. The sampling results consistently comply with potable water regulations.

Based on the geology of the site presented in Section 2.1.1 and the above hydrogeology discussions, the primary contaminant migration pathway for a potential release from the subject CCR surface impoundments would be downward migration to groundwater within the unconsolidated silty clay or sand/gravel aquifer. Due to the proximity to the Illinois River and/or plant intake channel, which are hydrogeologic flow boundaries, minimal to no downward vertical flow mixing would be anticipated. There are no other utility or man-made preferential pathway corridors that would act to intercept potentially the flow to move any contamination in a direction other than under natural groundwater flow conditions. There are no potable water wells between the impoundments and anticipated flow discharge boundaries. In addition, as previously discussed, there are no potable surface water intakes on the Illinois River either along or within at least several miles downstream of the subject site.

The FAB is subject to the federal CCR Rule, 40 CFR Part 257, and the Illinois CCR Rule, 35 Ill. Adm. Code Part 845. As required under the Federal CCR Rule and the Illinois CCR Rule, groundwater sampling has been occurring for the monitoring wells within the monitoring network for the FAB. This data is provided in Table 2 for the FAB.

3.0 IDENTIFICATION OF CLOSURE ALTERNATIVES

The FAB is considered an inactive CCR surface impoundment subject to the State CCR Rule 35 Ill. Adm. Code Part 845. In accordance with Section 845.700(b), the FAB has been determined to be an unlined CCR surface impoundment and is required to close. Closure of the FAB must be completed either by leaving the CCR in place and installing a final cover system or through removal of the CCR and decontamination of the CCR surface impoundment, as described in Sections 845.720 through 845.760. Prior to selecting a closure method, a closure alternatives analysis must be completed in accordance with the requirements of 845.710.

The closure alternatives evaluated in accordance with Sections 845.710(b) through 845.710(d) are as follows:

- Alternative Closure Scenario 1: Complete removal of CCR including alternative modes of transporting the CCR in accordance with Sections 845.710(c) and 845.740.
- Alternative Closure Scenario 2: Leave CCR in both the north and south portions of FAB and install a final cover system.
- Alternative Closure Scenario 3: Consolidate the CCR in the southern portion of the FAB and install a final cover system.
- Alternative Closure Scenario 4: Leave the CCR in place via in-situ soil stabilization and install a final cover system.

Geosyntec and Patrick Engineering both created alternatives for closing the FAB. Geosyntec's alternative consisted of consolidating the CCR from the north portion with the CCR in the south portion and capping the consolidated CCR with a final cover system. Patrick Engineering's alternative was to construct two different final cover systems over the CCR with one on the north portion CCR and the other on the south portion CCR. Those two alternatives are included as part of this evaluation with Geosyntec's alternative included as Alternative Closure Scenario 3 and Patrick Engineering's alternative included as Alternative Closure Scenario 2. The Geosyntec and Patrick Engineering alternatives were adjusted as necessary from their original designs to comply with 35 Ill. Adm. Code Part 845, since these closure alternatives were created prior to the state laws' enactment.

A brief description of each closure alternative is presented below.

3.1 Alternative Closure Scenario 1: Closure by Removal

The FAB was historically used for CCR disposal up until the 1970's. At that time, the FAB was one large area of approximately 40 acres (1,698,096 square feet) that was used to contain CCR. In 2010, a railroad was constructed through the FAB to allow railroad cars to enter onto the Powerton property. Soil borings conducted at the site have determined the horizontal and vertical extent of the deposited CCR material in both the north portion and south portion of the FAB. In general, the CCR in the north portion ranges from the ground surface (443 ft amsl to 434 ft amsl) to 18 feet below ground surface (bgs) to 9 feet bgs (425 ft amsl). The CCR in the south portion ranges from the ground surface (447 ft amsl to 432 ft amsl) to 18 feet bgs to 3 feet bgs (429 ft amsl).

As stated in 845.740(a), closure by removal consists of removing all CCR and decontaminating all areas affected by releases of CCR from the CCR surface impoundment. CCR removal and decontamination of the CCR surface impoundment are complete when all CCR and CCR residues, containment system components such as the impoundment liner and contaminated subsoils, and CCR impoundment structures and ancillary equipment have been removed. To execute closure by removal of the FAB, the following activities would occur:

- Dewater any standing water in the north and south portions of the FAB along with dewatering during excavation;
- Install erosion control measures, prior to earthwork;
- Construct access roads into the FAB to allow for equipment access to the extent of the CCR for excavating and loading;
- Excavate and stage CCR to allow for additional dewatering;
- Load the CCR into haul trucks and transport for off-site disposal.

The estimated quantity of CCR material that would require excavation from the north portion of the FAB is 466,000 CY and the south portion is 241,000 CY; which is the bank/in-place quantity based upon the existing site elevations and the estimated depth of the CCR material using the boring logs performed along the perimeter of the FAB. The extent of the removal areas and post-excavation contours are shown on Figure 1. As the bank/in-place material is removed, it may be stockpiled and staged as necessary to allow for any additional dewatering from the CCR prior to it being loaded and transported offsite. As the CCR is excavated, it is expected to swell by approximately 30%, which creates a handling and transportation volume of 606,000 CY from the north portion and 314,000 CY from the south portion. The slopes of the north and south portions of the FAB will be sloped at approximately 2H:1V post excavation.

As part of this scenario, continuous dewatering will be necessary to remove material down to the lowest elevation. Dewatering would be necessary for an estimated 600 days, or up to 3 years based on 240 working days per year. A more detailed discussion of this closure alternative relative to established evaluation criteria is provided in Section 4.0. Detailed cost estimates in accordance with Section 845.710(d)(1) are provided in Table 4. The cost for closure by removal uses Indian Creek Landfill as the disposal facility; however, no discussions for disposal at Indian Creek Landfill have occurred at this time.

As part of closure by removal as required by 845.740(b), groundwater monitoring must continue for three (3) years or for three years after groundwater monitoring does not show an exceedance of the groundwater protection standard established under 845.600, whichever is longer. A discussion of this closure alternative option relative to established evaluation criteria is provided in Section 4.0.

3.1.1 Availability of Nearby Landfill Space

As stated above, closure by removal and disposal at an existing off-site landfill will require dewatering, excavation, loading, transportation, and disposal of an estimated combined 920,000 CY of CCR from the north (606,000 CY) and south (314,000 CY) portions of the FAB. There are three landfills within 64 miles of the Powerton station, 1) Indian Creek Landfill No. 2, 2) Peoria City/County Landfill No. 2, and 3) Envirofil of Illinois, Inc.

Indian Creek Landfill No. 2 is approximately 20 miles from the station and the closest of the three identified landfills. Peoria City/County Landfill No. 2 is approximately 25 miles and the second closest landfill and Envirofil of Illinois, Inc. is approximately 64 miles from the station and the farthest of the three landfills. In regards to the closure by removal scenario and off-site disposal of CCR, the available landfill capacity based on IEPA's 2020 Landfill Capacity Report at each facility is as follows:

- Indian Creek Landfill No. 2 – 35,912,756 CY with 31.8 years of life expectancy based on the current disposal rate.
- Peoria City/County Landfill No. 2 – 2,900,562 CY with 3.6 years of life expectancy based on the current disposal rate.
- Envirofil of Illinois, Inc. – 17,078,304 CY with 94.3 years of life expectancy based on the current disposal rate.

GFL Environmental, Inc. operates Indian Creek Landfill No. 2 that accepts municipal waste and non-hazardous special industrial waste. As noted above the amount of material that would require disposal is 920,000 CY and the capacity of the landfill is greater than 35 million CY, which is enough to contain the amount of CCR requiring disposal. Access to this landfill would require truck traffic on county/state highways and local township roads. KPRG reached out to the landfill to request their potential acceptance of the CCR material. The landfill stated that it likely would not accept any CCR material, because of concerns over the interaction of the CCR with the municipal solid waste in the landfill.

The Peoria City/County Landfill No. 2 is jointly owned by the County and City of Peoria. The landfill is operated by Waste Management. This landfill is used for the disposal of municipal solid waste from County and City residents. Only 2.9 million CY of disposal capacity is available and this landfill is used for waste disposal by the City and the County. Therefore, this landfill is not a practical option for disposal of any CCR from the FAB.

Waste Management operates the Envirofil of Illinois, Inc. landfill. This landfill has a 5-year average disposal rate of 181,020 CY and accepted 174,717 CY in 2020. The amount of CCR from the FAB is 920,000 CY, which is five (5) times the 2020 disposal rate. The projected time to remove all of the CCR from the FAB is approximately 300 to 600 days, which is approximately 1.5 to 3 years based on 200 working days per year and a yearly disposal rate of 306,667 CY to 613,333 CY. It is unlikely this landfill will accept only waste from the FAB for up to three years, which will extend the time required for disposal. In addition, this landfill is 64 miles from the Powerton station, which creates a long turn-around time for each truck and decreases the loads per day that can be disposed of. It should be noted that the Envirofil of Illinois, Inc. landfill is less than one mile from an environmental justice area. This landfill is not a practical option for disposal of CCR from the FAB.

3.1.2 Modes of Transport

As required by 845.710(c)(1), this closure by removal analysis includes evaluating whether the CCR can be transported from the site for disposal by rail, barge, low-polluting trucks, or some combination of these transportation modes. These are discussed below.

3.1.2.1 Rail Transport

The site currently has railroad access that is used to deliver coal to the station for use in the electricity generating process. The site coal delivery system is only designed to unload coal from the rail cars and store on site, but not designed to load the rail cars. In order to load rail cars a new permanent system would have to be designed and constructed or existing commercially available equipment would need to be evaluated to determine if a temporary loading system could be erected. In the event a temporary loading system could be erected, the closest landfill to the site is the Indian Creek Landfill and its location was evaluated in relation to the railroad system and the Powerton station. The location of the railroad that travels from the vicinity of the Powerton station does not go towards the Indian Creek Landfill, instead it travels southeast towards Green Valley and Delavan, which are the closest locations to the landfill, but they are still at least 10.5 miles and eight (8) miles, from the landfill, respectively. The ability to unload a railroad car at either of these locations is unknown, but in the event the CCR could be unloaded, it would still need to be loaded onto dump trucks to be taken to the CCR to the landfill. Transporting the CCR by rail is not a viable option because of the logistics necessary to use the rail system to load, unload, and transport the CCR.

3.1.2.2 Barge Transport

The Powerton station is close to the Illinois River, but no slip or loading point for a barge exists. A loading point could be constructed, but a structural evaluation of the bank would first be required. The landfills that are nearest to the Powerton station are not located near any major rivers that would be able to accommodate barge traffic. The Indian Creek Landfill is located near the Mackinaw River, but based on the mapped appearance of the river, it seems unlikely a barge would be able to traverse the river. In addition, the river does not enter the landfill complex and the CCR material would still need to be off loaded from the barge and loaded onto a truck for final disposal in the landfill. It is likely that loading and unloading facilities would need to be constructed at both ends of the barge trip. Not only will this require time for permitting, but also access agreements would be needed with landowners that may be unwilling to agree. Finding a location with the facilities needed to unload the CCR may require transporting it many miles downstream or upstream, which increases the chance an accident may occur. Based on these factors, transporting the CCR via barge is not a viable transportation option.

3.1.2.3 New On-Site Landfill

As required by 845.710(c)(2), this closure by removal analysis includes identifying whether an on-site landfill is present on the property or if an on-site landfill could be constructed. The Powerton station property does not have an existing onsite landfill or the existing available land to construct a new on-site landfill. The Powerton property consists of approximately 2,048 acres. The majority of the Powerton station property is occupied by Powerton Cooling Lake and the remainder of the property is occupied by the buildings that house the electricity generating equipment, coal storage area, CCR surface impoundments, non-CCR surface impoundments, FAB, low lands, and green space. Powerton Cooling Lake consists of 1,583 acres; the area occupied by the electrical substation, surface impoundments, parking lot, generating building, and ancillary areas associated with the electricity generating process is 214.4 acres; the coal storage area is 61.5 acres; the surface impoundments occupy 27.3 acres; the FAB is 23 acres; the southwest green space is 58.8 acres; and the northern low lands area is 80 acres.

The area necessary to construct a landfill to contain the 707,000 CY from the FAB is approximately 30 acres if the CCR was placed to a thickness of 20 feet. The majority of the CCR would have to be placed above ground because the groundwater elevation in the area is approximately 20 to 25 feet bgs and minimal excavation can occur to place CCR below the ground surface. As a result, berms must be constructed as a perimeter to contain the CCR. The 30 acres is only the space required for CCR storage, additional land would be needed for property line setbacks, the leachate collection equipment, access roads, groundwater monitoring network, and other necessary equipment. Because of the groundwater elevation, any landfill would be constructed with a base only ten feet bgs, which means any remaining portion of the landfill, would extend above ground up to 14 feet to allow for the necessary space for the CCR and the final cover construction. The only areas at the Powerton station where a landfill could be constructed are the green space to the southwest and the low land areas to the north. The southwest area is not acceptable for a landfill because this is where the water supply wells for the station are located and the entire area is within the floodplain. The low land area to the north is adjacent to the Illinois River, classified as a wetland, and within the floodplain. The only areas at the station that are not within the floodplain are already occupied by an electrical substation, surface impoundments, parking lot, generating building, and ancillary equipment associated with electricity generating process.

Since there is not adequate space within the current Powerton Station footprint to build a new on-site landfill, adjacent parcels that could potentially be purchased were also evaluated. Two properties to the south appear to be farmland or vacant land based on aerial photography. These properties are south and southeast of E. Manito Road and are not owned by Midwest Generation. The property to the south is approximately 111 acres and the property to the southeast is approximately 79 acres. As stated previously, the area necessary to construct a landfill to contain the 707,000 CY from the FAB is approximately 22 acres if the CCR was placed to a thickness of 20 feet. The 22 acres is only the space required for CCR storage, additional land would be needed for the leachate collection equipment, access roads, and other necessary equipment. These properties appear to be adequate based on the total property size; however, it is unlikely they are viable options to construct a landfill. First, the sale of these properties is not certain. Second, the construction of a new landfill includes the sitting process, which requires local approval and local approval is not guaranteed. The property to the south is still actively farmed and it is not certain the owner would want to forgo the yearly income of farming for the one-time sale of the land for the construction of a landfill.

These properties to the south have water wells located on them. The property directly to the south has two water wells that limit the available space of the property because of the setback requirements when locating a new landfill. The property to the

3.2 Alternative Closure Scenario 2: Closure in Place

The closure in place scenario would consist of leaving the existing CCR in place and constructing a final cover system (FCS) over both the north and the south portions of the FAB in accordance with 845.750. This alternative was previously evaluated as a closure alternative in 2019 and has been reviewed and modified to comply with 35 Ill. Adm. Code Part 845. The final cover system would consist of a geomembrane low permeability layer, which is topped with an alternative final protective layer that provides equivalent performance to a soil final protective layer. The FCS would be sloped to allow for precipitation to runoff and drain off the FCS. The north FAB FCS would drain into the low lands to the north and the south FAB FCS would drain to the east and Lost Creek. The approximate FCS grades and contours for the north and south portions of the FAB are shown on Figure 2.

The FCS product that would be used is the proprietary ClosureTurf cover system created by Watershed Geo. The ClosureTurf FCS consists of a geomembrane low permeability layer that also incorporates a drainage layer. The final protective layer is replaced with engineered synthetic turf that is infilled with sand/small aggregate to provide ballast to the synthetic turf. The infiltration layer will be a 60-mil HDPE geomembrane with a hydraulic conductivity that is no greater than $1x10^{-7}$ cm/sec. The engineered synthetic turf is comprised of polyethylene fibers that are tufted through a double layer of woven geotextiles that are highly UV and heat resistant. The engineered synthetic turf is then infilled with small aggregate that is approximately 1/8 inch to 1/4 inch diameter in size. The small aggregate is brushed into the synthetic turf to ensure that it settles to the bottom of the turf, which provides ballast and prevents the turf's movement during wind events.

The FCS on the north portion of the FAB would be sloped from the existing perimeter embankment to a low point near the center to allow for drainage and collection of precipitation. Precipitation would then drain from the near center low point towards a drainage structure and from the drainage structure to the former inlet channel, west of the FAB. Trapezoidal shaped drainage channels on the surface of the FCS would be used to channel precipitation to the drainage structure. The drainage channels would be shaped as part of the grading process to create the necessary FCS contours and elevations. The embankment elevations range from 455 ft amsl to 457 ft amsl and will slope to a center elevation of approximately 442 ft amsl, at which point the FCS slopes towards the drainage structure. The drainage structure would drain the precipitation from the FCS through an underground pipe that discharges into the former intake channel. Approximately 70,000 CY of additional fill material is needed over the existing CCR to achieve the desired elevations.

The FCS on the south portion of the FAB would be sloped from the existing perimeter embankment to a low point near the northwest corner of the FCS to allow for drainage of precipitation. From the northwest corner, precipitation would drain through a pipe under the existing railroad track and into the drainage structure in the north portion of the FAB. The south FAB FCS will also have trapezoidal shaped channels, like the north FAB FCS, on the surface that will allow precipitation to drain from the FCS. The drainage channels would be shaped as part of the grading process to create the necessary FCS contours and elevations. The south FAB embankment elevations range from 458 ft amsl on the west half to 452 ft amsl on the east half of the south FAB portion. The FCS on the south portion of the FAB will drain from the embankments towards a northwest corner elevation of approximately 440 ft amsl. Approximately 44,000 CY of additional fill material is needed over the existing CCR to achieve the desired elevations.

Each portion of the FAB will be dewatered to allow for the upper portion of the CCR to dry out so the fill material can be placed on top. As the fill material is placed, it will be graded as needed and compacted to prevent future settling. The soils used in the FCS will consist of clean material sourced from as close to the FAB as possible. Because of the quantity needed, multiple soil sources may be required. Once the desired grades have been achieved in each portion of the FAB, the ClosureTurf FCS would then be placed on top of the sloped surface with the geomembrane being attached to the discharge structure, the synthetic turf placed on top of the geomembrane, and the turf infilled with sand/small aggregate.

The promulgated Illinois State CCR Rule, 35 Ill. Adm. Code Part 845, requires that CCR surface impoundments not be located within a floodplain, which is different from the previously promulgated Federal CCR Rule, 40 CFR Part 257, which did not regulate the presence of CCR surface impoundments in floodplains. The existing FAB is present within the 100-year floodplain, which has an elevation of approximately 457 ft amsl. To prevent future ponding that may occur if a flood condition occurs at the FAB, the construction of an embankment adjacent to the north perimeter of the FAB is included in this closure scenario. The embankment will extend from the existing north FAB embankment up to an elevation of 460 ft amsl and then slope at 3H:1V down to the existing ground surface. The construction of this embankment will require 49,000 CY of clean fill material.

A discussion of this closure alternative option relative to established evaluation criteria is provided in Section 4.0.

3.3 Alternative Closure Scenario 3: Consolidation with Closure in Place

Scenario 3 consists of removing the CCR from the north portion of the FAB and placing in the south portion and constructing a final cover system. This alternative was previously evaluated as a FAB closure alternative in 2016, which has been reviewed and modified as needed based on Part 845. The CCR from the north portion of the FAB would be either hydraulically dredged into the south portion of the FAB or mechanically excavated and dumped into the south portion of the FAB. The dredged CCR would be contained, allowing for the CCR to settle and the water to drain into the excavated north portion of the FAB. Dumped CCR material would be stockpiled and allowed to drain as necessary. Once the CCR material placed in the south portion of the FAB is sufficiently dried, it will be graded to achieve the desired elevations needed for the FCS. The embankment that surrounds the north portion of the FAB would also be excavated and placed in the south portion of the FAB. The FCS would then be constructed on top of all the consolidated CCR. The south FAB FCS would be crowned in the middle, sloping toward perimeter drainage channels. The perimeter drainage channels would drain towards the railroad berm, which would contain two storm pipes that traverse through the railroad berm and drain precipitation into the excavated former north portion of the FAB.

The FCS product that would be used is the proprietary ClosureTurf cover system created by Watershed Geo. The ClosureTurf FCS consists of a geomembrane low permeability layer that also incorporates a drainage layer. The final protective layer is replaced with engineered synthetic turf that is infilled with sand/small aggregate to provide ballast to the synthetic turf. The infiltration layer will be a 60-mil HDPE geomembrane with a hydraulic conductivity that is no greater than $1x10^{-7}$ cm/sec. The engineered synthetic turf is comprised of polyethylene fibers that are tufted through a double layer of woven geotextiles that are highly UV and heat resistant. The engineered synthetic turf is then infilled with small aggregate that is approximately 1/8 inch to 1/4 inch diameter in size. The small aggregate is brushed into the synthetic turf to ensure that it settles to the bottom of the turf, which provides ballast and prevents the turf's movement during wind events.

Two collection points would be located along the northwestern and northeastern perimeter of the FCS to transport runoff off the cover. The collection points would each drain water through a pipe that traverses trough the existing railroad berm and discharges into the north portion of the FAB. The pipes would discharge onto riprap to prevent erosion of the embankment slopes.

A discussion of this closure alternative option relative to established evaluation criteria is provided in Section 4.0.

3.4 <u>Alternative Closure Scenario 4: Closure in place with In-Situ Solidification/Stabilization</u>

The in-situ solidification/stabilization (ISS) treatment of the CCR in the north portion of the FAB would be completed over an approximate 763,000 square feet area and in the south portion of the FAB would be completed over an approximate 653,700 square feet area. This alternative would include the ISS of approximately 556,000 CY of CCR in the north portion and approximately 241,000 CY of CCR in the south portion. The ISS would be applied by soil mixing from the top of the CCR to the bottom most extent of the CCR as identified by site boring logs. The ISS treatment range in the north portion extends from elevation 440 ft amsl to elevation 424 ft amsl, which consists of a treatment thickness range of 16 feet. The ISS treatment range in the south portion extends from elevation 440 ft amsl to elevation 428 ft amsl, which consists of a treatment thickness range of 12 feet. In areas where CCR is below a layer of clean overburden, excavation may be performed to allow ISS to be performed only at the targeted CCR layer. For purposes of this closure alternatives analysis, it is assumed the ISS will be implemented through auger mixing; however, bucket mixing may be used in some areas based on unknown site conditions.

ISS treatment consists of adding reagents to physically bind/solidify and/or chemically react/stabilize the CCR, resulting in a solidified or stabilized mass with reduced constituent mobility and leachability. The ISS will isolate the CCR from human contact and from groundwater by encapsulating in a low permeable monolith. Active reagents used in ISS can include pozzolanic compounds such as cement or blast furnace slag to produce a solidified material, reducing contact with groundwater and surface water. Other additives such as bentonite may be included to help lower permeability especially in sandy formations in which the FAB is located. The reagents and additives are typically mixed with water to create a flowable and pumpable slurry that is then mixed with the CCR. The effectiveness and reagent mix for solidification/stabilization would need to be evaluated in a treatability study. Samples would be collected from the CCR in the north and south portions of the FAB and bench top testing would be performed to determine the proper mix design. It may be necessary to use multiple mix designs to treat the ISS based on site factors.

Performing ISS will result in expansion of the treated CCR. This expansion is typically 10% to 25% of the original treatment volume. Depending on the soil type, the expansion can range from 10% for sandy materials to 25% or more for clayey materials. Once such application of ISS to treat sandy silty fill material resulted in ISS swell of up to 40%. Testing during the ISS treatability study and the ISS pilot test will provide an estimate of the ISS swell expected from the CCR. For this closure alternative analysis, the swell volume estimate will be 30% to present a conservative estimate of the cost and volume of ISS.

The completed ISS treatment area would be covered with clean soil and seeded. The extent of the treatment area requiring additional clean soil is 1,434,200 square feet and requires approximately 95,000 CY to achieve the necessary grades to prevent ponding water. The clean soil cover would be sloped to allow water to drain towards the perimeter of the ISS treatment area. Conceptually, the cover installation would consist of direct placement of clean fill with six inches of topsoil on the treated ISS area, feathered to match adjacent grades. The cover will be at least two feet thick including topsoil thickness. The FCS will be graded to ensure positive drainage and minimize ponding. For the purposes of this report, it is assumed the cover will be vegetated to reduce soil erosion, thereby minimizing release of soil to the Illinois River. Material used for the surface barrier will consist of material imported from non-contaminated sites and/or sources. It is assumed 10% more material will be required to allow for compaction of the fill and topsoil to achieve a total of a two-foot cover. Stockpiles of on-site materials may be used in the FCS cover.

4.0 CLOSURE ALTERNATIVES EVALUATION CRITERIA

The closure alternatives were evaluated based on requirements under State CCR Rule Part 845.710(b)(1) through 845.710(b)(4). The evaluation criteria consisted of the following:

- Long- and short-term effectiveness and protectiveness, including reliability;
- Effectiveness of controlling future releases;
- Ease or difficulty of implementation; and
- The degree to which concerns of the community residents are addressed.

Each closure alternative was evaluated using the above criteria and that evaluation is provided in Table 3. The following highlights are provided from that evaluation. Groundwater modeling was performed in accordance with 845.710(d)(2) and 845.710(d)(3) to assist in evaluating the long- and short-term effectiveness of each closure alternative. A discussion of the groundwater modeling and the results are presented in Section 5.

Alternative Closure Scenario 1: Closure by Removal

- Removing the CCR from the FAB would require excavating and hauling 920,000 CY, which would take about 920 days to execute based on 50 truckloads per day and 15 cubic yards per truck.

- Removing the CCR would remove any remaining amounts of the CCR mass. Groundwater monitoring has shown that impacts to groundwater are not present downgradient and any elevated constituents that have been detected in the groundwater are not from the FAB.

- Not removing the CCR would eliminate the volume of material disposed at a landfill, and reduce the number of trucks traveling to and from the station.

- Additionally, the truck traffic removing the CCR will negatively affect the neighboring properties, including air quality and noise pollution, since the entrance and egress for the trucking would be directly via E. Manito Road and not through any residential neighborhood.

- This option will require at least 3 years of post-closure monitoring.

Alternative Closure Scenario 2: Closure in Place

- ClosureTurf has successfully been used around the country to close CCR surface impoundments and landfills.

- The ClosureTurf final cover will require approximately 149,000 CY of clean fill material and more overall truck traffic to and from the site because the FAB has to be filled to achieve the necessary grades and elevations. It will require approximately 200 days to deliver clean fill to the site based on 50 truckloads per day and 15 CY per truck.

- The ClosureTurf and soil infill will cover the CCR, prevent infiltration into the CCR, and prevent any human or animal contact.

- The ClosureTurf option will require 30 years of post-closure monitoring.

- The existing CCR mass remaining will not cause groundwater impacts. Groundwater monitoring has shown that impacts to groundwater are not present downgradient and any elevated constituents that have been detected in the groundwater are not from the FAB.

Alternative Closure Scenario 3: Consolidation with Closure in Place

- ClosureTurf has successfully been used around the country to close CCR surface impoundments and landfills.

- The ClosureTurf final cover will require moving approximately 314,000 CY from the north FAB to the south FAB. Currently, the proposed method for moving the material is hydraulic dredging.

- In addition, 68,000 CY of clean fill material would be needed to achieve the necessary grades and elevations. It will require approximately 91 days to fill the FAB based on 50 truckloads per day and 15 CY per truck.

- The ClosureTurf and soil infill will cover the CCR, prevent infiltration into the CCR, and prevent any human or animal contact.

- The ClosureTurf option will require 30 years of post-closure monitoring.

- The existing CCR mass remaining will not cause groundwater impacts. Groundwater monitoring has shown that impacts to groundwater are not present downgradient and any elevated constituents that have been detected in the groundwater are not from the FAB.

Alternative Closure Scenario 4: Closure in place with In-Situ Solidification/Stabilization

- ISS is expected to contain and stabilize the CCR and is anticipated to be an adequate and reliable means of reducing the leaching potential of the CCR if it is exposed to groundwater and precipitation.

- Placement and maintenance of soil cover would provide adequate and reliable means of controlling erosion of and exposures to stabilized CCR.

- ISS and targeted excavation of mass material and installation of the cover would result in impacts to the community relative to truck traffic and noise during the construction. However, as materials requiring offsite disposal are minimized, this disturbance would be less than the first two alternatives.

- Approximately 707,000 in-place CY of CCR would be treated with ISS.

- The leaching potential of CCR would be irreversibly reduced through ISS. The mobility of CCR into surface water or via flooding (i.e., associated with erosion) would be further reduced by installation of the soil cover.

5.0 GROUNDWATER MODELING

This section discusses the results of the groundwater modeling and a description of the fate and transport of each closure alternative over time in accordance with 845.710(d)(2) and 845.710(d)(3). The modeling that was conducted is based on a theoretical distribution of dissolved contaminants beneath the FAB, assuming a mass, to demonstrate the impact of the alternative closure scenarios on the spread of contaminants.

To conduct the support modeling a theoretical unit mass with a concentration of "1" was established beneath the FAB and projected forward in time 100 years with advection and dispersion to establish an equilibrated distribution of contaminants in groundwater if the FAB were the mass. The equilibrated distribution (base case) of the mass was then used as the initial concentrations in the groundwater for model runs to simulate the closure alternatives to evaluate corresponding improvement in groundwater quality from the base case scenario. The modeling runs are provided on the slides included in Attachment 1.

5.1 Alternative Closure Scenario 1 Modeling

From this initial equilibrated model run, in Scenario 1, the mass was removed and the change in concentrations were modeled over 5-years, 25-years, 50-years, and 100-years. The modeling runs identified reductions in concentrations by 5 years and the mass had completely moved through the groundwater system by 25 years and beyond. These modeling runs are shown on Slides 6 and 7 located in Attachment 1. On each slide, the base case run is illustrated on the left side and the alternative closure scenario is illustrated on the right side. Since the results for the 25-years, 50-years, and 100-years modeling runs are the same, they are included on the same slide. Slide 7 illustrates the concentration decay over time at a hypothetical midpoint in the groundwater system between the FAB and the Illinois River.

5.2 Alternative Closure Scenario 2 Modeling

The modeling of Scenario 2 consisted of starting with the initial equilibrated model run, the mass remaining in the north and south portions of the FAB, and then removing the precipitation recharge into the mass by simulating the presence of a FCS on the north and the south. Reviewing Slide 9, which projects out 5-years, indicates that groundwater impacts near the Illinois River do not change from the initial equilibrated model run. The 25-years, 50-years, and 100-years projections on Slide 10 indicate no increases in groundwater concentrations at the river. It should be noted that the concentrations in the groundwater system reach steady state after 25 years, which is why the 25-years, 50-years, and 100-years modeling runs are combined on the same slide. Slide 11 illustrates the concentration decay over time at a hypothetical midpoint in the groundwater system between the FAB and the Illinois River.

5.3 Alternative Closure Scenario 3 Modeling

The modeling of Scenario 3 consisted of starting with the initial equilibrated model run, the mass consolidated and remaining in only the south portion of the FAB, and then removing the precipitation recharge into the mass by simulating the presence of a FCS on the south portion of the FAB. The precipitation recharge in the north portion of the FAB is occurs in this scenario because the formerly present in the north portion of the FAB has been removed. Reviewing Slide 13, which projects out 5-years, indicates that groundwater impacts near the Illinois River have reduced by approximately 10% (from a theoretical maximum concentration of 0.9 to a concentration of 0.8) and the east-west width of the mass is reduced. The 25-years, 50-years, and 100-years projections on Slide 14 indicate a continued decrease in groundwater concentrations at the river, from a theoretical maximum concentration of 0.8 to a concentration of 0.7. It should be noted that the concentrations in the groundwater system reach steady state after 25 years, which is why the 25-years, 50-years, and 100-years modeling runs are combined on the same slide. Slide 15 illustrates the concentration decay over time at a hypothetical midpoint in the groundwater system between the FAB and the Illinois River.

5.4 Alternative Closure Scenario 4 Modeling

The modeling of Scenario 4 consisted of starting with the initial equilibrated model run, the mass remaining in the north and south portions of the FAB, removing the recharge into the mass by simulating the presence of a FCS on the north and the south, and having a hydraulic barrier around the perimeter of the FAB that reduces the permeability through the mass material. This scenario simulates the in-situ stabilization of the CCR, with a remedial objective permeability of the CCR mass equal to or less than $1x10^{-7}$ cm/sec. Reviewing Slide 18, which projects out 5-years, indicates that groundwater mass near the Illinois River decreased by 20% from a maximum theoretical concentration of 0.9 to a concentration of 0.7. The east-west width of the groundwater mass also decreases. The 25-years, 50-years, and 100-years projections on Slide 19 indicate the mass had completely moved through the groundwater system by 25 years and beyond. Slide 20 illustrates the concentration decay over time at a hypothetical midpoint in the groundwater system between the FAB and the Illinois River.

5.5 Seasonal Variations Modeling

As further required by the State CCR Rule, seasonal fluctuations of the groundwater system were considered. To estimate the potential impacts on contaminant migration under a seasonally varying groundwater flow system, a 100-year transient flow model was simulated with alternating periods of higher and lower recharge to groundwater. The flow model simulated 6 months of higher recharge (April through September) and 6 months of lower recharge (October through March), reflecting trends in the long-term average monthly precipitation records. The initial equilibrated contaminant distribution again served as the starting conditions, Scenario 2 and Scenario 4 were applied to the mass, and the concentrations were modeled with advection and dispersion. The results of the Scenario 2 modeling are the same as the modeling results discussed in Section 5.2. The modeling results for Scenario 4 are the same for the 25+ years modeling events and the results for the 5-years seasonality modeling results are only slightly different from the results discussed in Section 5.4. The groundwater mass footprint is generally the same with slight variations in the mass gradations throughout the footprint. The results of the seasonal variation results for Scenario 4’s 5-year projection is shown on Figure 5.

These modeling runs are used as part of evaluating the long- and short-term effectiveness of each closure option, as shown in Table 3.

6.0 SUMMARY

Four closure scenarios were evaluated as part of the closure alternatives analysis for closure of the FAB in accordance with 845.710(b). The four options evaluated are as follows:

1) Closure by removal;
2) Closure in place in both the north and south portions of the FAB with a FCS;
3) Closure in place by consolidating all CCR in south portion of FAB with a FCS;
4) Closure in place with in-situ solidification/stabilization in both north and south portions with a soil cover.

The options were evaluated based on effectiveness/protectiveness, ease of implementation, and addressing the concerns of the community residents.

Closure by removal would require the excavation, transportation, and disposal of 920,000 CY of warning layer material and take greater than 1,200 days to complete. The CCR removed is assumed to be disposed of at Indian Creek Landfill No. 2 for the purposes of evaluating this alternative. If this alternative were to move forward, discussions with the landfill would have to occur prior to selecting this alternative. The area of the removed CCR would be graded to prevent further erosion and slope degradation. Once the closure by removal is complete, groundwater monitoring in accordance 845.600 would occur for three (3) years.

The closure in place in both the north and south portions of the FAB scenario requires filling both the north and south portions to achieve the proper grades and constructing the FCS on this fill material. This scenario would require the north portion to be filled with approximately 70,000 CY of additional material in order to bring the grade up to the proper elevation to allow precipitation to gravity flow off the FCS. The south portion would require to be filled with approximately 44,000 CY of additional material in order to bring the grade up to the proper elevation to allow precipitation to gravity flow off the FCS. The ClosureTurf FCS system would then be placed on top of the fill material in both the north and south portions. Each FCS is sloped to drain towards a new discharge structure that will be installed in the southwest corner of the north portion FCS. From this drainage structure, a new underground pipe would be installed to drain water to the old intake channel. The south portion would drain through a pipe installed through the railroad spur berm and into the new drainage structure.

To prevent future ponding that may occur if a flood condition occurs at the FAB, the construction of an embankment adjacent to the north perimeter of the FAB is included in this closure scenario. The embankment will extend from the existing north FAB embankment up to an elevation of 460 ft amsl (the floodplain elevation is 457 ft amsl) and then slope at 3H:1V down to the existing ground surface. The construction of this embankment will require 49,000 CY of clean fill material.

This option would take approximately 200 days to complete and groundwater monitoring in accordance with 845.600 would occur for thirty (30) years.

The in-situ solidification/stabilization (ISS) treatment of the CCR in the north portion of the FAB would be completed over an approximate 763,000 square feet area and in the south portion of the FAB would be completed over an approximate 654,000 square feet area. This alternative would include the ISS of approximately 556,000 CY of CCR in the north portion and approximately 241,000 CY of CCR in the south portion. The ISS would be applied by soil mixing from the top of the CCR to the bottom most extent of the CCR.

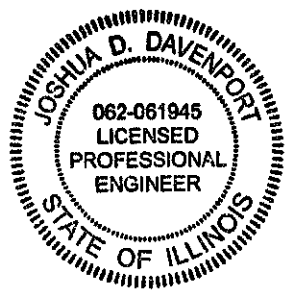
The completed ISS treatment area would be covered with clean soil and seeded. The extent of the treatment area requiring additional clean soil is 1,417,000 square feet and requires approximately 95,000 CY to achieve the necessary grades to prevent ponding water. The clean soil cover would be sloped to allow water to drain towards the perimeter of the ISS treatment area. Conceptually, the cover installation would consist of direct placement of clean fill with six inches of topsoil on the treated ISS area, feathered to match adjacent grades. The FCS will be graded to ensure positive drainage and minimize ponding and it is assumed the cover will be vegetated to reduce soil erosion. Each soil cover will be sloped to drain towards a new discharge structure that will be installed in the southwest corner of the north portion. From this drainage structure, a new underground pipe would be installed to drain water to the old intake channel. The south portion would drain through a pipe installed through the railroad spur berm and into the new drainage structure.

7.0 PROFESSIONAL ENGINEER'S CERTIFICATION

This closure alternatives analysis has been prepared in accordance with 35 Ill. Adm. Code 845.710.

Joshua D. Davenport, P.E.
Illinois Professional Engineer

SEAL



TABLES

Table 1. Former Ash Basin Groundwater Elevations - Midwest Generation, LLC, Powerton Station, Pekin, IL

Well ID	Date	Top of Casing Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft above MSL)
MW-01 (Upgradient)	11/16/2015	465.24	26.04	439.20
	2/22/2016	465.24	21.90	443.34
	5/16/2016	465.24	21.83	443.41
	8/15/2016	465.24	23.89	441.35
	11/14/2016	465.24	23.38	441.86
	2/13/2017	465.24	21.71	443.53
	5/1/2017	465.24	18.87	446.37
	6/20/2017	465.24	21.54	443.70
	8/25/2017	465.24	24.70	440.54
	11/8/2017	465.24	24.92	440.32
	5/17/2018	465.24	22.66	442.58
	8/8/2018	465.24	26.05	439.19
	10/30/2018	465.24	24.69	440.55
	2/25/2019	465.24	19.44	445.80
	4/29/2019	465.24	20.15	445.09
	8/26/2019	465.24	23.85	441.39
	2/24/2020	465.24	20.71	444.53
	4/27/2020	465.24	20.90	444.34
	12/7/2020	465.24	25.69	439.55
	4/7/2021	465.24	22.20	443.04
	5/10/2021	465.24	23.41	441.83
MW-02 (Downgradient)	6/20/2017	462.60	22.04	440.56
	8/23/2017	462.60	28.42	434.18
	11/7/2017	462.60	26.08	436.52
	5/17/2018	462.60	23.26	439.34
	8/7/2018	462.60	29.70	432.90
	10/30/2018	462.60	26.77	435.83
	2/25/2019	462.60	17.02	445.58
	4/29/2019	462.60	19.26	443.34
	8/26/2019	462.60	27.45	435.15
	2/24/2020	462.60	20.35	442.25
	4/27/2020	462.60	20.51	442.09
	12/7/2020	462.60	28.71	433.89
	4/7/2021	462.60	21.95	440.65
	5/10/2021	462.60	23.01	439.59
MW-03 (Downgradient)	6/20/2017	462.48	22.31	440.17
	8/23/2017	462.48	28.18	434.30
	11/7/2017	462.48	25.38	437.10
	5/17/2018	462.48	22.62	439.86
	8/7/2018	462.48	29.17	433.31
	10/30/2018	462.48	24.71	437.77
	2/25/2019	462.48	17.20	445.28
	4/29/2019	462.48	18.85	443.63
	8/26/2019	462.48	27.65	434.83
	2/24/2020	462.48	20.18	442.30
	4/27/2020	462.48	20.43	442.05
	12/7/2020	462.48	28.61	433.87
	4/7/2021	462.48	21.73	440.75
	5/10/2021	462.48	22.98	439.50

Table 1. Former Ash Basin Groundwater Elevations - Midwest Generation, LLC, Powerton Station, Pekin, IL

Well ID	Date	Top of Casing Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft above MSL)
MW-04 (Downgradient)	6/20/2017	460.57	22.15	438.42
	8/28/2017	460.57	28.49	432.08
	11/7/2017	460.57	25.62	434.95
	5/17/2018	460.57	24.13	436.44
	8/7/2018	460.57	29.23	431.34
	10/30/2018	460.57	26.58	433.99
	2/25/2019	460.57	15.45	445.12
	4/29/2019	460.57	15.88	444.69
	8/26/2019	460.57	27.35	433.22
	2/24/2020	460.57	19.81	440.76
	4/27/2020	460.57	19.76	440.81
	12/7/2020	460.57	28.50	432.07
	4/7/2021	460.57	21.90	438.67
	5/10/2021	460.57	23.92	436.65
MW-05 (Downgradient)	11/16/2015	458.58	26.39	432.19
	2/22/2016	458.66	21.12	437.54
	5/16/2016	458.66	16.58	442.08
	8/15/2016	458.66	23.59	435.07
	11/14/2016	458.66	22.72	435.94
	2/13/2017	458.66	19.13	439.53
	5/1/2017	458.66	13.09	445.57
	6/20/2017	458.66	19.43	439.15
	8/28/2017	458.66	25.38	433.20
	11/7/2017	458.66	22.91	435.67
	5/17/2018	458.66	21.54	437.04
	8/7/2018	458.66	26.17	432.41
	10/30/2018	458.66	23.97	434.61
	2/25/2019	458.66	13.21	445.45
	4/29/2019	458.66	15.40	443.26
	8/26/2019	458.66	24.35	434.31
	2/24/2020	458.66	17.25	441.41
	4/27/2020	458.66	17.41	441.25
	12/7/2020	458.66	25.65	433.01
	4/7/2021	458.66	19.40	439.26
	5/10/2021	458.66	21.38	437.28
MW-10 (Upgradient)	6/22/2017	457.31	13.46	443.85
	8/24/2017	457.31	16.39	440.92
	11/9/2017	457.31	16.86	440.45
	5/16/2018	457.31	14.88	442.43
	8/8/2018	457.31	17.88	439.43
	10/30/2018	457.31	17.04	440.27
	2/25/2019	457.31	11.28	446.03
	4/29/2019	457.31	11.88	445.43
	8/26/2019	457.31	15.89	441.42
	2/24/2020	457.31	12.64	444.67
	4/27/2020	457.31	12.75	444.56
	12/7/2020	457.31	17.80	439.51
	4/7/2021	457.31	14.21	443.10
	5/10/2021	457.31	15.58	441.73

MSL - Mean Sea Level
TOC - Top of Casing

Table 2. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL. Former Ash Basin.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228	Selenium	Thallium
	11/16/2015	1.0	98	44	0.17	7.07	93	530	< 0.003	< 0.001	0.057	^ < 0.001	< 0.0005	< 0.005	< 0.001	* < 0.0005	< 0.01	< 0.0002	< 0.0050	0.744	< 0.0025	* < 0.002
	2/25/2016	0.2	110	42	0.16	7.23	54	460	< 0.003	0.0025	0.053	< 0.001	< 0.0005	< 0.005	0.0014	0.0019	< 0.01	< 0.0002	< 0.005	< 0.722	0.0029	< 0.002
	5/20/2016	0.34	100	44	0.17	6.95	65	430	< 0.003	0.0081	0.062	< 0.001	< 0.0005	0.007	0.0053	0.011	< 0.01	< 0.0002	< 0.005	< 0.953	< 0.0025	< 0.002
	8/17/2016	0.27	78	39	0.25	7.16	50	530	< 0.003	0.0014	0.048	< 0.001	< 0.0005	< 0.005	< 0.001	0.0014	< 0.01	< 0.0002	0.0057	< 0.491	< 0.0025	< 0.002
	11/16/2016	0.18	97	39	0.21	7.22	32	500	< 0.003	0.0051	0.056	< 0.001	< 0.0005	< 0.005	0.0044	0.0082	< 0.01	< 0.0002	0.0059	< 0.618	< 0.0025	< 0.002
	2/14/2017	0.18	120	55	0.17	7.30	60	550	< 0.003	0.0041	0.056	< 0.001	< 0.0005	< 0.005	0.0045	0.0076	< 0.01	< 0.0002	0.0056	< 0.837	< 0.0025	< 0.002
	5/3/2017	0.19	86	66	0.16	7.41	45	460	< 0.003	0.0015	0.045	< 0.001	< 0.0005	< 0.005	0.0033	0.0067	< 0.01	< 0.0002	< 0.005	0.574	< 0.0025	< 0.002
	6/21/2017	0.18	85	58	0.18	7.60	47	540	< 0.003	< 0.001	0.040	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0061	< 0.418	< 0.0025	< 0.002
MW-01 up-gradient	8/25/2017	0.56	86	41	0.18	7.41	63	490	< 0.003	< 0.001	0.049	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0059	0.775	< 0.0025	< 0.002
	11/8/2017	0.57	130	38	0.12	6.69	61	640	< 0.003	< 0.001	0.083	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.343	< 0.0025	< 0.002
	5/17/2018	0.15	88	50	0.12	6.70	48	540	< 0.003	< 0.001	0.045	< 0.001	< 0.0005	< 0.005	< 0.001	0.00068	< 0.01	< 0.0002	< 0.005	< 0.396	< 0.0025	< 0.002
	8/8/2018	0.14	86	48	0.13	6.80	43	430	< 0.003	< 0.001	0.051	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.579	< 0.0025	< 0.002
	4/30/2019	0.07	78	54	0.17	7.20	27	450	< 0.003	0.0014	0.039	< 0.001	< 0.0005	< 0.005	< 0.001	0.0017	< 0.01	< 0.0002	< 0.005	< 0.656	< 0.0025	< 0.002
	8/26/2019	0.57	100	39	0.13	7.15	71	550	< 0.003	< 0.001	0.053	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.802	< 0.0025	< 0.002
	2/24/2020	0.28	87	53	0.21	7.19	34	410	< 0.003	< 0.001	0.044	< ^ 0.001	< 0.0005	< 0.005	< 0.001	0.00057	< 0.01	< 0.0002	< 0.005	< 0.478	< 0.0025	< 0.002
	4/28/2020	0.33	110	46	0.19	7.17	41	470	NA	< 0.001	0.051	NA	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.628	< 0.0025	< 0.002
	12/7/2020	0.59	100	54	0.25	7.22	55	640	NA	< 0.001	0.058	NA	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0052	< 0.542	< 0.0025	< 0.002
	5/11/2021	0.21	85	51	0.21	7.52	37	450	< 0.003	< 0.001	0.043	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.01	0.521	< 0.0025	< 0.002
	6/22/2017	0.46	100	48	0.19	6.81	54	1.0	< 0.003	0.0023	0.250	< 0.001	< 0.0005	< 0.005	0.008	0.003	< 0.01	< 0.0002	< 0.005	0.408	0.0042	< 0.002
	8/24/2017	0.32	93	51	0.18	7.14	57	480	< 0.003	0.0020	0.220	< 0.001	< 0.0005	< 0.005	0.007	0.003	< 0.01	< 0.0002	< 0.005	0.564	0.0044	< 0.002
	11/9/2017	0.36	98	48	0.18	6.78	64	500	< 0.003	< 0.0010	0.220	< 0.001	< 0.0005	< 0.005	0.004	< 0.001	< 0.01	< 0.0002	< 0.005	1.020	0.0034	< 0.002
	5/16/2018	0.42	93	44	0.19	7.64	80	530	< 0.003	0.0010	0.220	< 0.001	< 0.0005	< 0.005	0.021	0.001	< 0.01	< 0.0002	< 0.005	1.550	0.0050	< 0.002
	8/8/2018	0.39	99	58	0.19	7.10	60	550	< 0.003	0.0012	0.220	<^ 0.001	< 0.0005	< 0.005	0.014	0.001	< 0.01	< 0.0002	< 0.005	< 0.551	0.0062	< 0.002
MW-10 up-gradient	10/30/2018	0.34	110	49	0.22	7.65	49	510	< 0.003	0.0110	0.410	< 0.001	0.0008	0.024	0.047	0.023	0.02	< 0.0002	< 0.005	3.00	0.0046	< 0.002
	2/26/2019	0.39	150	48	0.21	6.77	36	540	< 0.003	0.0220	0.590	< 0.005	0.0015	0.063	0.081	0.036	0.03	< 0.0002	0.007	4.130	0.0041	< 0.002
	5/1/2019	0.35	92	50	0.22	6.81	30	470	< 0.003	0.0023	0.270	< 0.001	< 0.0005	< 0.005	0.011	0.0028	< 0.01	< 0.0002	< 0.005	1.330	0.0037	< 0.002
	8/26/2019	0.30	84	48	0.19	7.09	30	410	< 0.003	0.0017	0.190	< 0.001	< 0.001	< 0.005	0.007	0.0016	< 0.01	< 0.0002	< 0.005	1.540	0.0050	< 0.002
	2/25/2020	1.40	110	45	0.23	6.82	59	500	< 0.003	0.0033	0.280	< ^ 0.001	< 0.0005	0.0086	0.011	0.0046	< 0.01	< 0.0002	< 0.005	1.07	0.0058	< 0.002
	4/28/2020	1.00	110	41	0.24	6.80	64	550	NA	0.0022	0.250	NA	NA	< 0.005	0.0065	0.0017	NA	NA	< 0.005	0.639	0.0054	NA
	12/8/2020	2.40	120	44	0.26	7.11	71	550	NA	0.0015	0.280	NA	NA	< 0.005	0.0089	0.0023	NA	< 0.0002	< 0.005	1.76	0.0031	NA
	5/11/2021	0.64	100	52	0.24	7.01	59	540	< 0.003	0.0011	0.260	< 0.001	< 0.001	< 0.005	0.008	0.0009	< 0.01	< 0.0002	< 0.005	1.42	0.0049	< 0.002
	6/20/2017	0.33	90	55	0.19	7.01	47	500	< 0.003	0.0012	0.075	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.341	< 0.0025	< 0.002
	8/23/2017	V 1.30	86	49	0.19	7.40	61	440	< 0.003	< 0.001	0.062	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.833	< 0.0025	< 0.002
	11/7/2017	3.70	98	46	0.17	7.10	88	550	< 0.003	0.0014	0.091	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.309	0.0027	< 0.002
	5/15/2018	0.22	80	45	0.23	7.71	54	500	< 0.003	0.0013	0.065	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	0.0004	< 0.005	< 0.408	< 0.0025	< 0.002
	8/7/2018	1.50	89	54	0.15	7.09	51	530	< 0.003	0.0016	0.067	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.622	< 0.0025	< 0.002
MW-02 down-gradient	10/30/2018	0.23	86	43	0.17	7.83	34	480	< 0.003	0.0015	0.067	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.564	< 0.0025	< 0.002
	2/26/2019	0.07	69	49	0.16	7.82	23	400	< 0.003	0.0026	0.041	< 0.001	< 0.0005	< 0.005	< 0.001	0.0013	< 0.01	< 0.0002	< 0.005	< 0.425	< 0.0025	< 0.002
	4/30/2019	0.12	79	48	0.16	7.60	30	440	< 0.003	0.0013	0.048	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.441	< 0.0025	< 0.002
	8/26/2019	0.51	86	50	0.18	7.13	32	400	< 0.003	0.0011	0.065	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	1.180	< 0.0025	< 0.002
	2/24/2020	0.33	89	53	0.20	7.43	37	410	< 0.003	0.0011	0.061	< ^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.485	< 0.0025	< 0.002
	4/28/2020	0.33	90	50	0.20	7.32	41	430	NA	0.0016	0.06	NA	NA	< 0.005	< 0.001	< 0.0005	NA	NA	< 0.005	< 0.54	< 0.0025	NA
	12/9/2020	0.66	100	41	0.15	7.78	64	430	NA	< 0.001	0.076	NA	NA	< 0.005	< 0.001	< 0.0005	NA	< 0.0002	0.0059	< 0.471	< 0.0025	NA
	5/11/2021	0.23	79	51	0.21	7.70	37	370	< 0.003	0.0015	0.057	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.010	< 0.528	< 0.0025	< 0.002

Notes: All units are in mg/l except pH is in standard units.
V- Serial dilution exceeds control limits.
H- Sample was prepped or analyzed beyond specified holding time

F1 - MS and/or MSD Recovery outside of limits.
* - LCS or LCSD is outside acceptance limits.
^ - Denotes instrument related QC exceeds the control limits

NA - Not Analyzed

Table 2. Groundwater Analytical Results - Midwest Generation, LLC, Powerton Station, Pekin, IL. Former Ash Basin.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228	Selenium	Thallium
	6/20/2017	0.4	76	54	0.29	7.26	49	480	< 0.003	0.0013	0.066	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.325	< 0.0025	< 0.002
	8/23/2017	0.40	79	52	0.28	7.44	52	430	< 0.003	0.0010	0.066	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	1.200	< 0.0025	< 0.002
	11/7/2017	0.31	79	62	0.26	7.04	61	460	< 0.003	0.0013	0.068	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.588	< 0.0025	< 0.002
	5/15/2018	0.35	87	66	0.27	7.53	77	520	< 0.003	0.0010	0.059	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.489	< 0.0025	< 0.002
	8/7/2018	0.40	82	67	0.22	6.60	49	500	< 0.003	0.0015	0.067	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.341	< 0.0025	< 0.002
MW-03 down-gradient	10/30/2018	0.20	74	44	0.25	7.84	26	400	< 0.003	0.0014	0.056	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.354	< 0.0025	< 0.002
	2/26/2019	0.06	74	56	0.24	7.49	25	410	< 0.003	0.0013	0.054	< 0.001	< 0.0005	< 0.005	< 0.001	0.0007	< 0.01	< 0.0002	< 0.005	< 0.399	< 0.0025	< 0.002
	4/30/2019	0.28	74	49	0.22	7.17	38	390	< 0.003	< 0.001	0.060	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.668	< 0.0025	< 0.002
	8/26/2019	0.31	75	50	0.26	7.17	14	380	< 0.003	0.0014	0.069	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.444	< 0.0025	< 0.002
	2/24/2020	0.33	87	53	0.22	7.10	65	470	< 0.003	< 0.001	0.066	< ^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.400	< 0.0025	< 0.002
	4/28/2020	0.24	86	46	0.22	7.03	79	410	NA	0.0013	0.066	NA	NA	< 0.005	< 0.001	< 0.0005	NA	NA	< 0.005	< 0.498	0.0036	NA
	12/9/2020	0.86	92	45	0.28	7.46	60	390	NA	< 0.001	0.086	NA	NA	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.432	< 0.0025	NA
	5/11/2021	0.22	75	49	0.21	7.33	38	390	< 0.003	< 0.001	0.070	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.519	< 0.0025	< 0.002
	6/20/2017	0.5	77	55	0.29	7.45	53	480	< 0.003	< 0.001	0.0025	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.343	< 0.0025	< 0.002
	8/28/2017	V 0.73	90	89	0.33	7.13	110	680	< 0.003	< 0.001	0.028	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.013	< 0.246	< 0.0025	< 0.002
	11/7/2017	0.60	110	94	0.24	6.80	130	650	< 0.003	< 0.001	0.051	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.332	0.0092	< 0.002
	5/15/2018	0.68	87	66	0.27	7.63	100	630	< 0.003	< 0.001	0.037	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.661	< 0.0025	< 0.002
	8/7/2018	0.79	84	71	0.32	6.72	49	510	< 0.003	0.0011	0.031	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.006	< 0.334	< 0.0025	< 0.002
MW-04 down-gradient	10/30/2018	0.54	100	80	0.24	7.55	91	690	< 0.003	< 0.001	0.049	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.423	< 0.0025	< 0.002
	2/26/2019	0.38	79	55	0.25	7.18	52	490	< 0.003	0.0013	0.033	< 0.001	< 0.0005	< 0.005	0.001	0.0012	< 0.01	< 0.0002	< 0.005	0.366	< 0.0025	< 0.002
	4/30/2019	0.36	74	48	0.25	7.08	35	380	< 0.003	< 0.001	0.026	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.684	< 0.0025	< 0.002
	8/26/2019	0.64	91	60	0.24	7.08	14	490	< 0.003	< 0.001	0.032	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.008	1.090	< 0.0025	< 0.002
	2/24/2020	0.34	81	49	0.20	7.05	67	440	< 0.003	< 0.001	0.024	< ^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.595	< 0.0025	< 0.002
	4/28/2020	0.55	76	52	0.27	7.03	47	380	NA	< 0.001	0.025	NA	NA	< 0.005	< 0.001	< 0.0005	NA	NA	< 0.005	< 0.465	< 0.0025	NA
	12/9/2020	0.57	92	88	0.32	7.10	94	580	NA	< 0.001	0.034	NA	NA	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0076	< 0.411	< 0.0025	NA
	5/11/2021	0.61	77	44	0.33	7.22	76	410	< 0.003	< 0.001	0.025	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.533	< 0.0025	< 0.002
	5/17/2016	0.70	100	85	0.35	7.08	120	660	< 0.003	< 0.001	0.051	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.373	< 0.0025	< 0.002
	8/16/2016	0.69	110	97	0.30	6.85	150	830	< 0.003	< 0.001	0.060	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.452	< 0.0025	< 0.002
	11/15/2016	0.93	94	66	0.23	6.96	77	620	< 0.003	< 0.001	0.051	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	0.449	< 0.0025	< 0.002
	2/14/2017	0.79	100	100	0.25	7.25	170	760	< 0.003	< 0.001	0.062	< 0.001	< 0.0005	< 0.005	< 0.001	0.00091	< 0.01	< 0.0002	< 0.005	< 0.359	< 0.0025	< 0.002
	5/1/2017	0.70	100	92	0.28	7.60	170	710	< 0.003	< 0.001	0.059	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0066	< 0.439	< 0.0025	< 0.002
	6/20/2017	0.64	89	63	0.28	7.32	78	550	< 0.003	< 0.001	0.048	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0061	< 0.365	< 0.0025	< 0.002
	8/28/2017	0.62	110	120	0.33	7.05	210	870	< 0.003	< 0.001	0.064	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0085	0.381	< 0.0025	< 0.002
MW-05 down-gradient	11/7/2017	0.51	99	110	0.31	6.87	160	990	< 0.003	< 0.001	0.058	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.341	< 0.0025	< 0.002
	5/15/2018	0.61	130	89	0.29	7.70	210	910	< 0.003	< 0.001	0.062	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	< 0.005	< 0.390	< 0.0025	< 0.002
	8/7/2018	0.49	110	120	0.32	6.56	180	890	< 0.003	< 0.001	0.054	<^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0069	0.523	< 0.0025	< 0.002
	4/30/2019	0.56	84	73	0.36	6.96	120	590	< 0.003	< 0.001	0.041	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0061	< 0.709	< 0.0025	< 0.002
	8/26/2019	0.57	110	75	0.29	7.01	110	660	< 0.003	< 0.001	0.050	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0067	0.651	< 0.0025	< 0.002
	2/24/2020	0.54	110	70	0.36	6.90	120	H 700	< 0.003	< 0.001	0.057	< ^ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0061	0.506	< 0.0025	< 0.002
	4/28/2020	0.49	110	56	0.37	6.87	130	620	NA	0.001	0.052	NA	NA	< 0.005	< 0.001	< 0.0005	NA	NA	0.0074	0.508	< 0.0025	NA
	12/9/2020	0.53	98	78	0.31	6.91	110	670	NA	< 0.001	0.05	NA	NA	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0072	0.569	< 0.0025	NA
	5/11/2021	0.5	83	52	0.38	7.20	100	530	< 0.003	< 0.001	0.04	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.0062	< 0.525	< 0.0025	< 0.002

Notes: All units are in mg/l except pH is in standard units.
V- Serial dilution exceeds control limits.
H- Sample was prepped or analyzed beyond specified holding time

F1 - MS and/or MSD Recovery outside of limits.
* - LCS or LCSD is outside acceptance limits.
^ - Denotes instrument related QC exceeds the control limits

NA - Not Analyzed

Table 3 - Closure Alternatives Evaluation

35 Ill. Adm. Code Part 845.710(b)(1) through 845.710(b)(4) Requirements		Closure Alternatives			
		Closure by Removal for Pond Re-use	Closure-in-Place with a Final Cover System	Consolidation & Closure-in-Place with a Final Cover System	Closure-in-Place with Insitu Stabilization/Solidification
845.710(b)(1)(A)	Magnitude of existing risk reduction	The excavation and removal of the CCR from the FAB would remove a potential source. This will prevent about 38 inches per year of precipitation from passing through the unsaturated CCR into the groundwater. The groundwater modeling has shown that by previously removing the CCR source material, a reduction of at least 90% would occur in groundwater concentrations after 25 years.	Closing the CCR in place with the ClosureTurf final cover system will prevent infiltration through the CCR material that may be present. The final cover system also eliminates human/animal exposure to any CCR, in addition to removing the hazard of an open area. The final cover system would be constructed by filling the FAB with clean material and covering with a geomembrane infiltration layer that has a permeability of 1 x 10^{-13} cm/s, which is covered with a synthetic turf/sand infill erosion layer. This type of cover system has been used throughout the country since 2009 to effectively close CCR surface impoundments. The existing groundwater monitoring (through second quarter 2021) has shown that groundwater impacts above the proposed GWPSs are not present. The groundwater modeling has shown that a reduction of 10% of groundwater concentrations would occur after 5 years and the groundwater concentrations would reach a steady state condition after 25 years with no further increases in groundwater concentrations.	Closing the CCR in place with the ClosureTurf final cover system will prevent infiltration through the CCR material that may be present. The final cover system also eliminates human/animal exposure to any CCR, in addition to removing the hazard of an open area. The final cover system would be constructed by first dredging the north FAB CCR into the south, filling the south FAB with clean material and covering with a geomembrane infiltration layer that has a permeability of 1 x 10^{-13} cm/s, which is covered with a synthetic turf/sand infill erosion layer. This type of cover system has been used throughout the country since 2009 to effectively close CCR surface impoundments. The existing groundwater monitoring (through second quarter 2021) has shown that groundwater impacts above the proposed GWPSs are not present. The groundwater modeling has shown that a reduction of 20% of groundwater concentrations would occur after 5 years and the groundwater concentrations would reach a steady state condition after 25 years with no further increases in groundwater concentrations.	Closing the CCR in place with treating the CCR with in-situ solidification/stabilization will prevent infiltration through the CCR material that may be present. The soil cover also eliminates human/animal exposure to any CCR, in addition to removing the hazard of an open area. The ISS would be conducted by mixing the CCR with reagents (cement, bentonite) using either an excavator bucket or a large diameter auger, followed up by filling over the ISS with clean material and covering with topsoil and then seeded. The ISS would have a permeability of less than 1 x 10^{-7} cm/s. This type of technology has been used throughout the country since the 1960's to effectively treat impacted soil throughout the country. The existing groundwater monitoring (through second quarter 2021) has shown that groundwater impacts above the proposed GWPSs are not present. The groundwater modeling has shown that a reduction of greater than 90% of groundwater concentrations would occur after 5 years and the groundwater concentrations would reach a steady state condition after 25 years.
845.710(b)(1)(B)	Likelihood of future CCR releases	Since the CCR would be removed, the likelihood of a future CCR release is eliminated. Groundwater monitoring results have shown that no concentrations existing above the proposed GWPSs.	Covering the CCR would prevent the future release of CCR because it would not be exposed to surface water runoff and the potential for erosion. Groundwater monitoring through second quarter 2021 does not show any groundwater concentrations greater than the proposed GWPSs. Releases of CCR to the Illinois River has not been identified. The material brought on-site would be evaluated to determine that it will not cause a future release.	Covering the CCR would prevent the future release of CCR because it would not be exposed to surface water runoff and the potential for erosion. Groundwater monitoring through second quarter 2021 does not show any groundwater concentrations greater than the proposed GWPSs. Releases of CCR to the Illinois River has not been identified. The material brought on-site would be evaluated to determine that it will not cause a future release.	Solidifiying and covering the CCR would prevent the future release of CCR because it would not be exposed to surface water runoff, infiltration, and the potential for erosion. Groundwater monitoring through second quarter 2021 does not show any groundwater concentrations greater than the proposed GWPSs. Releases of CCR to the Illinois River has not been identified. The material brought on-site would be evaluated to determine that it will not cause a future release.
845.710(b)(1)(C)	Long-term management required	Long-term management of the FAB would be very minimal because the CCR would be removed. Therefore, there is no potential for future releases and no inspections required. Groundwater monitoring is required in accordance with 845.740(b) and 845.600. Groundwater monitoring is required for at least 3 years.	Post-closure activities will be required in accordance with 845.780 which includes regular inspections of the ClosureTurf FCS and groundwater monitoring. The post-closure period is at least 30 years.	Post-closure activities will be required in accordance with 845.780 which includes regular inspections of the ClosureTurf FCS and groundwater monitoring. The post-closure period is at least 30 years.	Post-closure activities will be required in accordance with 845.780 which includes regular inspections of the soil cover and groundwater monitoring. The post-closure period is at least 30 years.
845.710(b)(1)(D)	Short-term risks to the community during closure activities	The short-term risk to the community is very minimal to non-existent. The only potential risk would be from an increase in truck traffic hauling the CCR for offsite disposal and truck traffic returning to the site because each truck will make multiple trips per day for disposal. Over 61,000 truck loads is required to haul the CCR off-site for disposal. This has the potential to cause 0.761 traffic accident injuries and 0.036 traffic accident fatalities based on a 40-mile round trip for each truckload. 61,000 truckloads has the potential to produce over 420 lbs of particulate matter emissions.	The short-tem risk to the community is minimal and would come from the increased truck traffic bringing the fill material and ClosureTurf FCS supplies to the site. Filling the FAB to the required elevations would require approximately 114,000 CY of additional clean material from off-site and approximately 7,600 trucks to transport this material. The north embankment construction would require approximately 78,000 CY of additional clean fill material from offsite and approximately 5,200 truckloads. This has the potential to cause 0.1894 traffic accident injuries and 0.0089 traffic accident fatalities based on a 20-mile round trip for each truckload. The total number of truckloads has the potential to produce approximately 61 lbs of particulate matter emissions.	The short-tem risk to the community is minimal and would come from the increased truck traffic bringing the fill material and ClosureTurf FCS supplies to the site. Filling the FAB to the required elevations would require approximately 68,000 CY of additional clean material from off-site and approximately 4,550 trucks to transport this material. This has the potential to cause 0.065 traffic accident injuries and 0.0031 traffic accident fatalities based on a 20-mile round trip for each truckload. The total number of truckloads has the potential to produce approximately 21 lbs of particulate matter emissions.	The short-tem risk to the community is minimal and would come from the increased truck traffic bringing the fill material and ClosureTurf FCS supplies to the site. Filling the FAB to the required elevations would require approximately 95,600 CY of additional clean material from off-site and approximately 6,375 trucks to transport this material. This has the potential to cause 0.1062 traffic accident injuries and 0.005 traffic accident fatalities based on a 20-mile round trip for each truckload. The total number of truckloads has the potential to produce approximately 34 lbs of particulate matter emissions.
845.710(b)(1)(E)	Time to complete closure, post-closure or 845.740(b) groundwater monitoring	Excavation and disposal of the FAB's 920,000 CY of CCR is estimated to take over 1,200 days, based on disposing of 50 trucks/day of CCR. Post-closure activities are not required when closure by removal is performed, but groundwater monitoring must be conducted for at least 3 years after closure activities.	The total anticipated time to complete closure construction is 8 months and post-closure activities will take 30 years, which includes groundwater monitoring.	The total anticipated time to complete closure construction is 12 months and post-closure activities will take 30 years, which includes groundwater monitoring.	The total anticipated time to complete closure construction up to 24 months and post-closure activities will take 30 years, which includes groundwater monitoring.
845.710(b)(1)(F)	Potential threat to human health and environment	The potential threat to human health and the environment is minimal to non-existent because the CCR source material has been removed. Groundwater monitoring has shown that impacts to groundwater are not present.	The potential threat to human health and the environment is minimal to non-existent because the CCR has been covered and no exposure routes are available. Groundwater monitoring through second quarter 2021 has shown that impacts to groundwater are not present.	The potential threat to human health and the environment is minimal to non-existent because the CCR in the north has been removed and consolidated with the CCR in south which is then covered and no exposure routes are available. Groundwater monitoring through second quarter 2021 has shown that impacts to groundwater are not present.	The potential threat to human health and the environment is minimal to non-existent because the CCR has been solidified and covered and no exposure routes are available. Groundwater monitoring through second quarter 2021 has shown that impacts to groundwater are not present.

Table 3 - Closure Alternatives Evaluation

35 Ill. Adm. Code Part 845.710(b)(1) through 845.710(b)(4) Requirements		Closure Alternatives			
		Closure by Removal for Pond Re-use	Closure-in-Place with a Final Cover System	Consolidation & Closure-in-Place with a Final Cover System	Closure-in-Place with Insitu Stabilization/Solidification
845.710(b)(1)(G)	Long-term reliability of engineering/institutional controls	Having removed all the CCR is the most reliable alternative because the potential for any source material to remain is non-existent.	Geomembrane final cover systems and specifically ClosureTurf have been used throughout the country to effectively prevent CCR and other solid wastes from impacting human health and the environment.	Geomembrane final cover systems and specifically ClosureTurf have been used throughout the country to effectively prevent CCR and other solid wastes from impacting human health and the environment.	The ISS treatment creates a solidified/stabilized monolith of CCR with cement and sometimes bentonite to improve impermeability. The typical lifespan of concrete is greater than 30 years up to 100 years and the neutral pH of the groundwater will not degrade the monolith, extending its lifespan.
845.710(b)(1)(H)	Potential for future corrective action	Because the CCR has already been removed, the need for future corrective actions is not present.	Groundwater concentrations above the proposed GWPSs are not present and groundwater modeling has shown that the concentrations will decrease with the closure alternative, so the potential for future correction is minimal.	Groundwater concentrations above the proposed GWPSs are not present and groundwater modeling has shown that the concentrations will decrease with the closure alternative, so the potential for future correction is minimal.	Groundwater concentrations above the proposed GWPSs are not present and groundwater modeling has shown that the concentrations will decrease greater than 90% after 10 years with this closure alternative, so the potential for future correction is minimal.
845.710(b)(2)(A)	The extent containment reduces further releases	The CCR has been removed from the FAB and the potential for further releases is non-existent. Groundwater monitoring has shown that impacts are not present.	The CCR would remain within the confinements of the FAB and below the FCS. Previous groundwater monitoring has shown that a release of CCR has not occurred. The geomembrane used in the FCS prevent the infiltration of water thereby preventing any further release.	The CCR would remain within the confinements of the south FAB and below the FCS. Previous groundwater monitoring has shown that a release of CCR has not occurred. The geomembrane used in the FCS prevent the infiltration of water thereby preventing any further release.	The CCR would remain within the confinements of the FAB and solidified using cement. The permeability would be less than 1x10^{-7} cm/s, preventing groundwater and precipitation from traveling through the CCR thereby preventing any further release. Previous groundwater monitoring has shown that a release of CCR has not occurred. The soil cover minimizes the direct contact to the solidified CCR.
845.710(b)(2)(B)	Extent of the use of treatment technologies	Treatment will not be occurring as part of this closure alternative. The only technology used is the construction equipment to execute the removal.	Treatment will not be occurring as part of this closure alternative. ClosureTurf technology will be used to create the FCS. ClosureTurf consists of a geomembrane liner with synthetic turf and sand/small aggregate on top of the geomembrane. ClosureTurf has been successfully used at other CCR surface impoundments and landfills as cover systems.	Treatment will not be occurring as part of this closure alternative. ClosureTurf technology will be used to create the FCS. ClosureTurf consists of a geomembrane liner with synthetic turf and sand/small aggregate on top of the geomembrane. ClosureTurf has been successfully used at other CCR surface impoundments and landfills as cover systems.	ISS is the treatment technology that will be used as part of this scenario, No other technologies will be used. The completed ISS monolth will be covered with a soil cover that is then seeded.
845.710(b)(3)(A)	Degree of difficulty associated with constructing technology	Removing and disposing of the CCR is not diffult work and many contractors are able to perform work. Finding a disposal location would be the most difficult beauce existing facilities may not accept the CCR and the permitting and constructing of a new landfill is difficult due to potential environmental and local resistance and available of materials.	Filling, grading, and compacting clean soil into the FAB is not difficult. This is a process that has been occurring for many years and several construction companies in the area are capable of performing this work. The installation of the ClosureTurf system is not difficult, but the provider of ClosureTurf requires a certified company perform the work. This limits the availability of installation contractors because the certified list of contractors is a limited number. ClosureTurf has been successfully installed in over 17 states throughout the country beginning in 2009. These states include New York, California, Minnesota, and Massachusetts.	Dredging, grading, and compacting clean soil into the FAB is not difficult. hydraulic dredging has routinely been performed throughout the country. This is a process that has been occurring for many years and several construction companies in the area are capable of performing this work. The installation of the ClosureTurf system is not difficult, but the provider of ClosureTurf requires a certified company perform the work. This limits the availability of installation contractors because the certified list of contractors is a limited number. ClosureTurf has been successfully installed in over 17 states throughout the country beginning in 2009. These states include New York, California, Minnesota, and Massachusetts.	ISS has been effectively used since the 1960's. The companies that routinely perform ISS treatment do not have difficulties with implementing this scenario.
845.710(b)(3)(B)	Expected operational reliability of the technologies	This closure alternative does not require the operation of any technologies. The construction equipment that would be used to excavate and haul the CCR are expected to operate without interruption.	ClosureTurf has operated reliably at the other installations around the country. ClosureTurf experienced a hurricane in South Carolina that produced a 26-inch rainfall, which did not damage the ClosureTurf and so minimally displaced the sand infill that no maintenance was required.	ClosureTurf has operated reliably at the other installations around the country. ClosureTurf experienced a hurricane in South Carolina that produced a 26-inch rainfall, which did not damage the ClosureTurf and so minimally displaced the sand infill that no maintenance was required.	ISS has been effectively used to treatment soil impacts and CCR. QA/QC efforts as part of the treatment is constantly performed and has shown that permeabilites are routinely less than 1x10^{-7} cm/s. Unconfined compressive strength of the soil is typically greater than 50 psi.
845.710(b)(3)(C)	Need to coordinate with and obtain necessary approvals and permits from other agencies	This closure alternative would require approval from the Illinois EPA.	This closure alternative would require approval from the Illinois EPA.	This closure alternative would require approval from the Illinois EPA.	This closure alternative would require approval from the Illinois EPA.
845.710(b)(3)(D)	Availability of necessary equipment and specialists	Equipment and personnel are easily available to excavate the CCR. Locating a disposal location is the most difficult part of this alternative.	This closure alternative would require a contractor that is approved by Watershed Geo to install ClosureTurf. Several contractors throughout the country have been certified to install ClosureTurf. The availability of a certified ClosureTurf installer is less than an earthwork contractor, but it should not be a concern.	This closure alternative would require a contractor that is capable of performing hydraulic dredging and a contractror approved by Watershed Geo to install ClosureTurf. Several contractors throughout the country have been certified to install ClosureTurf. The availability of a hydraulic dredging contractor and certified ClosureTurf installer is less than an earthwork contractor, but it should not be a concern.	This closure alternative would require a contractor that is capable of performing in-situ solidification/stabilization. Several contractors throughout the country are able to perform this work. The availability of an ISS contractor is less than an earthwork contractor, but it should not be a concern.

Table 3 - Closure Alternatives Evaluation

35 Ill. Adm. Code Part 845.710(b)(1) through 845.710(b)(4) Requirements		Closure Alternatives			
		Closure by Removal for Pond Re-use	Closure-in-Place with a Final Cover System	Consolidation & Closure-in-Place with a Final Cover System	Closure-in-Place with Insitu Stabilization/Solidification
845.710(b)(3)(E)	Available capacity and location of needed treatment, storage, and disposal services	The available capacity of disposal for 920,000 CY is expected to be difficult to obtain. The location for any disposal is unknown and would require contacting proper disposal facilities in the area to inquire about space availability. Based on the 2020 Landfill Capacity Report, Indian Creek Landfill No. 2 has capacity in excess of 35 million CY, but at this time it is unkown the existing contracted air space.	This closure alternative does not require treatment, storage, or disposal services. Any storage of materials would occur at the station	This closure alternative does not require treatment, storage, or disposal services. Any storage of materials would occur at the station	This alternative does not require any disposal or storage services. Any storage of materials would occur at the station. This alternative uses the ISS treatment technology performed by specialized contractors trained in this type of work. These contractors are specialized, however, there availability is not detrimental to the completion of this alternative.
845.710(b)(4)	Degree to which community concerns are addressed	All the potential closure alternatives address the community concerns. The community is concerned about the potential for future groundwater contamination which is addressed by the closure alternatives. The groundwater monitoring through second quarter 2021 has shown that impacts are not present.	All the potential closure alternatives address the community concerns. The community is concerned about the potential for future groundwater contamination which is addressed by the closure alternatives. The installation of a FCS would prevent the infiltration of precipitation which would minimize contamination of groundwater from the remaining CCR.	All the potential closure alternatives address the community concerns. The community is concerned about the potential for future groundwater contamination which is addressed by the closure alternatives. The consolidation of CCR and installation of a FCS would prevent the infiltration of precipitation which would minimize contamination of groundwater from the remaining CCR.	All the potential closure alternatives address the community concerns. The community is concerned about the potential for future groundwater contamination which is addressed by the closure alternatives. The stabilization/solidification would prevent the infiltration of precipitation which would minimize contamination of groundwater from the remaining CCR.
845.710(d)(4)	Assessment of Impacts to Waters in the State	This closure alternative does not impact the Des Plaines River or the station's intake channel. The groundwater modeling performed in support of this analysis has shown that any theoretical impacts to the river are reduced to less than 90% of the original concentration after 25 years. Existing groundwater monitoring through second quarter 2021 has shown that impacts in downgradient monitoring wells are not present or not associated with the FAB.	This closure alternative does not impact the Des Plaines River or the station's intake channel. Existing groundwater monitoring through second quarter 2021 has shown that impacts in downgradient monitoring wells are not present or not associated with the FAB.	This closure alternative does not impact the Des Plaines River or the station's intake channel. Existing groundwater monitoring through second quarter 2021 has shown that impacts in downgradient monitoring wells are not present or not associated with the FAB.	This closure alternative does not impact the Des Plaines River or the station's intake channel. Existing groundwater monitoring through second quarter 2021 has shown that impacts in downgradient monitoring wells are not present or not associated with the FAB.

Table 4: Closure Alternatives Analysis Cost Estimates Comparison

Scenario 1: Closure Costs for Closure By Removal & Disposal at Indian Creek Landfill

Construction Activity	Cost
Mobilization/Demobilization	$25,000
Site Preparation	$60,025
Dewatering	$206,294
FAB North Excavation	$17,208,428
FAB South Excavation	$8,698,775
Indian Creek Landfill RDF Disposal	$42,323,176
Construction Subtotal	$68,521,699

Construction Management (4.5%)	$3,083,476
Engineering & Design (10%)	$2,619,852
Owner Construction Supervision (4.5%)	$3,083,476
30% Contingency	$20,556,510

CLOSURE TOTAL	$97,865,013

Scenario 2: Closure Costs for Closure in Place with a Final Cover System

Construction Activity	Cost
Mobilization/Demobilization	$25,000
Site Preparation	$60,025
Dewatering	$53,572
FAB North & South Site Grading	$3,934,218
ClosureTurf Cover System	$3,934,048
North Embankment Construction	$1,972,160
Construction Subtotal	$9,979,024

Construction Management (4.5%)	$449,056
Engineering & Design (10%)	$800,686
Owner Construction Supervision (4.5%)	$360,309
30% Contingency	$2,993,707

CLOSURE TOTAL	$14,582,783

Scenario 3: Closure Costs for Closure in Place with Consolidation & Final Cover System

Construction Activity	Cost
Mobilization/Demobilization & Site Preparation	$1,019,837
Dewatering	$128,330
Dredging from North FAB	$1,446,000
South FAB Fill	$383,575
South FAB Final Cover System	$1,694,215
Restoration	$2,738,008
Construction Subtotal	$7,409,965

Construction Management (4.5%)	$333,448
Engineering & Design (10%)	$467,196
Owner Construction Supervision (4.5%)	$333,448
30% Contingency	$2,222,989

CLOSURE TOTAL	$10,767,047

Scenario 4: In-Situ Stabilzation with Soil Cover

Construction Activity	Cost
Mobilization/Demobilization & Site Preparation	$25,000
Site Preparation	$12,761
Dewatering	$7,129
FAB North & South ISS	$58,821,578
Soil Cover System	$904,555
Discharge Structure & Drainage Piping	$282,440
Construction Subtotal	$60,053,464

Construction Management (4.5%)	$2,702,406
Engineering & Design (10%)	$5,977,102
Owner Construction Supervision (4.5%)	$2,702,406
30% Contingency	$18,016,039

CLOSURE TOTAL	$89,451,417

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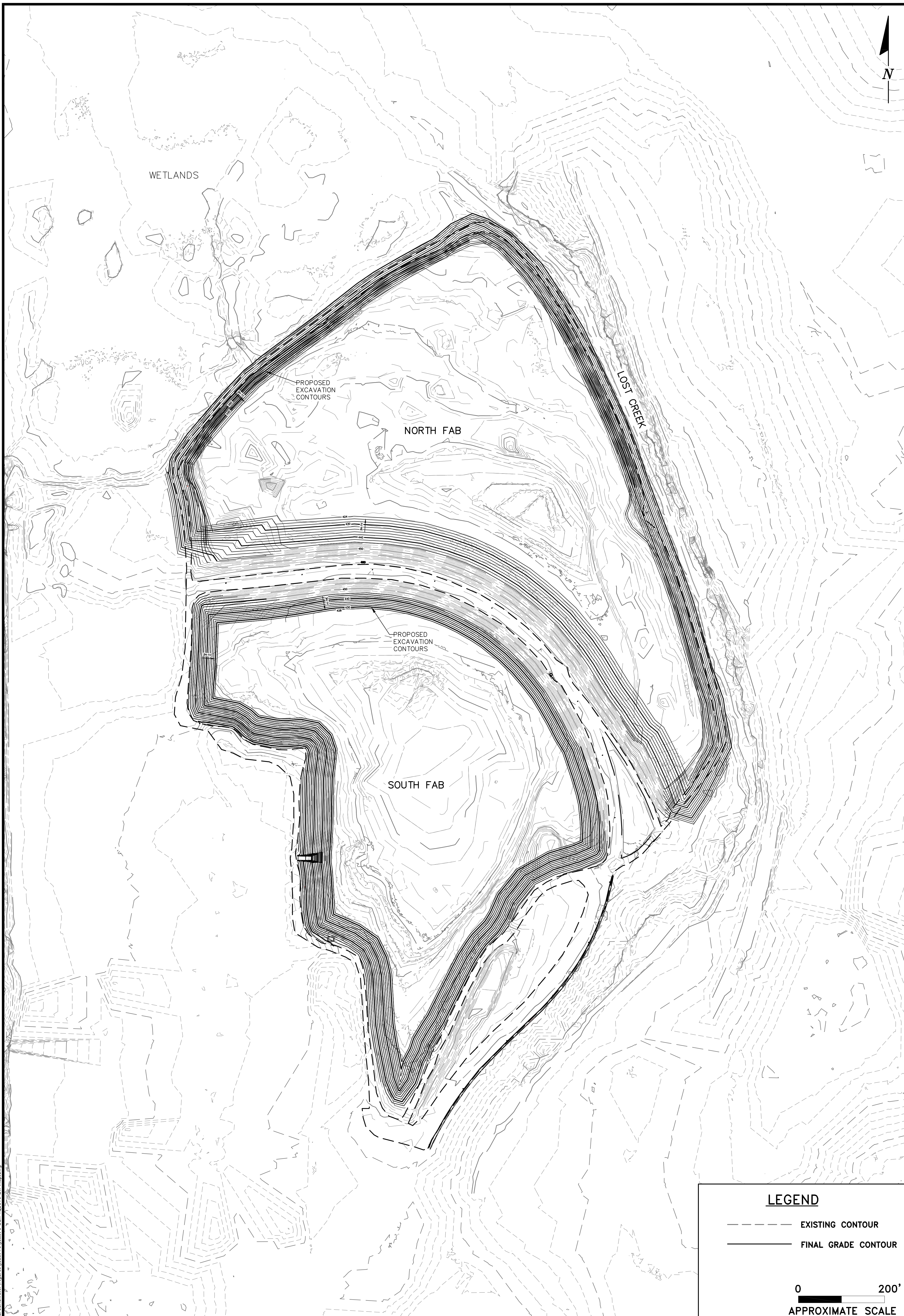
FIGURES



ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

CLOSURE BY REMOVAL SITE MAP

FORMER ASH BASIN–POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 200'	Date: October 26, 2022
KPRG Project No. 19620.1	FIGURE 1

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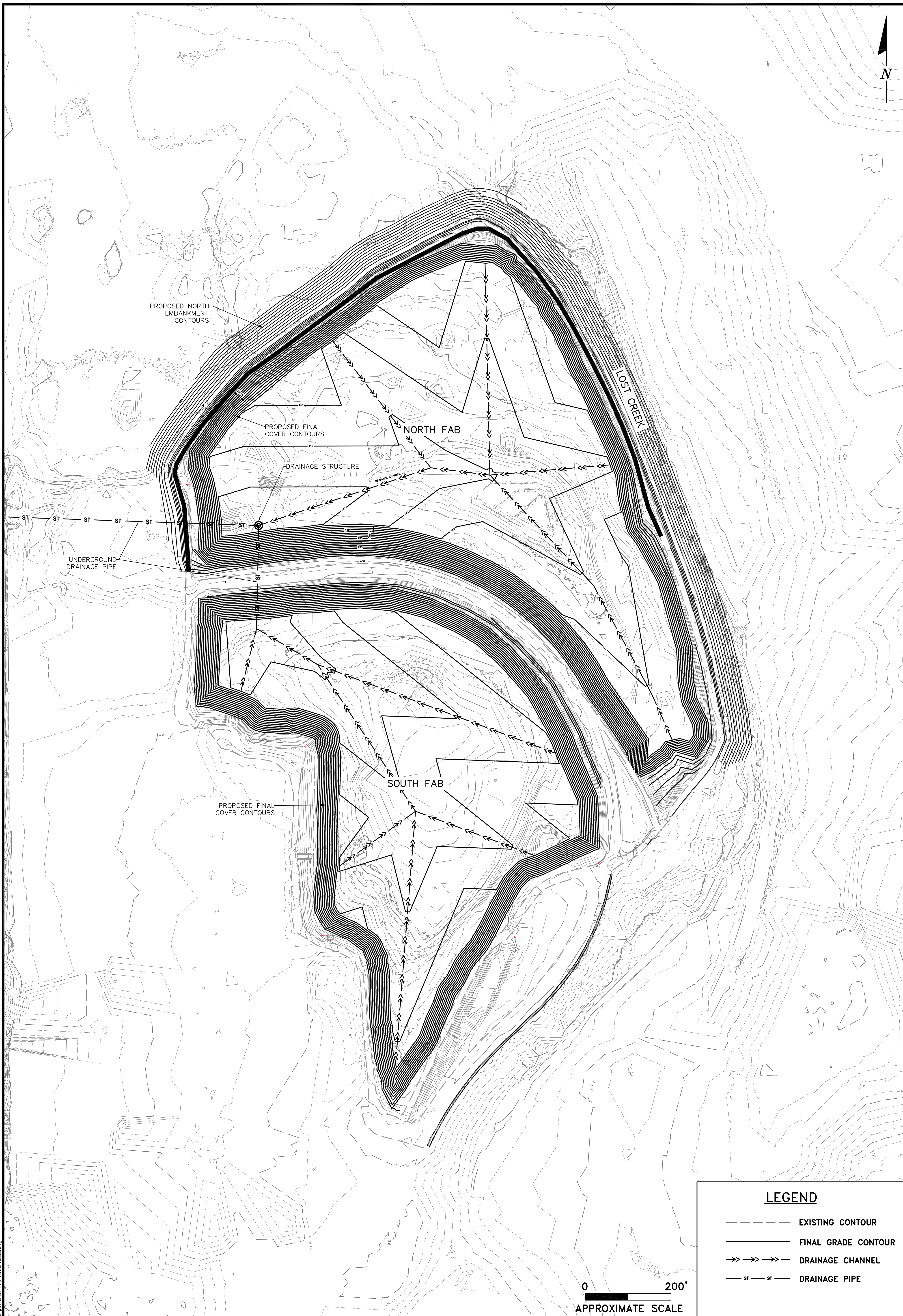

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CLOSURE IN PLACE ON NORTH & SOUTH FAB PORTIONS SITE MAP

FORMER ASH BASIN–POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 200'	Date: October 26, 2022
KPRG Project No. 19620.1	FIGURE 2

LEGEND

— — — —	EXISTING CONTOUR
———	FINAL GRADE CONTOUR
— ST — ST —	DRAINAGE PIPE

ENVIRONMENTAL CONSULTATION & REMEDIATION

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CLOSURE IN PLACE BY CONSOLIDATION WITH COVER SITE MAP

FORMER ASH BASIN–POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 200'	Date: October 26, 2022
KPRG Project No. 19620.1	FIGURE 3

LEGEND

- EXISTING CONTOUR
- FINAL GRADE CONTOUR
- ST —— ST DRAINAGE PIPE

ENVIRONMENTAL CONSULTATION & REMEDIATION

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CLOSURE IN PLACE BY IN-SITU STABILIZATION WITH SOIL COVER SITE MAP

FORMER ASH BASIN-POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 200'	Date: October 26, 2022
KPRG Project No. 19620.1	FIGURE 4

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ENVIRONMENTAL CONSULTATION & REMEDIATION

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CLOSURE SCENARIO 4 5-YEARS MODELING SEASONALITY TEST

FORMER ASH BASIN–POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 150'	Date: October 26, 2022
KPRG Project No. 19620.1	FIGURE 5

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ATTACHMENT 1

Midwest Generation Groundwater Modeling Powerton

OCTOBER 2022

BAS GROUNDWATER CONSULTING

KPRG
ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG and Associates, Inc.

Model Scenarios

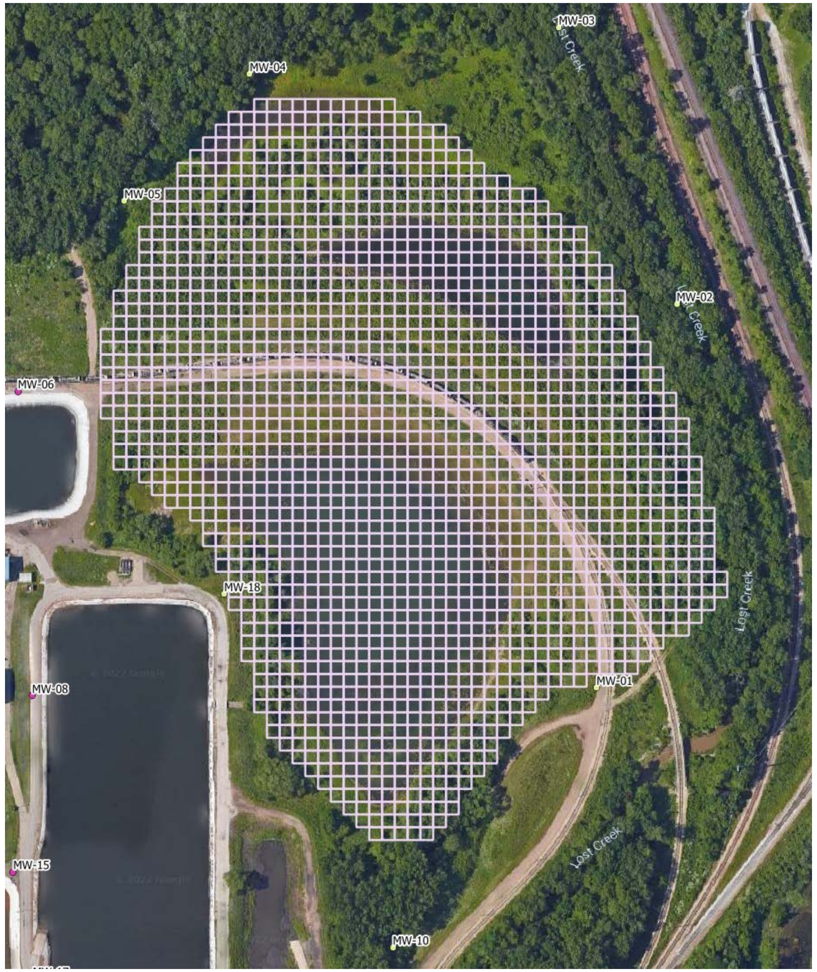
- From the calibrated, steady-state flow system:
  - Mass concentration of "1" beneath FAB, run forward for 100 years. Move mass with advection and dispersion

  Model Scenarios:
  - Use the distribution of mass concentration from year 100 in base run as the initial concentrations
  - Steady-state flow models

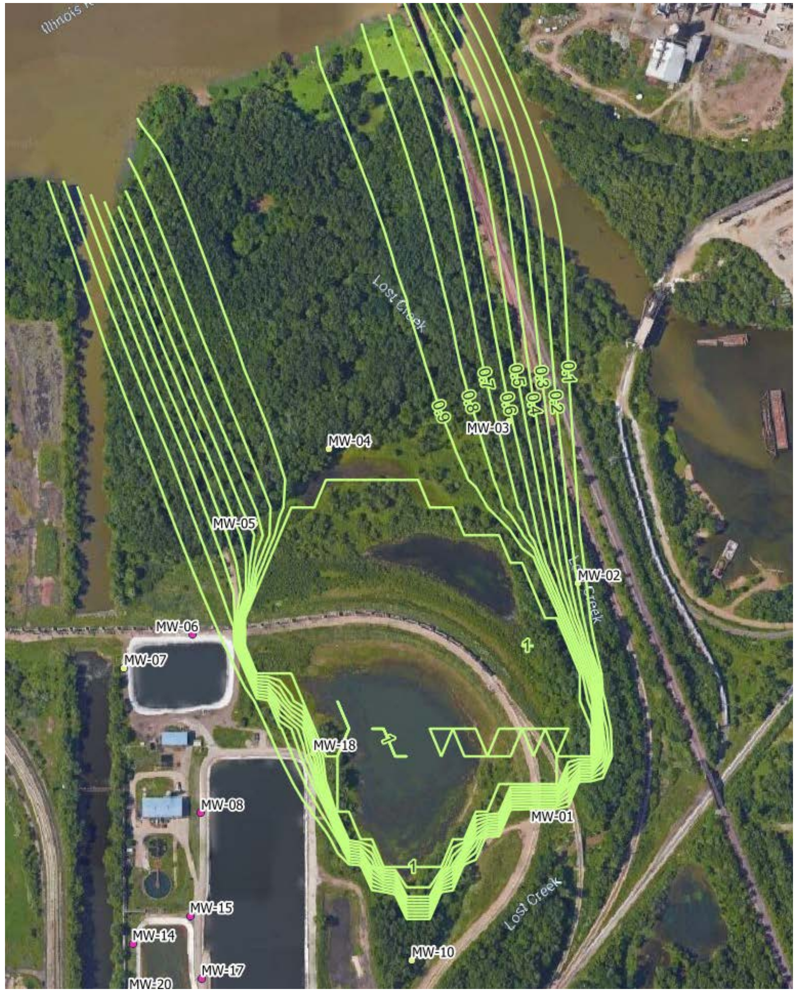
  1. Remove the mass, run for 100 years.
  2. Keep mass concentration of "1" in North and South FAB, remove flux (recharge) in pond area. Run for 100 years.
  3. Keep mass concentration of "1" in the Southern FAB and remove from the Northern FAB. Set flux (recharge) through northern pond to background recharge. Remove flux (recharge) in the southern pond area. Run for 100 years.
  4. Keep mass concentration of "1" in the northern and southern FAB but reduce Kv of layers 1&2 (~20 ft) in the FAB area to 1E-07 cm/s (2.83E-04 ft/d) and put in a Horizontal Flow Barrier (HFB) surrounding the FAB with K of 1E-07 cm/s (2.83E-04 ft/d) in layers 1&2. Remove flux (recharge) in the pond area. Run for 100 years.

Starting Concentrations

- Constant mass beneath FAB applied here:



- Resulting plume after 100 years

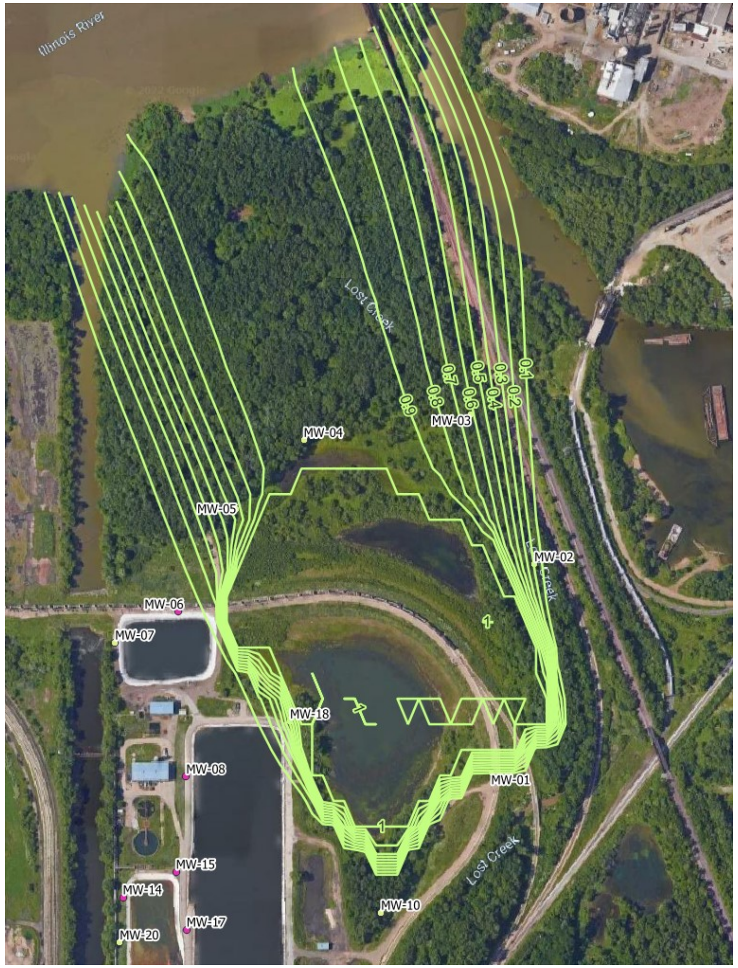


Model Scenario #1

- Model Scenario 1
  - Use the distribution of mass concentration from year 100 in base run as the initial concentrations
  - Steady-state flow model
    1. Remove the mass, run for 100 years. *i.e.: if there were a continuous mass at FAB, that created an equilibrated (steady-state) plume from the pond toward the river – then remove that mass, how would concentrations change over time.*

5-year plume distribution

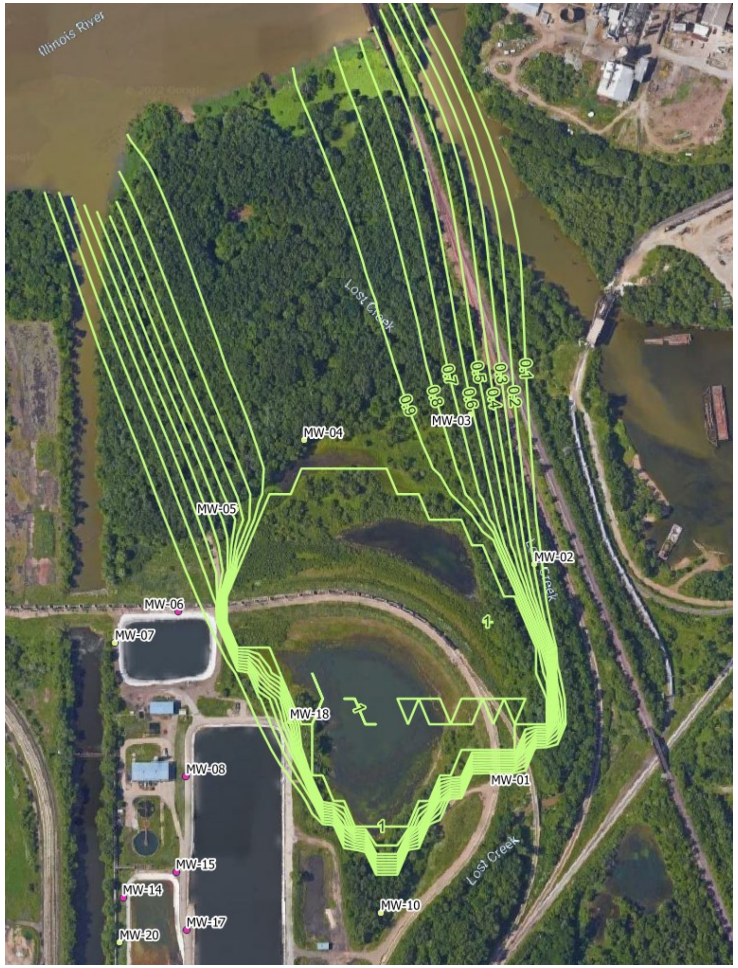
- Starting Conditions



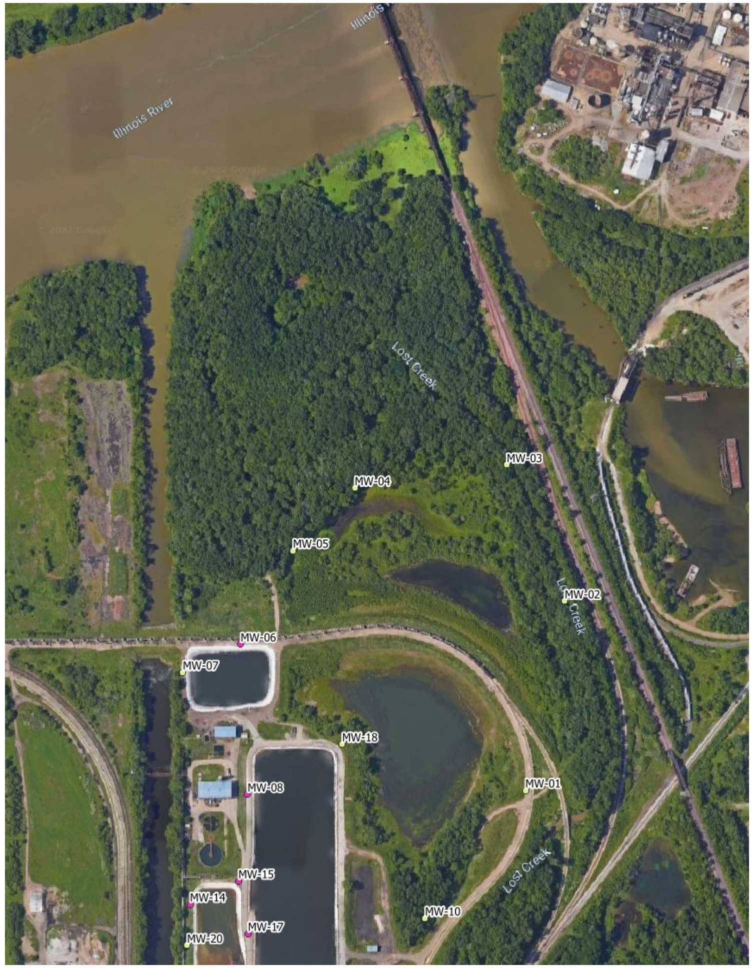
- 5 Years

25+ year plume distribution

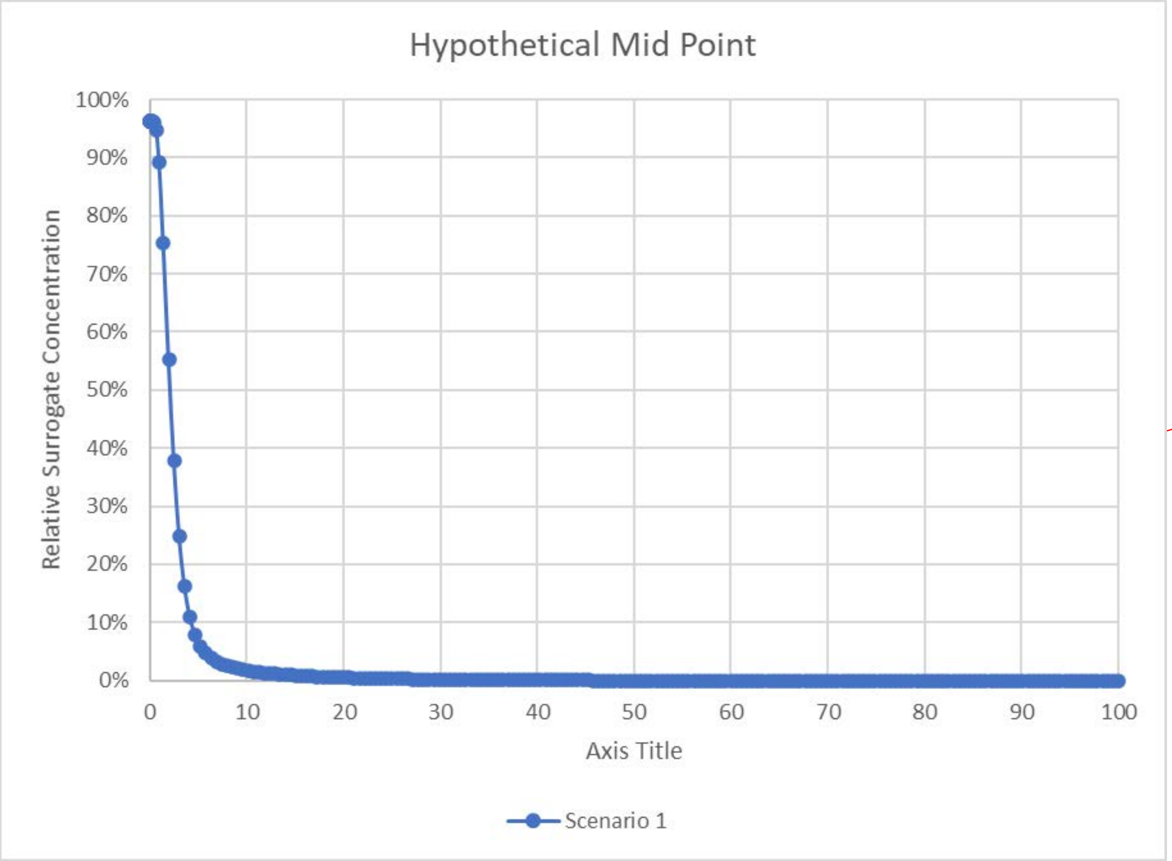
- Starting Conditions



- 25/50/100 Years



Decay over Time



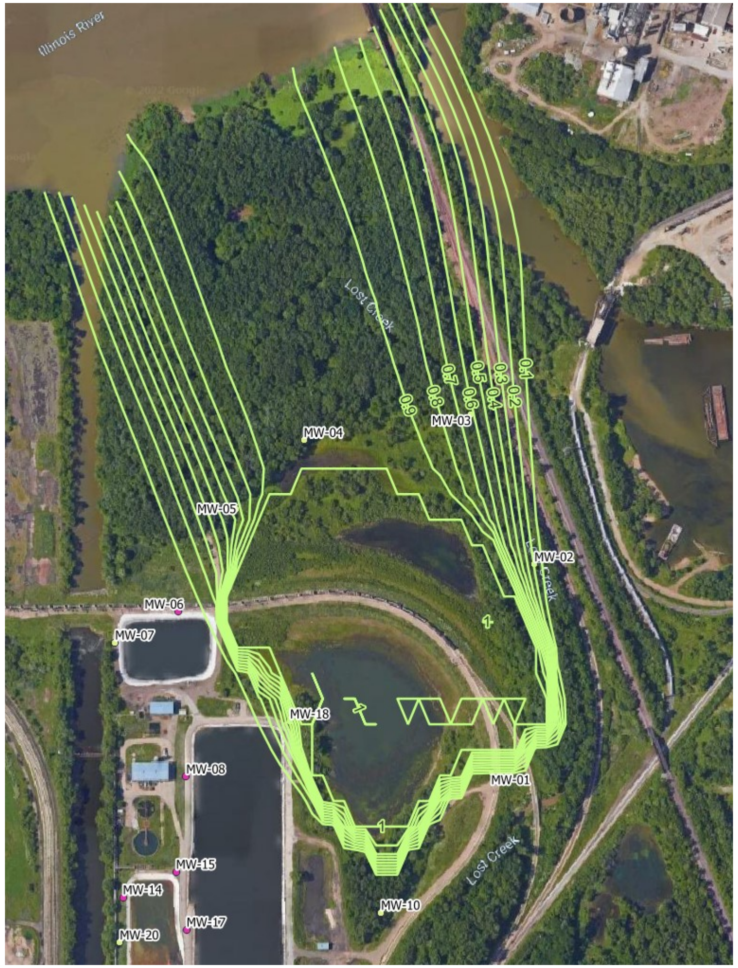
- Starting Conditions

Model Scenario #2

- Model Scenario 2
  - Use the distribution of mass from year 100 in base run as the initial concentrations
  - Steady-state flow model
    2. Keep mass in North and South FAB, remove flux in from both ponds. Run for 100 years.

5-year plume distribution

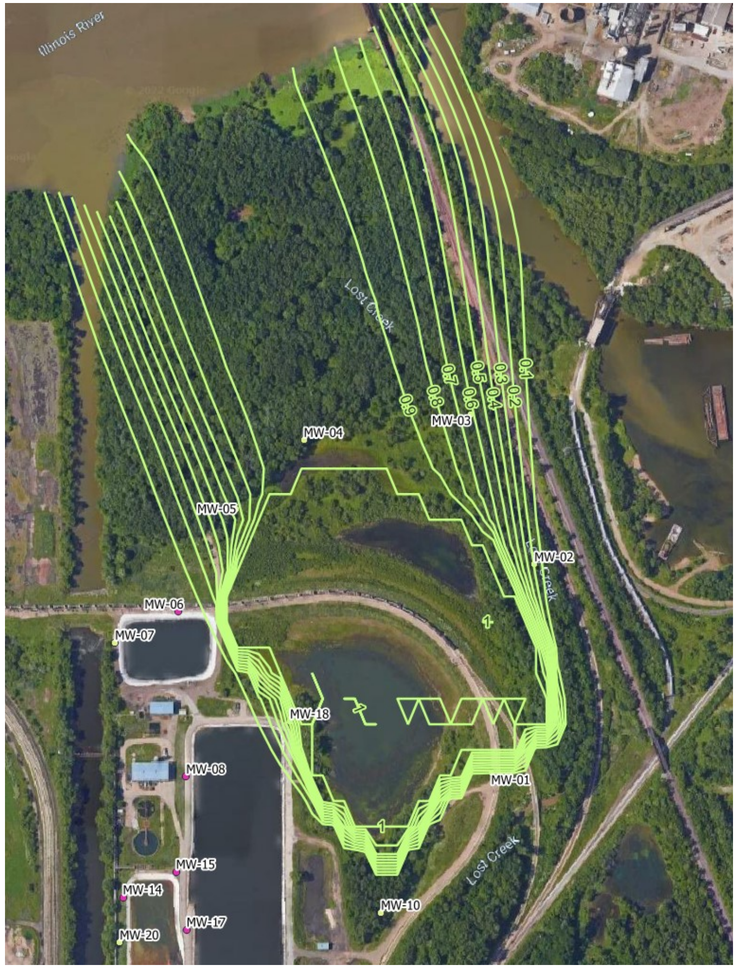
- Starting Conditions



- 5 Years

25+ year plume distribution

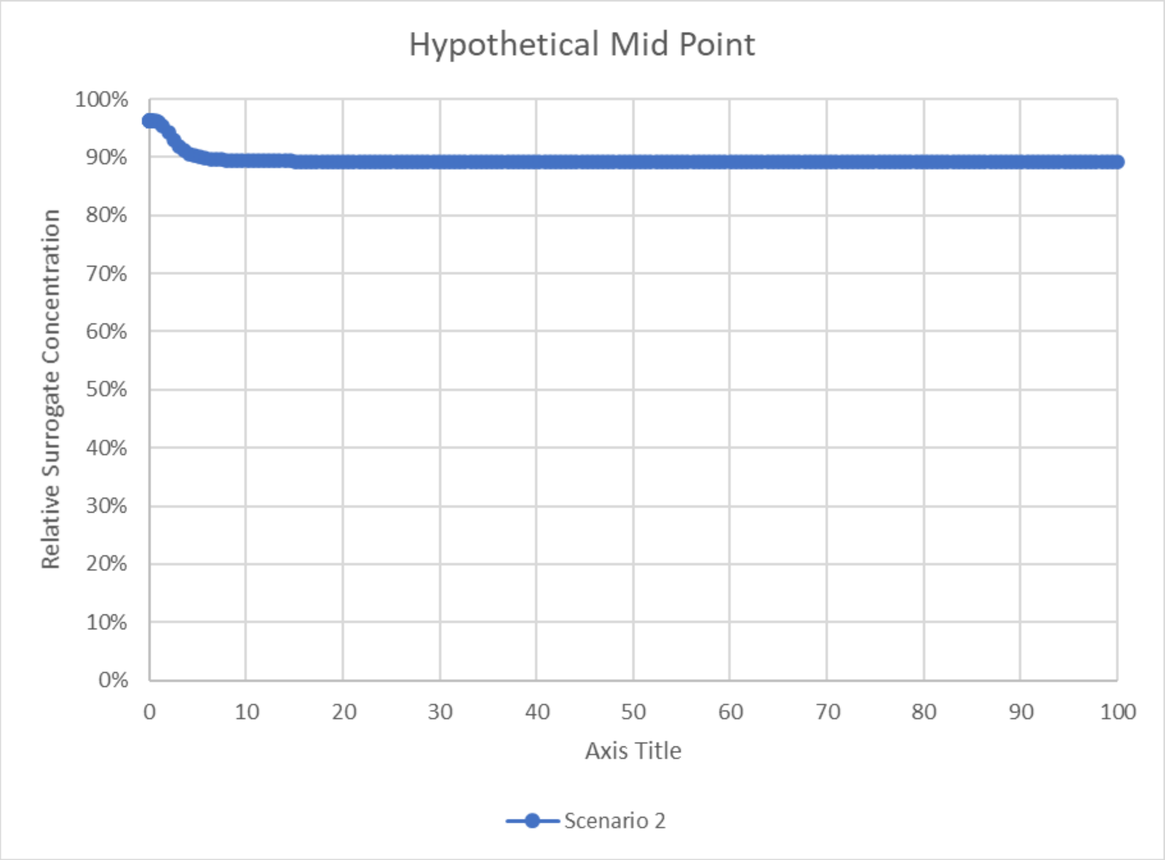
- Starting Conditions



- 25/50/100 Years

Concentrations reach steady state after 25 years

Decay over Time



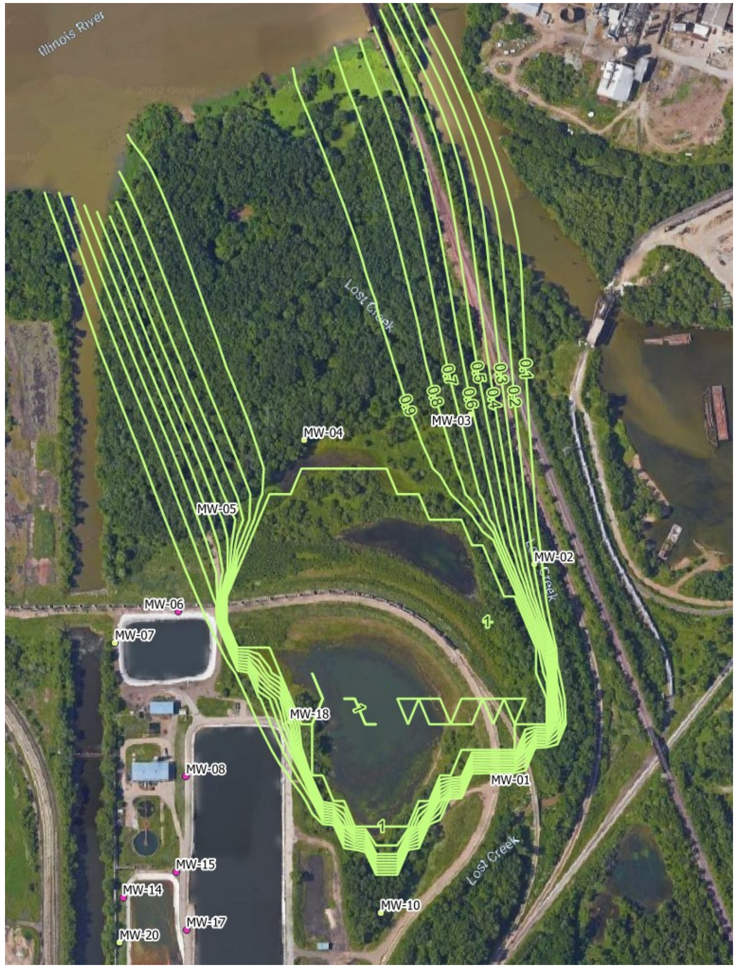
- Starting Conditions

Model Scenario #3

- Model Scenario 3
  - Use the distribution of mass from year 100 in base run as the initial concentrations
  - Steady-state flow model
    3. Keep mass concentration of "1" in the Southern FAB and remove from the Northern FAB (*see image*). Set flux in north pond area to background recharge. Remove flux (recharge) into south pond area. Run for 100 years.

5-year plume distribution

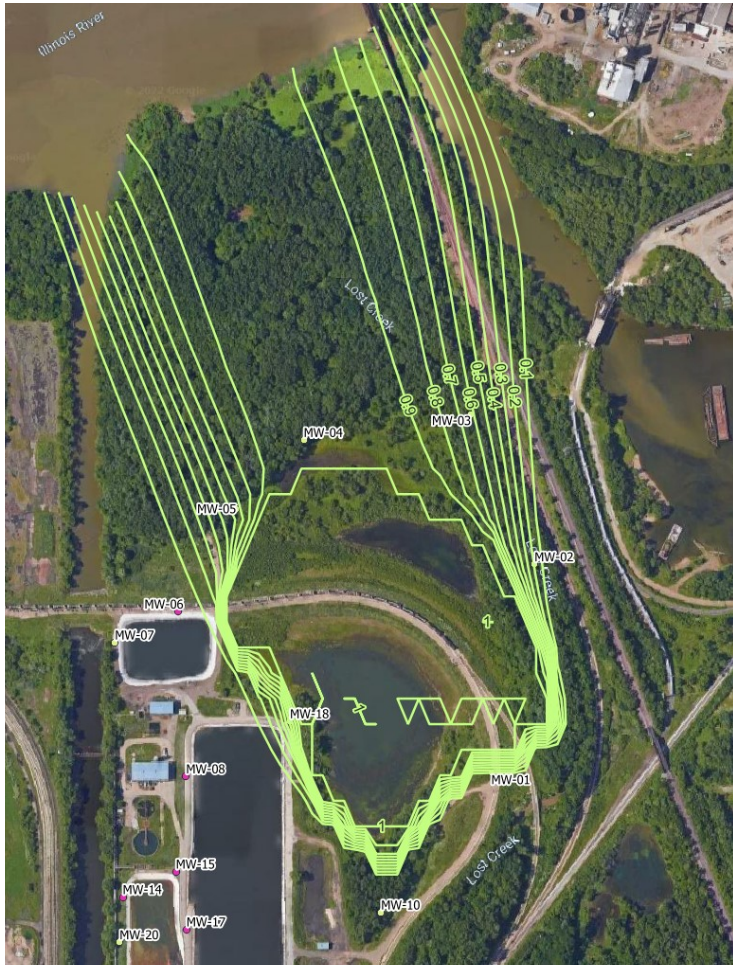
- Starting Conditions



- 5 Years

25+ year plume distribution

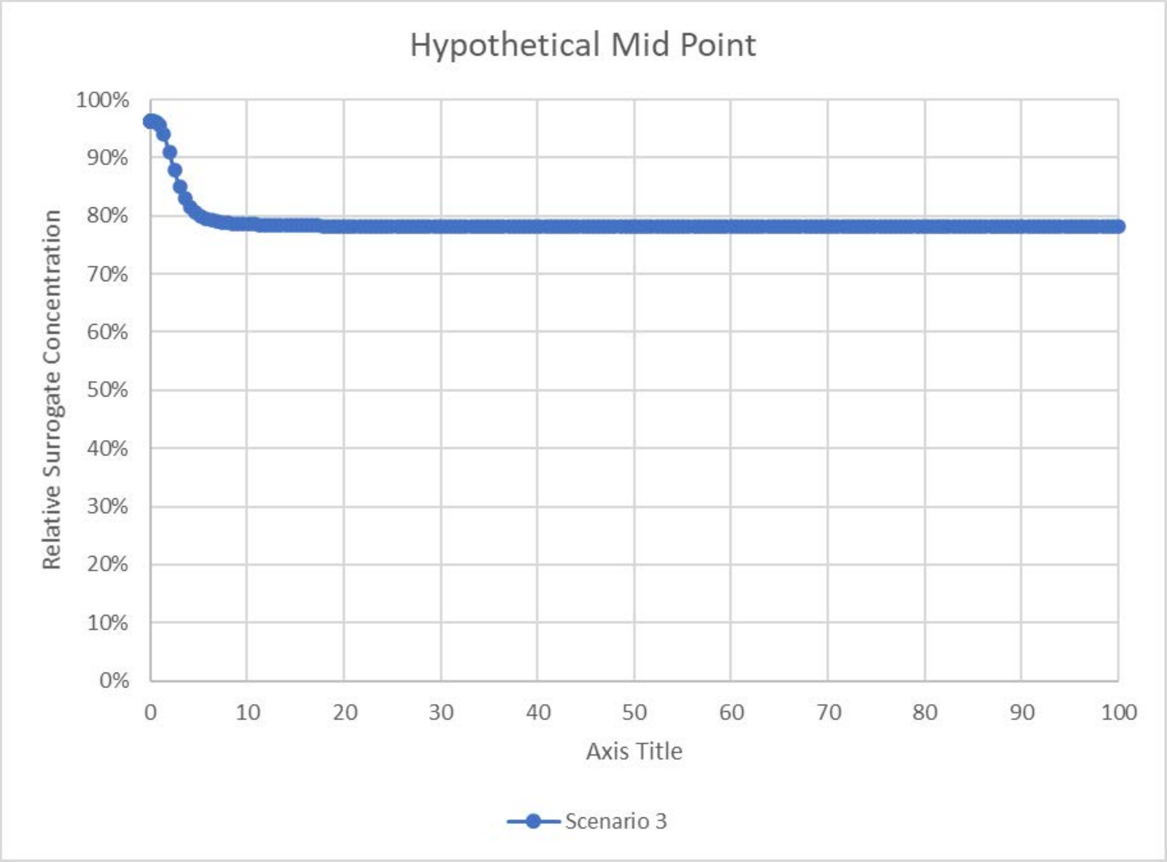
- Starting Conditions



- 25/50/100 Years

Concentrations reach steady state after 25 years

Decay over Time



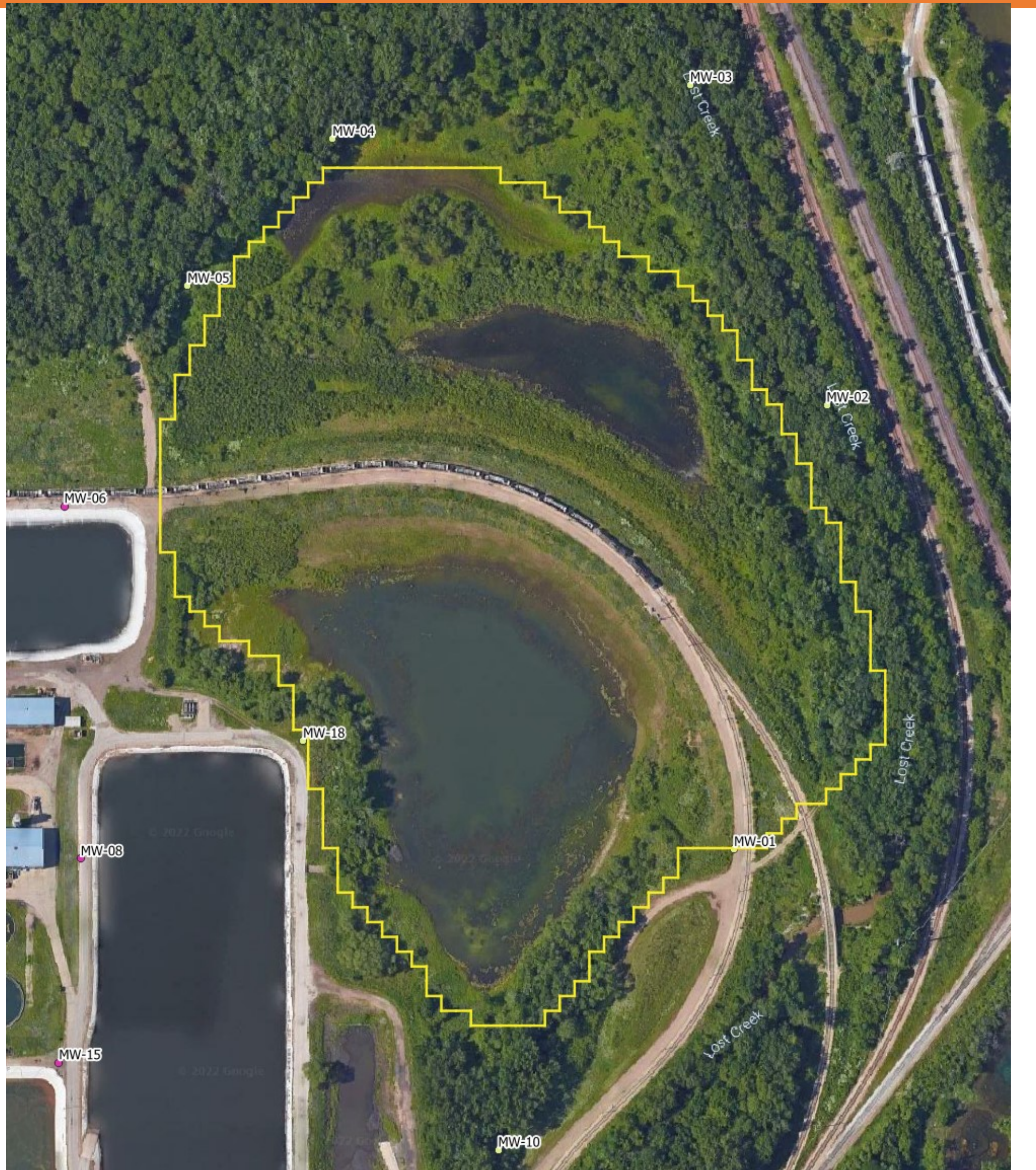
- Starting Conditions

Model Scenario #4

- Model Scenario 4
    - Use the distribution of mass from year 100 in base run as the initial concentrations
    - Steady-state flow model
        4. Keep mass concentration of “1” in the northern and southern FAB but reduce Kv of layers 1&2 (~20 ft) in the FAB area to 1E-07 cm/s (2.83E-04 ft/d), and put in a HFB surrounding the FAB with K of 1E-07 cm/s (2.83E-04 ft/d) in layers 1&2. Remove flux (recharge) through both ponds. Run for 100 years.

Model Scenario #4

- Model Scenario 4
  - The HFB barrier wall was drawn around the entire footprint of the mass in the FAB, in model layers 1 & 2 (~20 feet deep).
  - The HFB was assigned a K of 1E-07 cm/s
  - Layers 1&2 were assigned a Kv of 1E-07 cm/s in this polygon area



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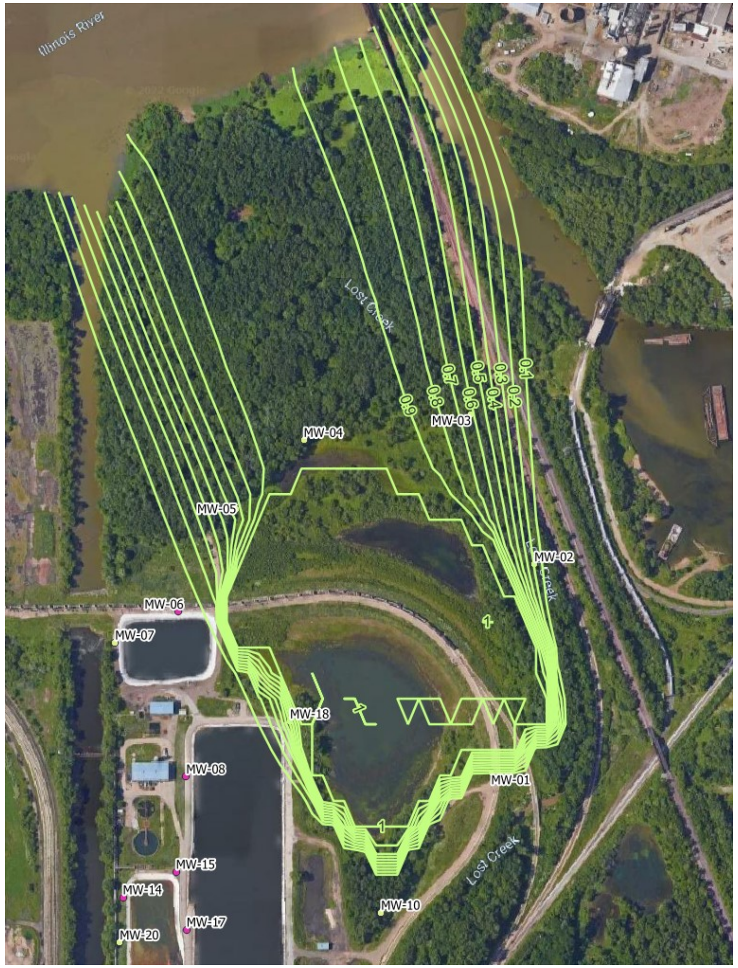
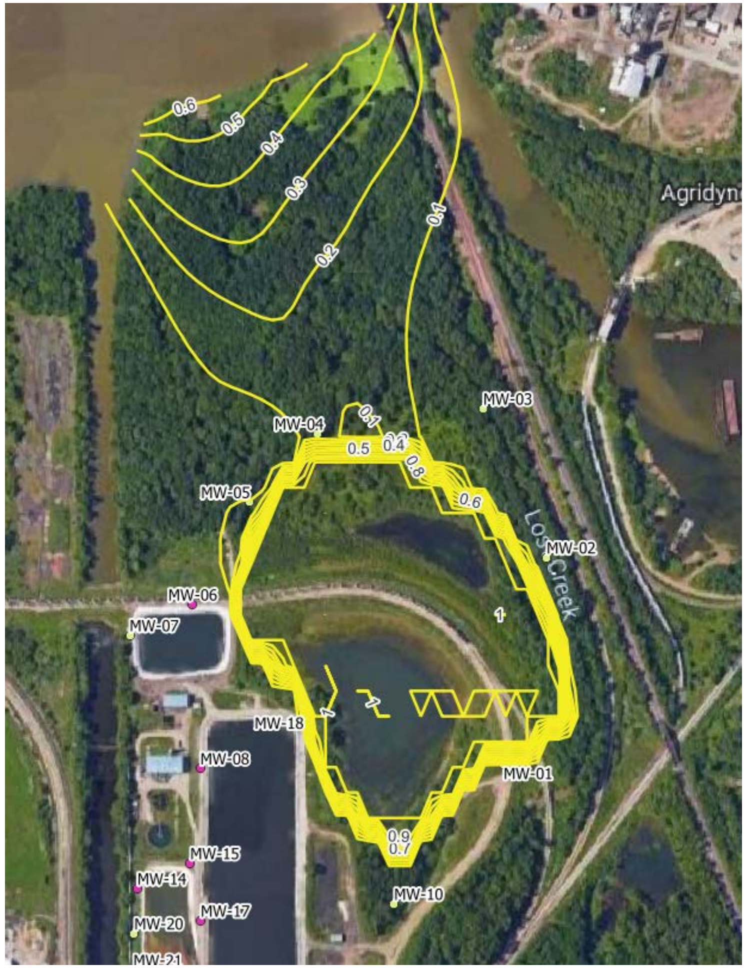
KPRG and Associates, Inc.

5-year plume distribution

- Starting Conditions

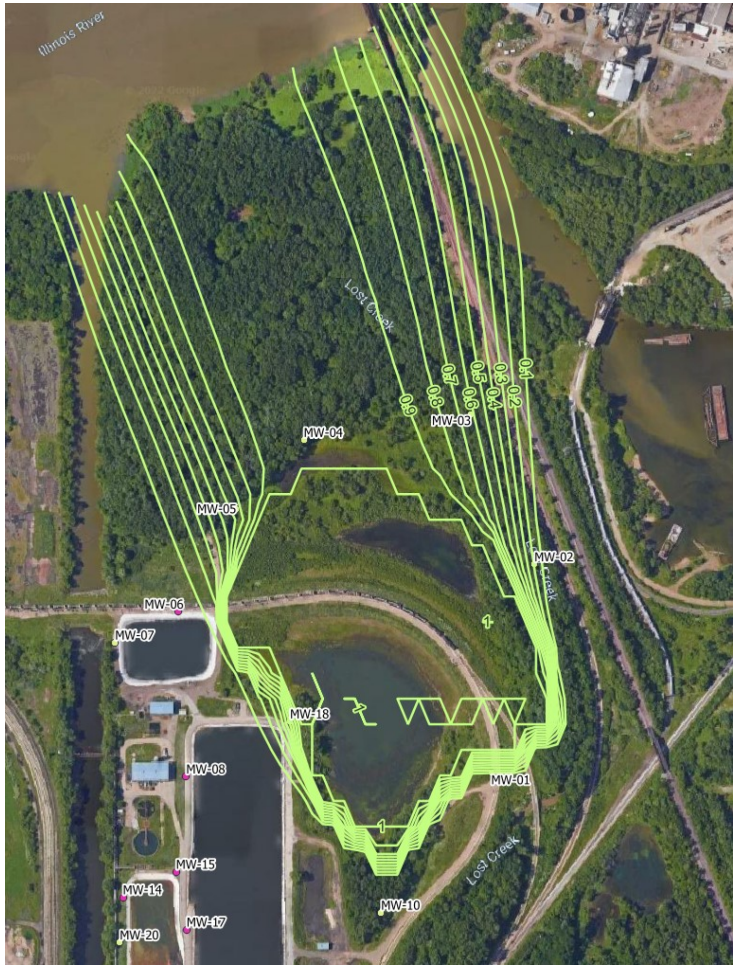


- 5 Years



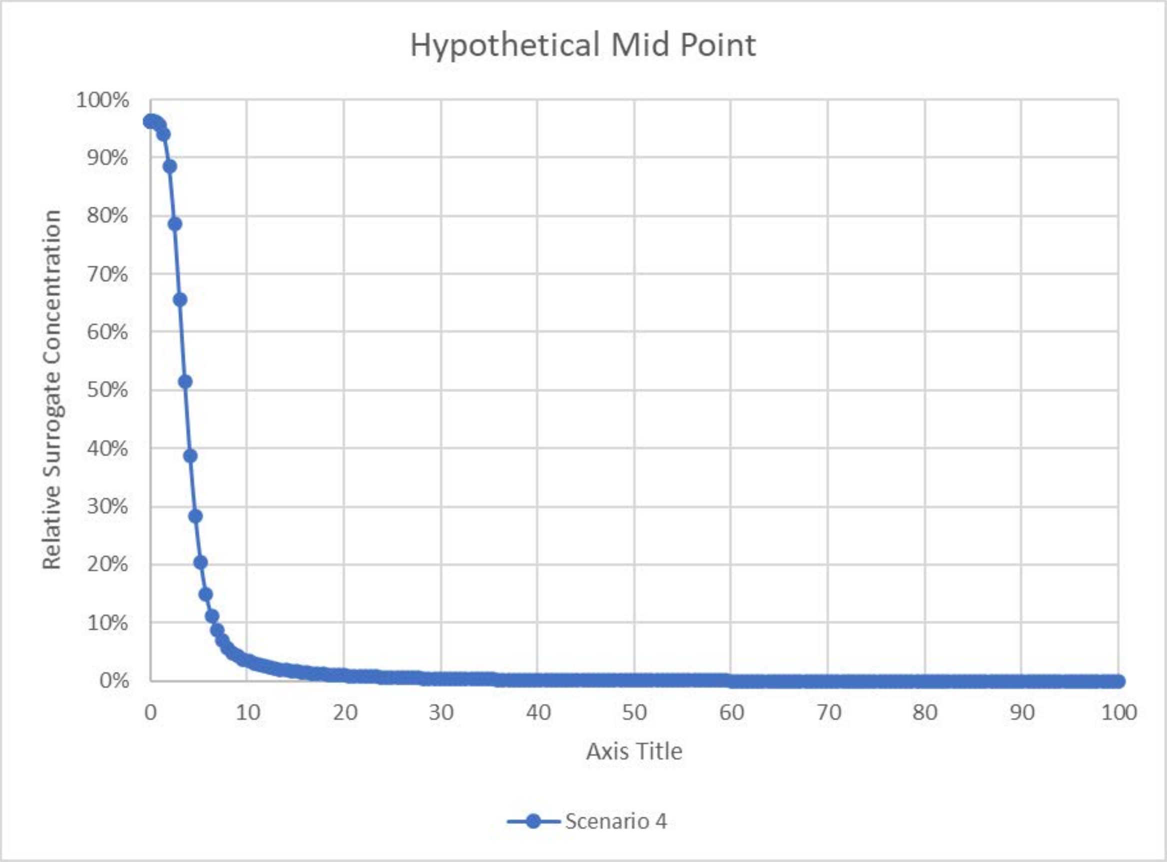
25+ year plume distribution

- Starting Conditions



- 25/50/100 Years

Decay over Time



- Starting Conditions

Attachment 7-3 – FAB Post-Closure Plan

POST-CLOSURE PLAN
FORMER ASH BASIN
POWERTON STATION
OCTOBER 2022

1.0 Introduction

This post-closure plan has been prepared in accordance with 845.780(d) for the Former Ash Basin (FAB) at the Powerton Generating Station, operated by Midwest Generation, LLC (Midwest Generation), in Pekin, IL. This post-closure plan describes the steps necessary for post-closure and methods for compliance with post-closure requirements for the FAB. The post-closure care period will begin once the closure report and closure certification documenting the closure of the FAB has been approved by the Illinois Environmental Protection Agency (IEPA) and Midwest Generation has placed the certified notification of closure as required by 845.760(f) in Powerton's operating record.

2.0 Post-Closure Monitoring and Maintenance Requirements [845.780(b)]

The post-closure monitoring and maintenance activities will be performed in compliance with 845.780(b). The post-closure care will consist of the following:

- Maintaining the integrity and effectiveness of the final cover system (FCS), including making repairs as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover.
- Maintaining the groundwater monitoring system and monitoring the groundwater in accordance with the requirements of Subpart F.

3.0 Final Cover System Monitoring & Maintenance Description [845.780(d)(1)(A)]

The FCS will be inspected annually for settlement, subsidence, erosion or other damage throughout the post closure care period. Corrective measures will be implemented if any of the above conditions are observed and any repairs made to the FCS will be repaired in accordance with the manufacturer's recommendations. If rips/tears to the engineered turf and/or geomembrane are noted, then they will be repaired by an approved ClosureTurf installer. Erosion of the sand infill that causes the engineered turf backing to become exposed will be brushed back into the exposed turf backing areas.

4.0 Groundwater Monitoring [845.780(b)(2)]

Groundwater monitoring will be performed in accordance with Part 845 Subpart F for the duration of the post-closure period. The groundwater monitoring for the FAB will occur in accordance with Part 845 Subpart F. Groundwater sampling will be conducted quarterly during the first five years of the post-closure period and groundwater elevations will be collected monthly. The groundwater monitoring frequency may be reduced to semi-annual monitoring by demonstrating compliance with 845.650(b)(4). The groundwater sampling and analysis methods will be appropriate for environmental groundwater monitoring.

This post-closure care plan is based upon the regulatory requirement to maintain and monitor the site for 30 years after closure. If at the end of the 30-year post-closure care period, the groundwater monitoring activities must continue until the groundwater monitoring data complies with 845.780(c)(2).

5.0 Post-Closure Care Contact Information [845.780(d)(1)(B)]

Environmental Specialist
Powerton Generating Station
13082 East Manito Road, Pekin, IL 61554
309-346-2165

6.0 Planned Uses Of The Property [845.780(d)(1)(C)]

The FAB will not be developed during the post-closure care period. The FAB will be inactive during the post-closure care period and it will only be accessed to perform groundwater monitoring or inspections, as noted above. The groundwater monitoring will not involve access onto the FCS. Access onto the FCS for inspections will be kept to a minimum.

7.0 Post-Closure Plan Amendments [845.780(d)(4)]

This Post-Closure Plan may be amended in accordance with 845.780(d)(3) if a change in the operation of the FAB would substantially affect the content of this Post-Closure Plan or if unanticipated events necessitate revision of the plan. If a change in operation requires amendment to the Post-Closure Plan, the plan will be amended no later than 60 days prior to the change in operation being implemented. If an unexpected event occurs that requires amendment of the Closure Plan, the plan will be amended within 60 days of the unexpected event. A request to modify the operating permit will be submitted within 30 days of the unexpected event. Amendments to this Post-Closure Plan will be certified by a professional engineer registered in the State of Illinois in accordance with 845.780(d)(4).

ATTACHMENT 8
GROUNDWATER MODELING REPORT

REPORT

NUMERICAL GROUNDWATER FLOW MODEL

Groundwater Flow Modeling in Support of CCR Compliance and Permitting
Powerton Generating Station
13082 E Manito Road, Pekin, IL 61554

Submitted to:

KPRG and Associates, Inc.
14665 W. Lisbon Road, Suite 1A
Brookfield, WI 53005

and:

Midwest Generation, LLC
13082 E. Manito Road
Pekin, IL 61554

Prepared by:

BAS Groundwater Consulting Inc.
3649 Evergreen Parkway Ste 1510
Evergreen, Colorado 80437
+1 720 334-8249

October 27, 2022

BAS GROUNDWATER CONSULTING

NUMERICAL GROUNDWATER FLOW MODEL

Groundwater Flow Modeling in Support of CCR Compliance and Permitting
Powerton Generating Station
13082 E Manito Road, Pekin IL 61554

BAS Project Number 21141401

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October 27, 2022

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Rochelle Destrampe, RG
Senior Hydrogeologist/*BAS Groundwater Consulting Inc.*

DISTRIBUTION LIST

Midwest Generation, LLC

KPRG and Associates, Inc.

Executive Summary

This report documents the results of a numerical groundwater modeling analysis of groundwater flow in the vicinity of the Former Ash Basin (FAB) at the Midwest Generation, LLC (Midwest Generation) Powerton Generating Station (Powerton Station). The purpose of the numerical groundwater modeling was to create a tool capable of evaluating groundwater flow paths in the vicinity of the FAB and to provide a platform upon which proposed engineering scenarios for closure can be overlain and evaluated for their short and long-term effectiveness relative to improvements of groundwater quality. The results of the modeling are intended for input into the engineering considerations and evaluations of various closure alternatives being evaluated for the FAB. This modeling is a requirement under Illinois Administrative Code Title 35 Part 845.220(d)(3).

The model has a non-uniform grid spacing of 25 to 50 feet and has five layers. The groundwater flow model was run in the software MODFLOW-NWT and the transport model was run with the software MT3D-USGS. The model represents the regional flow direction to the Illinois River to the north with constant head and general head boundaries on the south and west sides of the model, respectively.

The model was calibrated to water levels measured in monitoring wells upgradient and downgradient of the FAB. The model achieved a good calibration, with a scaled root mean squared error in the site wells of less than 10 percent. The model was the most sensitive to the modeled values of hydraulic conductivity and vertical anisotropy and less sensitive to the regional recharge rate.

The existing groundwater quality data do not indicate groundwater impacts above Section 845.600(a) groundwater protection standards (GWPSs) downgradient of the FAB. Therefore, to meet the modeling requirements of Part 845.220(d)(3), a hypothetical initial situation was created in which a constant surrogate mass (relative concentration of “1”) was modeled at the FAB and allowed to discharge freely to groundwater. The resulting hypothetical distribution of concentrations served as the initial concentrations to four predictive scenarios of in-place closure alternatives. The model scenarios indicate improvement to groundwater quality in all four closure alternatives. It is noted that this is improvement over existing conditions which, as previously noted, are already below the proposed GWPSs for the FAB.

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TABLES

FIGURES

Table of Abbreviations

Abbreviation	Definition
A	Cross sectional area
ADAMP	Adaptive damping solution method
amsl	Above mean sea level
af/yr	Acre-feet per year
CCR	Coal Combustion Residuals
cfd	Cubic feet per day
cm/s	Centimeters per second
dh/dl	Hydraulic gradient
FAB	Former Ash Basin
ft bgs	Feet below ground surface
ft/d	Feet per day
ft^2	Square feet
ft/ft	Feet per foot
GHB	General head boundary
GIS	Geographic information system
gpm	Gallons per minute
GWPS	Groundwater Protection Standard
HCLOSEXMD	Head change closure criterion
HFB	Horizontal Flow Boundary
ISGS	Illinois State Geological Survey
ILWATER	Illinois Water Well Database
ISWS	Illinois State Water Survey
in/yr	Inches per year
LINMETH	XMD linear solution method
K	Hydraulic conductivity
MAP	Mean annual precipitation
mg/l	Milligrams per liter

Abbreviation	Definition
PCGn	Preconditioned Conjugate Gradient
Q	Darcy Flux
RMS	Root Mean Squared
TDS	Total Dissolved Solids
%	Percent

1.0 INTRODUCTION

This report documents the results of a numerical groundwater modeling analysis of groundwater flow near the on-site ash basins at the Midwest Generation, LLC (Midwest Generation) Powerton Generating Station (Powerton Station), specifically in the vicinity of the Former Ash Basin (FAB). The numerical groundwater flow and transport modeling was conducted as required under the Ill. Adm. Code Title 35, Part 845: Standards for the Disposal of Coal Combustion Residuals (CCR) in Surface Impoundments (State CCR Rule) Section 845.220(d)(3) in support of the engineering closure alternatives evaluation being completed for the FAB.

2.0 BACKGROUND

The Powerton Station is an active coal power generating station located along the southern bank of the Illinois River in Section 9, Township 24 North, Range 5 West, in the City of Pekin, Tazewell County, Illinois. The locations of the facility and ash basins are shown on Figure 1. Powerton Station is bordered on the north by the Illinois River, on the west by Lake Powerton, on the south by agricultural land, and on the east by industrial properties. The site has two active, lined basins named the Ash Surge Basin (ASB) and the Ash ByPass Basin (ABB), a lined basin called the Metal Cleaning Basin located immediately west of the ASB, and an unlined inactive basin called the Former Ash Basin (FAB) located to the northeast of the ASB (Figure 1). There are 21 monitoring wells located on site (MW-01 through MW-21), 17 of which are part of the CCR monitoring program (MW-01 through -05, MW-08 through -15, MW-17 and -18, and MW-20 and -21). The locations of the 21 monitor wells are shown on Figure 2. CCR monitoring wells specifically associated with the FAB are wells MW-01 through -05 and -10. Wells MW-01 and MW-10 are upgradient monitoring wells and wells MW-02 through MW-05 are downgradient monitoring wells.

The purpose of the numerical groundwater modeling was to create a tool capable of evaluating groundwater flow paths near the basins and to estimate impacts to contaminant concentrations at the Powerton site associated with various basin closure alternatives being considered. The focus of this report is on closure alternatives being considered specifically for the FAB.

3.0 REPORT ORGANIZATION

The remainder of this report is organized as follows:

- Section 4.0: Conceptual Model – This section provides information that was used to refine the conceptual model of groundwater flow at Powerton Station. The conceptual model formed the basis for construction and calibration of the numerical model.
- Section 5.0: Numerical Groundwater Flow Model – This section provides a description of the numerical model construction, calibration, and sensitivity analysis. The calibrated groundwater flow model was used as the basis to conduct predictive analyses of closure construction activities.
- Section 6.0: Predictive Model Simulations – This section provides results of predictive analyses that were used to evaluate changes to the water table, groundwater flow paths, and contaminant concentrations beneath and adjacent to the ash basins.

- Section 7.0: Conclusions – This section provides a summary of the modeling and predictive analysis.
- Section 8.0: References – This section provides a list of references used in the analysis documented in this report.

Figures and tables follow the main text of the report.

4.0 CONCEPTUAL MODEL

Site data were compiled as part of this modeling study and used to update the conceptual model of groundwater flow at Powerton Station. The numerical model was constructed to represent the updated conceptual model.

Components of the conceptual model of groundwater flow include:

- climate
- lithology and geologic framework
- aquifer properties
- nature of groundwater flow
- water budget

Each of these components of the conceptual model is presented below.

4.1 Climate

Powerton Station is located within the humid continental climate zone with warm to hot and humid summers and cold and snowy winters. There are 13 weather stations located within approximately 20 miles of Powerton Station that provide data to evaluate long-term trends in precipitation. These stations are shown on Figure 3 and are listed here:

- Bartonville 5 SW, IL US
- Chillicothe, IL US
- General Wayne A Downing International Airport, IL US
- Germantown Hills, IL US
- Morton, IL US
- Morton 1.0 S, IL US
- Morton 1.0 SSE, IL US

- Pekin 1.2 NNW, IL US
- Peoria Airport 3 SW, IL US
- Peoria 1.7 SSE, IL US
- Peoria 5 NW, IL US
- Peoria Station
- Washington 2 W, IL US

Precipitation data from complete years from these stations were averaged for monthly and annual averages and are provided in Table 1. These stations provide data between 1991 and 2020. Long-term average monthly precipitation has ranged from approximately 2 inches in January and February to over 3 inches in late Spring and Summer (April through September). The long-term mean annual precipitation (MAP) from these data is 39.2 inches.

4.2 Geology

The geology surrounding Powerton Station was summarized in the Application for Initial Operating Permit submitted to IEPA on October 31, 2021 (Midwest Generation, 2021) as approximately 100 to 125 feet of unconsolidated deposits consisting mainly of alluvial sands and gravels with some interspersed clays and silty clays, underlain by alternating layers of limestone, shale, and coal of the Carbondale Formation. Local to Powerton Station, the site stratigraphy has been characterized to a depth of approximately 41 feet (ft) below ground surface (bgs) as:

- Fill (16 to 24.5 feet thick) consisting of tan, brown and black fine to medium sand/silty sand with some gravel and clay seams. Several locations also included black cinders and brick fragments.
- Clay/silty clay/silts (0 to 18 feet thick) consisting of olive, brown to gray clays, silts and silty clays with some more organic rich layers. May locally contain fine silty sand and/or fine sand. This unit is not mappable across the site (i.e. discontinuous).
- Sand and gravel (thickness undetermined; borings terminate within unit) consisting of light brown, brown and/or gray medium to coarse sands and gravels.

Surficial geology was obtained from the Surficial Geology of Tazewell County, Illinois (Johnstone, 2003) and is shown on Figure 4. Borehole logs for the site wells were compiled along with logs for nearby wells from the Illinois State Geological Survey's (ISGS) Water and Related Wells Database (ILWATER) and are presented in Table 2 and Figure 5. Lithology in the borehole logs is displayed in three dimensions in Figure 6 and includes the groups:

- Fill
- Topsoil
- Organics

- Clay
- Loam
- Silt and Clay
- Sandy Clay
- Clay, Sand, and Gravel
- Sand
- Coal
- Coarse sand and/or gravel
- Dirty coarse sand and/or gravel
- Hardpan
- Limestone
- Shale

Near the site the lithology is dominated by silt and clay, and sand and gravel. The lithologic intervals provided guidance on initial model calibration through the definition of zones of hydraulic conductivity that were later modified as discussed further in Section 5.2.1.

4.3 Aquifer Properties

Aquifer properties of hydraulic conductivity (K) and storage are important controls on groundwater movement and behavior and are necessary parameters to define in a numerical model. Hydraulic conductivity values were initially estimated for monitor wells MW-2, -5, -8, -9, and -10 from slug tests (Patrick Engineering, 2011). The geometric mean of the test data for these wells was approximately 350 feet per day (ft/d) for each well, as calculated by (Patrick Engineering, 2011). The slug test data were reviewed as part of this current modeling study and the data were reanalyzed using corrected input values for the well casing and borehole dimensions and effective porosity of the sand filter pack material. The revised hydraulic conductivity estimated values are summarized in Table 3 for comparison. The revised geometric mean of the test data for these wells decreased to approximately 120 ft/d for each well. The hydraulic conductivity estimate for MW-8 should be used with caution as this monitor well was screened through site fill and native silty clay. The aquifer properties derived from this well have likely been impacted by the more porous non-native fill material in the upper portion of the well screen and are likely not indicative of the silty clay aquifer.

4.4 Nature of Groundwater Flow

Groundwater occurs under unconfined conditions with depth to water ranging from approximately 12 feet at monitor well MW-10 to approximately 33 feet at monitor well MW-13 ((Midwest Generation, 2021b). Groundwater contour maps provided within the 2021 Annual Consolidated Report for site wells (both CCR program and non-CCR program wells) show groundwater flow directions in both the silt/clay unit and the gravelly sand unit. Monitor wells MW-06, -08, -12, -14, -15, -17, -20 and -21 are screened in the shallow, discontinuous silt/clay unit indicating that this unit is present beneath and to the west of the ASB, and to the north of the Service Water Basin. The remaining site wells are screened in the underlying gravelly sand unit. Within the discontinuous silty clay unit, groundwater flow is generally from east to west. Within the underlying gravelly sand unit groundwater flow is generally to the north with some divergence to the northeast and northwest.

Groundwater level measurements from site wells since June 2011 were provided by KPRG. A summary of these data is provided in Table 4 including minimum and maximum measured water level elevations and the average water level elevation from the 1st and 3rd quartiles to eliminate statistical outliers. These average water levels were used as the water level calibration targets. These data from the site wells were supplemented with water levels in shallow wells obtained from the Illinois Domestic Wells Database and the Illinois Water and Related Wells Database (2021) (Table 4). These data are older, typically representing the depth to water at the time the well was drilled and were limited to those wells with water levels that were generally consistent with the groundwater elevation contour maps routinely generated by KPRG as part of groundwater monitoring. These water level data were deemed much less reliable and were given a low weight during model calibration.

4.5 Impacted Groundwater

As noted above, the CCR groundwater monitoring network for the FAB has six wells: MW-01 through -05, and well MW-10. Wells MW-01 and MW-10 are upgradient monitoring wells and wells MW-02 through MW-05 are downgradient monitoring wells. CCR sampling under the Federal Rule was initiated in 2015 for the identified Appendix III and Appendix IV parameters and assessment monitoring under that program is ongoing for Appendix III and Appendix IV parameters. Also, starting in second quarter 2021, sampling under the new State CCR Rule was initiated quarterly for all Federal CCR Rule Appendix III/IV parameters plus turbidity since the State Rule does not distinguish between detection and assessment monitoring parameter lists.

Relative to the most recent (November 2021) and more comprehensive sampling under the State CCR Rule, concentrations of all 22 monitored water quality parameters in the four downgradient monitoring wells were below the Proposed Groundwater Protection Standards (GWPSs) presented in the above referenced Application for Initial Operating Permit as well as in the subsequently submitted 2021 Annual Consolidated Report for Powerton. It is further noted that for the last four years of monitoring, there were no detections in downgradient FAB monitoring wells above the most stringent GWPSs under Section 845.600(a) which are based on Class I groundwater quality standards under Part 620.

4.6 Water Budget

A conceptual water budget was developed for Powerton Station to provide context of the results of the calibrated model water budget (ASTM D5447-17, 2017). The identified and estimated components of the conceptual water budget included:

- recharge to groundwater
- inflow of groundwater from the south
- inflow of water from retention ponds
- outflow of groundwater toward Powerton Lake
- discharge of groundwater to the Illinois River

The conceptualized estimate for each of these components of the water budget is discussed below. The conceptual water budget was used as an initial definition of the water budget in the numerical model, and components were adjusted during model calibration.

4.6.1 Recharge to Groundwater

Recharge from the infiltration of precipitation to the water table has been estimated in a regional, general context for central Illinois:

- A groundwater model of Kane County and Northeastern Illinois estimated recharge in the southwestern portion of the regional model near Peoria, Illinois at approximately 5 in/yr (Meyer, Roadcap, Lin, & Walker, 2009).
- A groundwater model of southwest McLean and southeast Tazewell counties estimated recharge between 0.8 and 1 in/yr (Wilson, 1998).
- A groundwater model developed near Bloomington estimated recharge at approximately 1 percent of MAP.
- The Illinois State Water Survey (ISWS) estimated shallow groundwater recharge using a geographic information system (GIS) approach coupled with pattern recognition (Interagency Coordinating Committee on Groundwater, 2010). A generalized map of potential recharge at Illinois power plants shows 'low' to 'very high' recharge potential near Powerton Station.

Recharge from precipitation was initially assumed in the groundwater model at 1.2 in/yr, which equates to approximately 3 percent of MAP. This rate over the model domain (Section 5.1) equates to approximately 100 acre-feet per year (af/yr) (11,887 cubic feet per day (cfd)).

4.6.2 Groundwater Inflow from the South

The boundaries to the groundwater model are discussed below in Section 5.1.3. Groundwater flow into the model domain from the south was estimated using Darcy's Law:

$$Q = KA\frac{dh}{dl}$$

where Q is the Darcy Flux, K is the hydraulic conductivity (ft/d), A is the cross-sectional area (feet), and dh/dl is the hydraulic gradient (ft/ft). Using the length of the southern model boundary (9,167 feet), an assumed thickness of unconsolidated materials above the shale of 75 feet, hydraulic conductivity of 116 ft/d (the geometric mean of test data from site wells, not including well MW-08 (Section 4.3)), and a hydraulic gradient of 0.0048 ft/ft (the average estimated hydraulic gradient in the sand and gravel unit (Midwest Generation, 2021b) a rough estimate of groundwater flow from the south in the unconsolidated sediments above the Carbondale Formation was calculated as 3,208 af/yr (382,842 cfd).

4.6.3 Inflow from Retention Ponds

There are several stormwater retention ponds that often contain water and for which there is no information regarding if the ponds have liners including:

- the off-property stormwater retention pond south of the site (and south of the railroad tracks), and
- the East Yard Runoff Basin located southwest of the ASB.

The volume of recharge to groundwater associated with these retention ponds is an uncertain variable. The initial assumption for their inclusion in the numerical model was that these ponds, and the FAB, provide seepage to groundwater and the seepage amount was estimated during model calibration and tested during sensitivity model runs

4.6.4 Groundwater Outflow toward Powerton Lake

Groundwater flow west toward Powerton Lake was estimated using Darcy's Law, similar to the estimate for flow in from the south. Using a length of the western model boundary where the heads within the model domain are greater than the GHB boundary of 440 feet (3,845 ft), a rough estimate of groundwater flow to Powerton Lake in the modeled area is approximately 1,345 af/yr (160,567 cfd).

4.6.5 Groundwater Discharge to Illinois River

Groundwater flow north to the Illinois River was estimated using Darcy's Law in a similar way as estimated for flow toward Lake Powerton with a revision for the length of the northern model domain along the river. A rough estimate of groundwater flow to the Illinois River in the modeled area is approximately 1,966 af/yr (234,677 cfd).

This discussion of the conceptual water budget is an order-of-magnitude, first approximation to estimate the components of the water budget that will be represented in the numerical model. The conceptual water budget will be used to compare to the modeled water budget, and to provide initial estimates for defined boundary conditions.

5.0 NUMERICAL GROUNDWATER FLOW MODEL

A numerical groundwater flow model was constructed for Powerton Station. This section describes the construction and calibration of the numerical model.

5.1 Model Construction

The numerical model was created to cover the area of the ash ponds at Powerton Station (Figure 8). The model domain extends west from the FAB approximately 0.35 miles, south and east from the ash basins approximately one-half mile and three-quarter miles, respectively, and north to the Illinois River. The selection of lateral boundaries to the model is further described below. The overall, active model area is approximately 1.6 square miles.

5.1.1 Software Selection

The groundwater flow system was simulated with MODFLOW-NWT (Niswonger, 2011), an advanced version of the widely used MODFLOW software. Groundwater Vistas (Version 8.0) (Environmental Simulaitons Inc. (ESI), 2020), a graphical user interface, was used to parameterize the model input, write MODFLOW files, and visualize results. MODFLOW-NWT was considered over MODFLOW-2000, MODFLOW-2005, or MODFLOW-USG because it has enhanced solvers that employ upstream weighting for non-linear problems, it is a relatively recent, widely-used, and non-proprietary release of MODFLOW, and it is coupled with the widely-used and non-proprietary transport model MT3DMS (Zheng, 2012), which was used for the transport simulations.

5.1.2 Model Grid and Layering

The model has a non-uniform grid spacing of 25 to 50 feet. The model grid is 25 feet square throughout the area of the basins and site wells and grows to 50 feet square away from the basins (Figure 9). The model has 295 rows and 242 columns and five layers, for a total of 231,802 active cells. The MODFLOW-NWT model was constructed with length and time units of feet and days, respectively. The coordinate system State Plane Illinois West, NAD 83, FIPS 1202 was used for all coordinates and for GIS data management. The model grid has an origin at coordinates 2,430,046, 1,408,525, without rotation.

Lithology data was compiled from site well logs and ISGS drill logs and organized into geological units as described in Section 4.2. Contacts were used to create a surface of the top of the Carbondale Formation using Seequent Leapfrog™ software (Seequent Limited, 2021), as well as to visualize the borehole lithology. Model layers one through five represent the unconsolidated materials, including the gravelly sand unit and the silt/clay unit, which were differentiated in the model by assigning differing values of hydraulic conductivity.

The top of the model was defined with surface topography from the U.S. Geological Survey (U.S. Geological Survey, 2021). The volume of aquifer above the Carbondale Formation was divided into five model layers to simulate groundwater flow through the unconsolidated sediments. Model layers one through five each range in thickness from 2 to 70 feet, and around the site wells and basins generally range from approximately 20 to 35 feet. Representative sections through the model domain are provided in Figure 10 to show the layering in an east-west model row (row 159) and a north-south model column (column 77) through the site.

5.1.3 Model Boundaries

The outside edges of the model domain must be defined with model boundaries to describe how groundwater inside the model domain interacts with groundwater outside the model domain. Additionally, boundaries can be defined interior to the model domain to represent sources and sinks of groundwater such as pumping wells or infiltration through a pond. Exterior boundaries of the numerical model are shown on Figure 8 and include:

- Constant Head boundary along the southern edge of the model domain
- River boundary along the northern edge of the model domain, aligned with the Illinois River
- No-flow boundary along the east side of the model
- General Head boundary along the west side of the model

The constant head boundary along the southern edge of the model allows for groundwater from the south to flow into the model domain. The boundary was generally aligned (roughly) parallel to the trend of the Illinois River and was placed where regional data from the Illinois Domestic Wells Database and the Illinois Water and Related Wells Database provide water levels to use to define the boundary, and far enough upgradient from the site to not potentially influence model results. The Constant Head boundary elevation was defined with an elevation of 450 feet in model layers 1 through 5.

The No-flow boundary along the east side of the model is aligned generally perpendicular to the trend of the river, to represent a streamline (groundwater flow direction) as expected from the conceptualized direction of regional groundwater flow toward the Illinois River.

The General Head boundary (GHB) along the west side of the model represents flow to the west toward Powerton Lake. The linear GHB boundary references an elevation of 440 feet for the lake (defined from surface elevations in the center of the lake from Google Earth) and variable conductance set from an assumed, average hydraulic conductivity of 50 ft/d, the dimensions of the model cells, and from the varying distance of the model boundary to the lake along its length.

The river boundary along the northern edge of the model allows for groundwater to discharge to the Illinois River, consistent with the conceptualized direction of groundwater flow. The river was defined in model layer 1 at a stage of 435.8 feet. This stage was calculated by comparing the recorded gage heights (converted to elevation) at the Illinois River at Kingston Mines gage (USGS gage no. 5568500, located approximately 5 miles downstream from the site) to the water levels measured in the site wells, when the data aligned on the same date. The river stage is typically lower than the groundwater elevations at the site, consistent with the conceptual model that groundwater flow directions are generally toward the river. There are times when the river flows are high and the river stage is higher than the groundwater elevations at the site, indicating a transient reversal of hydraulic gradient. The river stage used in the model's River boundary condition must represent the long-term average conditions, consistent with the water levels used for model calibration. The stage of the river boundary was calculated as the average difference between the measured water level elevation in downgradient monitor well MW-04 and the recorded gage height from the same day, for all available periods of the data set (2011 through 2020) (Table 5). The average difference was 0.76 feet indicating that the river is, on average, at a lower elevation than the water levels on site. This average difference was subtracted from the long-term average water level in monitor well MW-04 and used as the stage in the model's River boundary condition. The river was assumed to be 10 feet deep, and the conductance was set from the model cell dimensions and an assumed hydraulic conductivity of 50 ft/d and a thickness of 1 foot, to represent relative ease of exchanging water between the river and groundwater.

5.1.4 Model Stresses

In addition to the exterior model boundaries described in Section 5.1.3, MODFLOW boundaries and properties were used in the interior of the model domain to simulate stresses (inflows and outflows) on the groundwater system as follows:

- General head boundaries (GHB) were defined for the FAB to represent the infiltration of surface water to the water table. The GHB was defined in model layer 1 at an elevation of 443 ft from surface elevations in Google Earth, and a conductance set from the dimensions of the model cells and assumed hydraulic conductivity.
- GHB were defined east of the area of the FAB representing an offsite surface water pond and channel connected to the Illinois River. The GHB was defined in model layer 1 at an elevation of 436 feet, amsl for the pond and 435.84 ft, amsl for the channel, representing the connection with the river.
- GHB were defined along the intake channels on the west side of the basins to allow for groundwater discharge to these local features, to improve the representation of hydraulic gradients during model calibration. The GHB was defined at an elevation of 435.84 ft, amsl to represent the connection with the river and assumed hydraulic conductivity representative of silty clay materials.
- Recharge from precipitation was defined throughout the model domain using MODFLOW's recharge package. Recharge was simulated at approximately 1.2 in/yr (2.64E-04 ft/d) or approximately 3 percent MAP, consistent with the conceptual model discussion in Section 4.5.1. No recharge from precipitation was assigned below the retention ponds, the canals, or the offsite surface water pond that are covered by the GHB or in the footprint of the basins which are lined. Recharge up to 5 in/yr was tested during model calibration.

5.1.5 Numerical Parameters

The Preconditioned Conjugate Gradient (PCGn) package was used with MODFLOW-NWT to solve the system of equations within the model domain. The type of solver was tested in early model runs and the PCGn solver provided a stable solution in a fast computational time compared to other solvers available with MODFLOW. The solver was used with adaptive damping (ADAMP) and the XMD linear solution method (LINMETH), again to provide a stable and computationally quick solution.

Optimal settings for the PCGn with XMD were found during model calibration. Key numerical parameters were a head change closure criterion (HCLOSEXMD) of 1E-04 feet for inner iterations and 1E-05 feet for outer iterations, 2000 maximum outer iterations and 200 maximum inner iterations.

5.2 Model Calibration

The following sections describe the approach taken to calibrate the model and the results of the model calibration.

5.2.1 Approach

The groundwater flow model was first calibrated through a trial-and-error approach by adjusting hydraulic conductivity and recharge rates until the model reasonably matched field measurements in site wells MW-01 through MW-21. Model calibration then continued with parameter estimation techniques in PEST software (Doherty, 2010), used with pilot points within Groundwater Vistas.

The flow model calibration relied on the measured water level data provided by KPRG for the site wells MW-01 through MW-21. The period of measured water levels from the site wells since 2011 were averaged, having removed outliers determined from the interquartile range, and used as model calibration targets (Table 4). The data from the site wells were considered reliable and were given a target weight of 1. This dataset was supplemented with water levels in regional wells downloaded from the ISGS ILWATER database. There are regional wells with water level data to the south and northeast of the ash pond area. The regional wells typically had one reported water level from when the well was drilled. These water level measurements are much older and were considered much less reliable for model calibration, and therefore were given a target weight of 0.1. These regional wells were included to provide coverage away from the site, but only in a general sense.

In addition to calibrating to measured water levels in the wells, qualitative considerations of model calibration included:

- General groundwater flow directions, and patterns in the hydraulic gradient including a western gradient from the ASB in the silt/clay unit and the gravelly sand and a northern gradient from the north end of the ASB in the gravelly sand,
- General consistency in the modeled hydraulic conductivity and the field-measured hydraulic conductivity,

- General consistency in the modeled water budget with the conceptual water budget, and
- Limiting or eliminating flooding above the surface of the model.

The measure of model calibration, other than the qualitative considerations, was to minimize the calibration residual, measured as the difference between measured and modeled groundwater elevations in wells. A negative residual indicates that the modeled groundwater elevation is higher than the measured elevation, and a positive residual indicates that the modeled groundwater elevation is lower. The statistical measures of average residual, sum of squared residuals, and root mean square (RMS) error were used to objectively evaluate the calibration.

The RMS error was calculated as:

$$\mathrm{RMS} = \left[\frac{1}{\mathrm{n}}\sum_{\mathrm{i}=1}^{\mathrm{n}}(\mathrm{h_o} - \mathrm{h_s})^2\right]^{0.5}$$

where $h_o - h_s$ is the target residual and n is the number of observed groundwater elevation values. The RMS error is typically scaled against the range in observed groundwater elevations in the model area. A scaled RMS error of less than 10% is the standard calibration criteria that is generally considered acceptable throughout the industry (Anderson, 2015).

Initially, the borehole lithologic intervals were intersected with the model grid to define zones of hydraulic conductivity ("K zones") for the lithologic groups (i.e. grouped together areas of sand, areas of sand and gravel, etc). Hydraulic conductivity was defined for these K zones based on literature values and professional judgement for initial model calibration. After the basic model calibration was completed by varying the values of hydraulic conductivity and recharge, the model calibration was refined using pilot points and PEST software. The manual calibration suggested a relatively lower zone of hydraulic conductivity to the west of the ASB, consistent with where clay has been encountered in site wells. Pilot points were defined throughout model layers 1 through 5 to estimate the horizontal and vertical hydraulic conductivity values. Initial values of horizontal hydraulic conductivity (Kh) were 100 ft/d in the gravelly sand, consistent with the revised estimates of hydraulic conductivity (Table 3), and 1 ft/d in the silty/clay. Horizontal hydraulic conductivity was allowed to range between 10 and 500 ft/d in the gravelly sand and between 0.01 and 10 in the silty/clay, ranges deemed more than sufficient to bracket potential values of hydraulic conductivity. Vertical hydraulic conductivity (Kv) was assumed initially to be equal to horizontal and was allowed to vary up to a ratio (Kh:Kv) of 10 in the gravelly sand and up to 1000 in the silt/clay, typical vertical anisotropy ratios used in modeling applications (Anderson, 2015).

5.2.2 Model Calibration Results

The calibrated distribution of hydraulic conductivity in the model is shown for each model layer on Figures 11a through 11c. The calibrated model calculated groundwater level contours are shown on Figure 12. The spatial distribution of the calibration residuals is shown on Figure 13 and a scatter plot of the residuals are shown on Figure 14. The calibrated model water budget is provided in Table 6, the model calibration residuals are provided in Table 7, and the calibrated model statistics are provided in Table 8. Recharge from precipitation was simulated at approximately 1 in/yr (2.2E-04 ft/d), consistent with the conceptual model and equal to approximately 3 percent of MAP (Section 4.6.1)

5.2.2.1 Calibrated Hydraulic Conductivity

The model calibrated distribution of hydraulic conductivity ranges from 0.008 ft/d in the clay unit in model layer 1 to approximately 1,680 ft/d in the sand and gravel in model layers 1 through 5. Use of PEST software for the model calibration resulted in a krigged distribution of hydraulic conductivity rather than zones of hydraulic conductivity. A krigged surface is more defensible for the unconsolidated sediments above the carbonates because the bounds of the hydraulic conductivity zones were not defined based on contacts between geologic units shown on detailed geologic maps and cross sections as in bedrock settings, but rather, on available borehole logs, thereby making the definition of zones uncertain.

The resulting distribution of hydraulic conductivity has the lowest values (lower than 5 ft/d) beneath the site, in the clay unit. The calibrated vertical anisotropy ratios are up to approximately 900:1 in the silty clay unit beneath the site. The calibrated vertical anisotropy ratio is lower in the sand and gravels, with vertical hydraulic conductivity values (Kv) approximately one-half to one-third of the horizontal values (Kh), representing a vertical anisotropy ratio of 2:1 Kh:Kv or 3:1 Kh:Kv, appropriate for sands, gravelly sands, and silty sands.

The calibrated values of hydraulic conductivity at wells MW-02, -05, -08, -09, and -10 were compared to the field data for these wells (Table 3). The modeled values of hydraulic conductivity for these wells are consistent with the revised estimates of hydraulic conductivity from Patrick Engineering (Patrick Engineering, 2011) other than for monitor well MW-08, as discussed in Section 4.3. The calibrated hydraulic conductivity values for these well locations are as follows:

- MW-02: 466 ft/d,
- MW-05: 47 ft/d,
- MW-08: 0.4 ft/d,
- MW-09: 149 ft/d, and
- MW-10: 175 ft/d.

These values, other than for monitor well MW-08, are also consistent with the new estimates of hydraulic conductivity for these wells (Table 3).

5.2.2.2 Calibrated Water Budget

The model calibrated water budget is provided in Table 6. Groundwater flow in from the southern model boundary is the largest inflow component of the modeled water budget and equals 795 af/yr (94,858 cfd). Calibrated recharge from precipitation equals 84 af/yr (9,990 cfd), consistent with the conceptual water budget estimate of 100 af/yr. Calibrated infiltration from stormwater retention ponds and the FAB is 304 af/yr (36,232 cfd). The total, modeled inflow to groundwater is 1,182 af/yr (141,080 cfd).

Outflows from the groundwater model discharge toward Powerton Lake and to the Illinois River. Modeled discharges toward Powerton Lake equal 24 af/yr (2,808 cfd), The modeled discharge to the Illinois River equals 1,157 af/yr (138,056 cfd), including discharges to the canals west and east of the site that are connected to the river, and discounting water in through the GHB on the north end of western model boundary that subsequently discharges to the river. This is comparable to the conceptual model estimate of discharge to the river of 1,200 af/yr.

5.2.2.3 Statistics and Residuals

The weighted calibration residuals and modeled water level for each well is provided in Table 7. Calibration residuals for the site wells range from -0.65 feet in well MW-21 southwest of the FAB to 1.82 feet in well MW-01 east/southeast of the FAB. The average residual considering all calibration targets, with weighted residuals for the regional wells, is 0.37 feet, and is 0.36 feet for the site wells (Table 8). The site wells are further subdivided into those that are screened within the sand and gravel unit (average residual of 0.39 ft) and within the clay unit (average residual of 0.28 ft). The RMS error for all weighted calibration targets is 0.77 feet, or 2 percent of the change in hydraulic head across the model domain. The RMS error for the site wells is 0.70 feet, or 5 percent of the change in hydraulic head across the site. The RMS error in the site sand and gravel unit wells is 0.64 feet, or 7 percent of the change in hydraulic head across these wells, and in the clay is 0.34 feet, or 9 percent. These results are all below the recommended threshold of 10 percent for the scaled RMS error (Anderson, 2015).

The sum of squared residuals (phi) for the weighted calibration targets from the manual calibration was 377 square feet (ft^2), representing the starting point for the PEST calibration. The final, calibrated phi was 19.5 ft^2, representing a significant improvement of the calibration by the PEST software (Table 8).

The modeled water level contours and water level elevation in each calibration target (well) is shown on Figure 12. The modeled water level contours match the overall northward groundwater flow direction in the sand and gravel as well as the overall westward groundwater flow direction through the clay unit. The calibration residuals for each calibration target (well) are shown on Figure 13. Generally, the modeled water level is slightly low on the downgradient side of the FAB, and high on the south and southwest end of the site.

A scatter plot of the calibration residuals is provided for the site wells on Figure 14. In a perfect model calibration, each point would fall on a 1:1 line. Ideally deviations from the line should be balanced between high and low representing a lack of bias in the model calibration toward over- or under-prediction of the groundwater system. The calibration residuals for all wells are close to the 1:1 line for the site wells, with the points falling above, on, and below the line, representing a relatively balanced, on whole, calibration to the site wells.

These results demonstrate that the model reasonably matches the overall groundwater elevations across the model domain, and the water balance reasonably represents the conceptual model of groundwater flow. The calibrated model is appropriate to use for predictive simulations.

5.3 Model Sensitivity

A sensitivity analysis was conducted as part of the model calibration. Calibrating the numerical model was an effort of fine-tuning the heterogeneity and distribution of the horizontal and vertical hydraulic conductivity values, the recharge rate, and the boundary conditions to represent seepage from the stormwater retention ponds to match measured water levels in the wells. During the PEST and manual trial-and-error calibration model runs, the model was the most sensitive to the values of hydraulic conductivity. The model calibration was particularly sensitive to the low hydraulic conductivity values in the clay unit, and to the hydraulic conductivity of the sediments near the river, both of which improved the model calibration to the site wells.

The model calibration is sensitive to the recharge rate, but to a lesser extent than it is to hydraulic conductivity. The model calibration was improved with seepage from the FAB, and from retention ponds near the site, represented with GHB, however the calibration was sensitive to the amount of seepage from these features and boundary conductance was kept moderate to prevent an excessive amount of infiltration that adversely affected the calibration.

A sensitivity model run was conducted in which the vertical hydraulic conductivity was set equal to the horizontal hydraulic conductivity. The calibrated values of vertical hydraulic conductivity are lower than the horizontal values, particularly in the clay unit where the ratio is as high as 1:900 horizontal to vertical. With the vertical hydraulic conductivity set equal to the horizontal, the model calibration was significantly worsened. Water levels were lowered, and the clay unit became significantly underestimated, with the RMS error increasing from 9 percent in the clay unit to 212 percent. The RMS error of the calibration to the site wells increased from 5 percent to 32 percent, indicating that higher vertical anisotropy of the hydraulic conductivity values is appropriate to best match the measured flow system at the Powerton station.

A sensitivity model run was conducted in which the highest values of hydraulic conductivity were limited to the upper end of the measured hydraulic conductivity values in site wells, and in which the distribution of hydraulic conductivity was smoothed. The distribution of calibrated hydraulic conductivity values shows highs and lows, an artifact of the PEST calibration, and particularly high values of hydraulic conductivity near the river and along the edges of the model domain (Figures 11a through 11c). A sensitivity test was conducted in which the hydraulic conductivity was limited to 500 ft/d, the calibrated value of hydraulic conductivity near monitor well MW-02, and areas of local highs and lows were smoothed away. The calibration with these changes was worsened, particularly in the clay unit, in which the RMS error increased from 9 percent to 11 percent. Additionally, this model sensitivity test resulted in a bias in the calibration, with most site wells underpredicted by the model (water levels too low), and therefore was not deemed to be an appropriate distribution of hydraulic conductivity for the model.

6.0 PREDICTIVE MODEL SIMULATIONS

Four predictive, contaminant transport model runs were conducted to demonstrate the impact to potential impacted groundwater from FAB closure alternatives. The closure alternatives tested with the predictive model included combinations of removing all CCR materials and/or capping the FAB in place. Transport modeling was performed using the software MT3D-USGS, a widely used and accepted version of the MT3D software designed to be compatible with MODFLOW-NWT.

The calibrated, steady state groundwater flow model was used as the basis for a hypothetical 100-year transport simulation of a surrogate constituent from the FAB. As previously stated, the last four years of groundwater monitoring data from the downgradient monitoring wells around the FAB showed concentrations below the Part 845.600(a) groundwater protection standards. Therefore, to provide a platform upon which to evaluate potential closure alternative, a hypothetical release from the FAB was established. The hypothetical (artificial) release assumes that the FAB is full of ash and water with no liner present. The surrogate constituent was simulated by hypothetically introducing a concentration in groundwater of “1” beneath the FAB, as shown on Figure 15. The hypothetical mass was defined in groundwater beneath the FAB (model layer 1, 10 feet thick) using a constant source boundary condition and forward tracked for 100 years. Mass was moved through the groundwater system with advection and dispersion, and dispersion was simulated with a uniform value of 1 foot in all directions. The resulting hypothetical plume is shown on Figure 16 and shows mass extending from the FAB to the Illinois River. The mass in groundwater at the FAB is continuous in these runs, therefore the mass is shown at the relative concentration of “1” beneath the FAB in all figures. This plume was the starting condition for the predictive scenarios of the conceptual closure alternatives for the FAB. The results of the predictive modeling for the four closure alternatives are provided on Figures 17 through 36.

6.1 Closure Alternative 1

Closure Alternative 1 simulated the removal of the hypothetical mass from the FAB. In this scenario, the mass boundary condition was removed from the water table and the 100-year distribution of dissolved surrogate mass (Figure 17, left-hand side) was used as the initial concentrations. With this closure alternative, the distribution of dissolved contaminants that resulted from the hypothetical, continuous release of mass from the FAB was reduced over time after the removal of the source mass at the FAB. These plumes are shown on the *right-hand side* of Figures 17 and 18 at 5 years and 25 years, respectively. As these figures show, the dissolved mass reduced to approximately 40 to 50 percent at the river by 5 years and the dissolved mass was effectively removed from groundwater within 25 years, with the removal of the source. Figure 19 shows a graph of relative concentration of the surrogate mass over time at a hypothetical monitoring point between the FAB and the river. This graph illustrates the decay of the surrogate mass over time, and shows that at a point approaching the river, the hypothetical mass is reduced to a relative concentration of about 0 within approximately 20 years, meaning the mass has been flushed through the shallow groundwater system within about 20 years.

6.2 Closure Alternative 2

Closure Alternative 2 simulated the closure-in-place of the FAB with the hypothetical mass remaining in place within groundwater in model layer 1 (10 feet thick). In this scenario, the mass boundary condition remained at the water table, but no recharge was simulated within the footprint of the FAB, representing an impermeable designed and placed cap/cover system. The 100-year distribution of dissolved surrogate mass (Figure 20, left-hand side) was used as the initial concentrations. With this model closure alternative, the distribution of dissolved contaminants that resulted from the hypothetical, continuous release of mass from the FAB was only slightly reduced over time after the capping of the pond. These plumes are shown on the *right-hand side* of Figures 20 and 21 at 5 years and 25 years, respectively. As these figures show, the dissolved mass reduced by approximately 10 percent at the river by 5 years and slightly more reduction by 25 years. The resulting plume reached a steady distribution after 25 years, so these figures were not repeated. In this scenario, the dissolved mass in groundwater is constant, therefore the plume is only slightly impacted by removing recharge from above. Figure 22 shows a graph of relative concentration of the surrogate mass over time at a hypothetical monitoring point between the FAB and the river. This graph illustrates the decay of the surrogate mass over time, and shows that at a point approaching the river, the hypothetical mass is reduced by approximately 10 percent within about 20 years, where it stabilizes at a relative concentration of approximately 90 percent. Overall, reductions in mass on the order of 5 to 20 percent are noted, depending on location within the hypothetical area of impact.

6.3 Closure Alternative 3

Closure Alternative 3 simulated the removal of the CCR materials from the northern portion of the FAB with placement and consolidation of that material on the south half of the FAB followed by capping. In this scenario, the mass boundary condition remained at the water table in the southern portion of the FAB as shown on Figure 23. No recharge was simulated within the footprint of the southern portion of the FAB, representing an impermeable designed and placed cap/cover system. The hypothetical mass was removed from the northern portion of the FAB in this scenario. The 100-year distribution of dissolved surrogate mass (Figure 24, left-hand side) was used as the initial concentrations. With this closure alternative, the distribution of dissolved contaminants that resulted from the hypothetical release of mass from the FAB was reduced over time after removal of the mass from the northern portion of the FAB and the capping of the southern portion of the FAB. These plumes are shown on the *right-hand side* of Figures 24 and 25 at 5 years and 25 years, respectively. As these figures show, the initial plume is reduced throughout, and downgradient of, the northern portion of the FAB within 5 years, with concentrations reduced by approximately half in this area (Figure 24) and slightly more reduction by 25 years (Figure 25). The resulting plume reached a steady distribution after 25 years, so these figures were not repeated. Figure 26 shows a graph of relative concentration of the surrogate mass over time at a hypothetical monitoring point between the FAB and the river. This graph illustrates the decay of the surrogate mass over time, and shows that at a point approaching the river, the hypothetical mass is reduced by approximately 20 percent within about 10 years, where it stabilizes at a relative concentration of approximately 80 percent. Overall, reductions in mass on the order of 15 to 40 percent are noted, depending on location within the hypothetical area of impact.

6.4 Closure Alternative 4

Closure Alternative 4 simulated the isolation/stabilization of the hypothetical mass and closure-in-place at the FAB. In this scenario, the mass boundary condition remained at the water table in the FAB and a barrier wall was erected surrounding the FAB. The barrier wall was simulated using the MODFLOW Horizontal Flow Boundary (HFB) package with a permeability of $1x10^{-7}$ centimeters per second (cm/s) ($2.83x10^{-4}$ feet per day (ft/d)) in model layers 1 and 2 representing the upper approximately 20 feet (Figure 27). Additionally, no flow cells were defined in model layer 2 beneath the FAB to represent that the ash has been stabilized in-place using a cement-bentonite mixture, or equivalent, resulting in a non-permeable solid mass. Lastly, no recharge was simulated within the footprint of the FAB, representing a perfect cover. The 100-year distribution of dissolved surrogate mass (Figure 28, left-hand side) was used as the initial concentrations.

With this closure alternative, the distribution of dissolved contaminants that resulted from the hypothetical, continuous release of mass from the FAB were reduced over time after the capping of the FAB and the in-situ stabilization of the mass isolating it from the surrounding groundwater system. These plumes are shown on the *right-hand side* of Figures 28 and 29 at 5 years and 25 years, respectively. As these figures show, the dissolved mass reduced between the FAB and the river by up to approximately 40 to 50 percent at the river by 5 years and the dissolved mass was effectively removed from groundwater within 25 years. Figure 30 shows a graph of relative concentration of the surrogate mass over time at a hypothetical monitoring point between the FAB and the river. This graph illustrates the decay of the surrogate mass over time, and shows that at a point approaching the river, the hypothetical mass is reduced to a relative concentration of about 2 percent within about 20 years.

6.5 Relation to Constituent Concentrations

The trends of predicted reduction in the surrogate mass concentrations discussed in Sections 6.1 through 6.4 for the four closure alternatives were related to the concentrations of several example CCR constituents being monitored in groundwater. Specifically, boron, chloride, sulfate, arsenic and lithium. The concentrations of these constituents from the 4th quarter 2021 monitoring in downgradient monitoring wells MW-02 through MW-05 were used as the starting concentrations for this evaluation. The percent decrease in the surrogate concentrations from the starting concentrations was calculated through the 100-year simulation for each closure alternative, at four FAB CCR monitoring well locations (Figure 31):

- MW-02 on the east side of the northern portion of the FAB,
- MW-03 on the northeast, downgradient side of the FAB,
- MW-04 on the north, downgradient side of the FAB, and
- MW-05 on the northwest side of the FAB.

The relative reduction of the surrogate concentration over time can be related to the dissolved mass of any constituent by applying the percent decrease of the surrogate concentration to an initial concentration of a specific constituent of concern. As noted above, an initial concentration was assigned at each of these four monitoring well locations for specific constituents of concern based on the 4th quarter 2021 sampling event as provided in Table 9. It should be noted that the concentrations of each of these constituents were already below the proposed GWPSs presented in the Application for Initial Operating Permit submitted to Illinois EPA on October 31, 2021 (Midwest Generation, 2021):

- Boron,
- Chloride,
- Sulfate,
- Arsenic,and
- Lithium

The calculated percent decrease in the surrogate concentration over the 100-year model simulations was applied to the assigned initial concentration in each monitoring well. For example, the initial concentration for boron in monitoring well MW-02 is 0.22 milligrams per liter (mg/l) (Table 9). The initial, relative surrogate concentration in monitoring well MW-02 is 0.2 (relative to the source concentration of "1") (Figure 16). The decrease in the surrogate concentration throughout the 100-year closure scenario was calculated as a percentage of the initial, relative concentration in this monitoring well, and the percentage decrease was applied to the initial concentration of 0.22 mg/l to yield a curve of decreasing boron concentrations for the model scenario. The resulting concentrations for each constituent of concern in each monitoring well was compared to the Section 845.600(a) GWPSs for each constituent. The GWPSs are presented as dashed lines on each model scenario's concentration graphs.

The decay curves for boron concentrations are shown on Figure 32 for Closure Alternatives 1 through 4. The current concentrations of boron in all four monitoring wells are well below the GWPS of 2 mg/l. Concentrations further decrease and remain below the GWPS in all four closure alternative scenarios.

The decay curves for chloride concentrations are shown on Figure 33 for Closure Alternatives 1 through 4. The current concentrations of chloride in all four monitoring wells are well below the GWPS of 200 mg/l. Concentrations further decrease and remain below the GWPS in all four closure alternative scenarios.

The decay curves for sulfate concentrations are shown on Figure 34 for Closure Alternatives 1 through 4. The current concentrations of sulfate in all four monitoring wells are well below the GWPS of 400 mg/l. Concentrations further decrease and remain below the GWPS in all four closure alternative scenarios.

The decay curves for arsenic concentrations are shown on Figure 35 for Closure Alternatives 1 through 4. The current concentrations of arsenic in all four monitoring wells are well below the GWPS of 0.01 mg/l. Concentrations further decrease and remain below the GWPS in all four closure alternative scenarios.

The decay curves for lithium concentrations are shown on Figure 36 for Closure Alternatives 1 through 4. The current concentrations of lithium in all four monitoring wells are well below the GWPS of 0.04 mg/l. Concentrations further decrease and remain below the GWPS in all four closure alternative scenarios.

6.6 Seasonal Sensitivity

A model scenario was conducted to test the impacts of seasonal variations of climate on the predictions made for the Closure Alternatives. The typical precipitation pattern is for higher rainfall in the summer and less in the winter. A 100-year transient flow model was run with alternating stress periods of higher and lower recharge: 6 months of higher recharge to represent April through September, and 6 months of lower recharge to represent October through March. Three percent of the average, long-term precipitation measured at nearby climate stations for these two six-month periods was assumed for recharge. The seasonal variation test was conducted on Closure Alternatives 2 and 4. The same initial distribution of concentrations used in Closure Alternatives 2 and 4 was also used for this seasonal variation test. The setup of the model scenarios was the same as for Closure Alternatives 2 and 4, and the model was run with 6-month transient stress periods with alternating higher and lower recharge for a total simulation time of 100 years.

The results of the seasonality tests for Closure Alternatives 2 and 4 are shown on Figures 37 and 38, respectively. The resulting plume distributions for both Closure Alternative 2 and its seasonality test are shown on Figure 37 at 25 years and the results are identical. The resulting plume distribution is shown for both Closure Alternative 4 and its seasonality test on Figure 38 at 25 years and the results are identical. The sensitivity test of wet and dry recharge seasons did not impact the ultimate results of the predictive model runs of closure alternatives.

7.0 CONCLUSIONS

A numerical groundwater flow model was created for the vicinity of the FAB at the Powerton station. The model was calibrated to current water levels in site wells to reasonably replicate the groundwater flow patterns beneath the site. Groundwater flow paths from the site and the FAB are predicted to the north toward the Illinois River. Although the current groundwater data do not indicate groundwater impacts above Section 845.600(a) GWPSs downgradient of the FAB, to meet the requirements of the regulation, the model was used predictively to simulate a hypothetical release scenario to the underlying water table based upon which the effectiveness of engineering closure options can be evaluated. A hypothetical surrogate constituent was simulated at the FAB in the groundwater. The hypothetical surrogate mass travelled with the groundwater flow paths toward the Illinois River. This hypothetical distribution of mass served as the initial concentrations to four predictive scenarios of mass removal or various closure in-place alternatives at the FAB. The hypothetical scenarios assume that the FAB is full of ash and water with no liner allowing for impacts to discharge constituents to the water table. The predictive scenarios of mass removal or various in-place closure scenarios then illustrate the relative reduction in the concentrations in groundwater as a result. In summary, the modeling results indicate that all four evaluated alternatives for closure of the FAB resulted in improvement to groundwater quality with scenarios 1 and 4 providing a similar level of improvement and scenarios 2 and 3 providing a similar level of improvement. It is noted that this is improvement over existing conditions which as previously noted are already below the proposed GWPSs for the FAB.

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TABLES

Table 1: Precipitation Data near Powerton Station

Month	Average Monthly Precipitaiton (inches)[1,2]
January	2.02
February	1.90
March	2.56
April	3.98
May	4.65
June	3.76
July	3.66
August	3.44
September	3.52
October	3.16
November	2.79
December	2.20
Average Annual Precipitation[1]	39.2

Notes:

[1]Total annual precipitation data were averaged for the periods of complete annual records available for stations: Bartonville 5 SW IL, Chillicothe IL, General Wayne A. Downing International Airport, Germantown Hills IL, Morton IL, Morton 1.0 S IL, Morton 1.0 SSE IL, Pekin 1.2 NNW IL, Peoria Airport 3 SW IL, Peoria 5 NW IL, Peoria 1.7 SSE IL, Peoria Station, Washington 2 W IL,

[2]Periods of complete records were determined as months with 5 or less missing days and years without months with more than 5 missing days

Table 2: Compiled Borehole Lithology

Well Name/Identifier	From[1]	To[1]	Description	Lithology Group
	ft, bgs	ft, bgs		
121792196100	0	2	top soil	topsoil
121792196100	2	27	fine sand	sand
121792196100	27	95	medium to coarse gravel	coarse sand and/or gravel
121792196100	95	95	fine sand at	sand
121790013100	0	28	sand and gravel, dry	coarse sand and/or gravel
121790013100	28	60	sand and gravel, water	coarse sand and/or gravel
121790013000	0	2	topsoil	topsoil
121790013000	2	35	coarse sand and gravel	coarse sand and/or gravel
121790013000	35	56	coarse sand, test 1m., 36 sec.	coarse sand and/or gravel
121790013000	56	70	medium sand, test 3m., 20 sec.	coarse sand and/or gravel
121790013000	70	70	shale at	shale
121790012900	0	4	topsoil	topsoil
121790012900	4	21	dry sand and gravel	coarse sand and/or gravel
121790012900	21	44	coarse sand and gravel 1m., 40 s.	coarse sand and/or gravel
121790012900	44	66	med coarse sand and gravel, 2m., 10s.	coarse sand and/or gravel
121790012900	66	74	medium sand and gravel, 2m. 20s.	coarse sand and/or gravel
121790012900	74	74	clay, white at	clay and silt
121790012800	0	2	cinders and brick	FILL
121790012800	2	14	sand, medium	coarse sand and/or gravel
121790012800	14	18	sand, coarse	coarse sand and/or gravel
121790012800	18	19	coal	coal
121790012800	19	20	sand	sand
121790012800	20	39	sand, coarse, and gravel, 3m	coarse sand and/or gravel
121790012800	39	48	sand, coal, and boulders, 9m	coarse sand and/or gravel
121790012800	48	50	clay and rock	silt and clay
121790012800	50	55	sand, coarse, 3m	coarse sand and/or gravel
121790012800	55	63	sand, coarse, 2m	coarse sand and/or gravel
121790012800	63	66	sand, medium, 5m	coarse sand and/or gravel
121790012800	66	76	sand, 3m, 10s	coarse sand and/or gravel
121790012800	76	76	shale at	shale
121790025600	0	3	clay	clay
121790025600	3	15	sand & gravel	coarse sand and/or gravel
121790025600	15	19	gravel, coarse	coarse sand and/or gravel
121790025600	19	27	sand and gravel	coarse sand and/or gravel
121790025600	27	29	clay	clay
121790025600	29	33	gravel and small stones	coarse sand and/or gravel
121790025600	33	35	gravel	coarse sand and/or gravel
121790025600	35	42	sand, coarse	coarse sand and/or gravel
121790025600	42	51	sand, coarse	coarse sand and/or gravel
121790013800	0	3	soil	Topsoil
121790013800	3	82	sand and gravel	coarse sand and/or gravel
121790013300	0	3	soil, black	Topsoil
121790013300	3	5	sand, soil	coarse sand and/or gravel
121790013300	5	80	sand and gravel	coarse sand and/or gravel
121790013200	0	14	gravel, sand and clay	clay, sand, gravel
121790013200	14	18	sand and clay	clay, sand
121790013200	18	24	sand and gravel	coarse sand and/or gravel
121790013200	24	35	gravel and sand	coarse sand and/or gravel
121790013200	35	45	gravel	coarse sand and/or gravel
121790013200	45	59	gravel and sand	coarse sand and/or gravel
121790013200	59	61	shale	shale
121790052800	0	1	brown fill sand-some rocks	topsoil
121790052800	1	3	black sandy dirt	sand
121790052800	3	7	yellow sand-medium	coarse sand and/or gravel
121790052800	7	15	gray sand-medium	coarse sand and/or gravel
121790052800	15	28	gray sand & gravel	coarse sand and/or gravel
121790052800	28	49	gray sand & gravel-very coarse	coarse sand and/or gravel
121790052800	49	49	blue shale at	shale
121790050100	0	3	sandy loam	loam
121790050100	3	47	dirty sand & gravel	coarse sand and/or gravel
121790050100	47	81	yellow sand, trace gravel	coarse sand and/or gravel
121790048800	0	3	topsoil	topsoil
121790048800	3	8	yellow sand	sand

Well Name/Identifier	From[1]	To[1]	Description	Lithology Group
	ft, bgs	ft, bgs		
121790048800	8	20	gray silty clay	Silt and Clay
121790048800	20	21	brown clay	clay
121790048800	21	116	brown fine to med sand & gravel	coarse sand and/or gravel
121790048800	116	120	med to crs gravel, some coarse sand	coarse sand and/or gravel
121790048800	120	121	gray shale	shale
121790047700	0	3	brown sandy clay	clay, sand
121790047700	3	10	yellow clay - very sandy	clay, sand
121790047700	10	40	brown sand - coarse & clean	coarse sand and/or gravel
121790047700	40	47	brown sand - fine	sand
121790047700	47	58	dirty sand & yellow clay	clay, sand
121790047700	58	73	brown sand - fine to coarse	sand
121790047700	73	78	yellow sand - fine	sand
121790047700	78	87	fine to coarse sand - some pebbles	coarse sand and/or gravel
121790047700	87	93	fine to crs water sand-some pebbles	coarse sand and/or gravel
121790047700	93	96	med to coarse sand - some gravel	coarse sand and/or gravel
121790047700	96	101	fine to med sand-some rocks	coarse sand and/or gravel
121790047700	101	114	fine red sand	sand
121790047700	114	120	fine to coarse brown sand	sand
121790047700	120	127	f to crs sand with some fine gravel	coarse sand and/or gravel
121790047700	127	127	fine sand at	sand
121790012700	0	4	topsoil	topsoil
121790012700	4	15	sand, gravel, and clay	clay, sand, gravel
121790012700	15	32	sand, gravel, and boulders	coarse sand and/or gravel
121790012700	32	33	coal	coal
121790012700	33	36	hardpan	hardpan
121790012700	36	38	boulders	coarse sand and/or gravel
121790012700	38	40	sand and gravel, 2m. 15 s.	coarse sand and/or gravel
121790012700	40	48	coarse sand and gravel 1m. 40s.	coarse sand and/or gravel
121790012700	48	56	sand and gravel, 2 m., 15 s.	coarse sand and/or gravel
121790012700	56	58	sand 3m. 25 s.	sand
121790012700	58	66	sand, fine 5m, 20s	sand
121790012700	66	71	sand, 3m., 5s.	sand
121790012700	71	76	sand, 3m., 40 s.	sand
121790012700	76	76	shale at	shale
121790012600	0	18	muck	topsoil
121790012600	18	28	gravel, coarse and boulders	coarse sand and/or gravel
121790012600	28	36	sand, fine	sand
121790012600	36	36	shale at	shale
121790012500	0	85	sand & gravel	coarse sand and/or gravel
121790012500	85	85	shale at	shale
121790058500	0	4	topsoil	topsoil
121790058500	4	71	sand & gravel	coarse sand and/or gravel
121792462600	0	21	cinders black soil	cinders
121792462600	21	26	black & brown clay	clay
121792462600	26	39	fine sand w/soft clay mixed	clay, sand
121792462600	39	41	large gravel & coarse sand	coarse sand and/or gravel
121792462600	41	52	coarse sand & some small gravel	coarse sand and/or gravel
121792462600	52	79	coarse sand w/streaks of small gvl	coarse sand and/or gravel
121792462600	79	98	fine to coarse sand w/some small gvl	sand
121792462600	98	99	fine silty sand	sand
121792462600	99	103	dk gray shale & hd dk color limestone	shale
121792456600	0	4	loam-sandy	Loam
121792456600	4	15	sand -yellow	sand
121792456600	15	53	sand & gravel	coarse sand and/or gravel
121792456600	53	83	sand & gravel-coarse	coarse sand and/or gravel
121790041500	0	85	Sand	sand
121790041300	0	2	cindres, fill	FILL
121790041300	2	35	fine to coarse sand & gravel	sand
121790041300	35	74	f to crs, sand, fine to crs gravel bldrs	sand
121790041300	74	80	f to crs sand	sand
121790041300	80	93	f to crs sand, medium gravel	sand
121792453000	0	3	topsoil	topsoil
121792453000	3	22	lt. med gravel	coarse sand and/or gravel
121792453000	22	44	med-large gravel	coarse sand and/or gravel
121792453000	44	45	shale bedrock	shale

Well Name/Identifier	From[1]	To[1]	Description	Lithology Group
	ft, bgs	ft, bgs		
121792323500	0	4	topsoil	topsoil
121792323500	4	12	fine silty clay	Silt and clay
121792323500	12	48	medium sand	coarse sand and/or gravel
121792323500	48	93	medium to coarse gravel	coarse sand and/or gravel
121792323500	93	93	shale at	shale
121792489200	0	21	sand	sand
121792489200	21	38	sand & gravel	coarse sand and/or gravel
121792489200	38	56	sand medium	coarse sand and/or gravel
121792489200	56	61	sand coarse	coarse sand and/or gravel
121792489200	61	63	sand & gravel	coarse sand and/or gravel
121792489200	63	63	shale below	shale
121792486200	0	15	fine sand	sand
121792486200	15	20	gritty sand	sand
121792486200	20	30	fine to medium sand	sand
121792486200	30	35	medium-coarse sand with light gravel	coarse sand and/or gravel
121792486200	35	40	fine to medium sand	sand
121792486200	40	45	clay	clay
121792486200	45	60	light to medium sand	sand
121792486200	60	65	medium to coarse gravel	coarse sand and/or gravel
121792486200	65	88	fine sand	sand
121792486200	88	93	fine to medium sand	sand
121792486200	93	103	fine sand	sand
121792486200	103	108	coarse sand with big gravel	coarse sand and/or gravel
121792486200	108	113	medium to coarse sand with gravel	coarse sand and/or gravel
121792486200	113	118	medium to coarse sand	coarse sand and/or gravel
121792486200	118	120	medium to big gravel	coarse sand and/or gravel
121792485000	0	70	Sand	sand
121792377600	0	9	loam	Loam
121792377600	9	15	gravel very coarse	coarse sand and/or gravel
121792377600	15	60	sand & gravel	coarse sand and/or gravel
121792377600	60	85	sand & finer gravel	coarse sand and/or gravel
121792444600	0	2	topsoil	topsoil
121792444600	2	14	sand	sand
121792444600	14	75	sand & gravel	coarse sand and/or gravel
121792326500	0	2	loam sandy	Loam
121792326500	2	9	clay yellow sandy	clay, sand
121792326500	9	42	sand & gravel - coarse	coarse sand and/or gravel
121792326500	42	72	coarse sand	coarse sand and/or gravel
121792326500	72	82	sand & gravel	coarse sand and/or gravel
121792481400	0	2	topsoil	topsoil
121792481400	2	29	sand	sand
121792481400	29	70	sand & gravel	coarse sand and/or gravel
121792478800	0	21	cinders, black soil	cinders
121792478800	21	26	black & brown clay	clay
121792478800	26	39	fine sand clay mixed	clay, sand
121792478800	39	46	coarse sand gravel (boulders)	coarse sand and/or gravel
121792478800	46	48	black peat	Organic
121792478800	48	79	coarse sand gravel	coarse sand and/or gravel
121792478800	79	99	medium sand gravel	coarse sand and/or gravel
121792478800	99	104	gray shale	shale
121792477400	0	3	topsoil sandy	topsoil
121792477400	3	52	sand	sand
121792477400	52	70	sand & gravel	coarse sand and/or gravel
121792474300	0	4	topsoil	topsoil
121792474300	4	23	sand	sand
121792474300	23	60	sand & gravel	coarse sand and/or gravel
121792484700	0	4	topsoil	topsoil
121792484700	4	28	fine to medium sand & gravel	sand
121792484700	28	88	coarse gravel & rocks	coarse sand and/or gravel
121792481600	0	6	cinders	cinders
121792481600	6	42	coarse sand & gravel	coarse sand and/or gravel
121792481600	42	50	brown silty sand & fine gravel	coarse sand and/or gravel
121792481600	50	66	coarse sand & gravel	coarse sand and/or gravel
121792481600	66	99	fine to coarse sand	sand
121792481600	99	102	fine to coarse sand & gravel	coarse sand and/or gravel
121792481600	102	103	dark gray shale	shale

Well Name/Identifier	From[1]	To[1]	Description	Lithology Group
	ft, bgs	ft, bgs		
121792478000	0	3	topsoil	topsoil
121792478000	3	26	sand	sand
121792478000	26	70	sand & gravel	coarse sand and/or gravel
121792467500	0	4	topsoil	topsoil
121792467500	4	10	red clay with light gravel	clay, sand, gravel
121792467500	10	14	tan sandy hardpan	hardpan
121792467500	14	24	light medium gray with coarse sand	coarse sand and/or gravel
121792467500	24	29	light gravel, coarse sand	coarse sand and/or gravel
121792467500	29	38	light tan clay, coarse sand	clay, sand
121792467500	38	71	medium coarse gravel	coarse sand and/or gravel
121792467500	71	72	medium sand with light gravel at	coarse sand and/or gravel
121792313900	0	4	loam	loam
121792313900	4	82	sand & gravel	coarse sand and/or gravel
121792313900	82	82	brown clay below	clay
121792534000	0	2	loam	loam
121792534000	2	12	sand - yellow, fine	sand
121792534000	12	60	sand & gravel - coarse	coarse sand and/or gravel
121792534000	60	67	sand	sand
121792534000	67	70	sand & gravel	coarse sand and/or gravel
121792534000	70	70	boulders or bedrock at	shale
121792539500	0	10	sand, gravel, cinders	coarse sand and/or gravel
121792539500	10	14	sand, gravel, clay	clay, sand, gravel
121792539500	14	26	organic clay	clay
121792539500	26	34	organic silt	Silt and clay
121792539500	34	45	sand and gravel	coarse sand and/or gravel
121792539400	0	10	clay and gravel	clay, sand, gravel
121792539400	10	14	clayey silt	Silt and clay
121792539400	14	18	cinders	cinders
121792539400	18	28	organic silt and clay	Silt and clay
121792509100	0	12	black sand, gravel & cement fill	FILL
121792509100	12	25	brown sand & small gravel	coarse sand and/or gravel
121792509100	25	27	gray clay with gravel	clay, sand, gravel
121792509100	27	104	coarse sand & gravel	coarse sand and/or gravel
121792497500	0	4	topsoil	topsoil
121792497500	4	18	sand	sand
121792497500	18	26	clay	clay
121792497500	26	86	sand & gravel	coarse sand and/or gravel
121792497400	0	4	black topsoil, rock	topsoil
121792497400	4	15	medium sand	sand
121792497400	15	45	medium sand - rocks	coarse sand and/or gravel
121792501800	0	2	topsoil	topsoil
121792501800	2	4	brown clay	clay
121792501800	4	73	medium sand & gravel	coarse sand and/or gravel
121792501800	73	73	shale at	shale
121792538900	0	10	cinders, gravel, clay	FILL
121792538900	10	18	cinders and sand	sand
121792538900	18	32	organic silt	Silt and clay
121792538900	32	34	silty clay, sand	clay, sand
121792538900	34	40	gravel	coarse sand and/or gravel
121792538800	0	10	gravel, sand, cinders	coarse sand and/or gravel
121792538800	10	16	clay and gravel	clay, sand, gravel
121792538800	16	20	silt and clay	Silt and clay
121792538800	20	26	organic silt	Silt and clay
121792538800	26	33	silty clay	Silt and clay
121792538800	33	40	sand and gravel	coarse sand and/or gravel
121792538700	0	1	topsoil	topsoil
121792538700	1	16	clay & silt	Silt and clay
121792538700	16	20	sand	sand
121792538700	20	34	gravel	coarse sand and/or gravel
121792492400	0	17	sand	sand
121792492400	17	20	gravel	coarse sand and/or gravel
121792492400	20	27	sand fine	sand
121792492400	27	60	sand & gravel coarse	coarse sand and/or gravel
121792492400	60	85	blue-green shale below 60'	shale
121792539300	0	2	topsoil	topsoil
121792539300	2	17	clay and silt with gravel	clay, sand, gravel

Well Name/Identifier	From[1]	To[1]	Description	Lithology Group
	ft, bgs	ft, bgs		
121792539300	17	31	sand and gravel	coarse sand and/or gravel
121792539200	0	10	gravel, sand, silt, clay fill	clay, sand, gravel
121792539200	10	25	cinders	cinders
121792539200	25	28	organic clay	clay
121792539200	28	30	organic silt	silt and clay
121792539100	0	10	cinders, gravel, clay	FILL
121792539100	10	20	cinders, gravel, sand	coarse sand and/or gravel
121792539100	20	24	fine sand	sand
121792539100	24	28	silt	silt and clay
121792539100	28	30	silty clay	silt and clay
121792539000	0	10	cinders, gravel, clay	FILL
121792539000	10	20	gravel and clay	clay, sand, gravel
121792539000	20	30	organic silt	silt and clay
121792565200	0	10	topsoil	topsoil
121792565200	10	16	fine sand	sand
121792565200	16	26	med to coarse sand & gravel	coarse sand and/or gravel
121792565200	26	39	super coarse gravel	coarse sand and/or gravel
121792564300	0	2	cinders	cinders
121792564300	2	7	black and dark gray peaty clay	clay
121792564300	7	38	brown sandy clay	clay

Table 3: Hydraulic Conductivity Data for Site Wells

Well Name	Screened Depth	Screened Geology	Test Name	2011 Hydraulic Conductivity Estimate		2021 Hydraulic Conductivity Estimate	
	ft bgs			ft/s	ft/d	ft/s	ft/d
MW-2	23.5-33.5	Gravel with Sand	D3	9.24E-03	800	4.82E-03	420
MW-5	21-31	Gravel	D1	7.41E-04	60	3.21E-04	30
MW-8	20-30	Fill/Clay/Silt	U1	4.00E-03	350	1.62E-03	140
			D1	3.21E-03	280	1.36E-03	120
MW-9	22-32	Sand	D2	3.35E-03	290	1.52E-03	130
MW-10	19-29	Clay/Sand/Gravel	U2	2.26E-03	200	1.01E-03	90
			D1	3.46E-03	300	1.58E-03	140

Notes:
ft bgs = feet below ground surface
ft/d = feet per day
ft/s = feet per second

Table 4: Groundwater Elevation Data

	Site Wells								
	MW-01	**MW-02**	**MW-03**	**MW-04**	**MW-05**	**MW-06**	**MW-07**	**MW-08**	**MW-09**
Groundwater Elevation:									
Minimum (ft)	435.06	431.12	429.944	430.279	430.981	443.116	431.377	445.67	439.766
Maximum (ft)	448.15	449.87	448.93	449.5	449.3	450.73	449.31	448.533	449.346
1st Quartile (ft)	439.78	434.78	434.3	432.379	433.28	446.7	433.88	446.763	443.12
3rd Quartile (ft)	443.53	442.09	442.05	440.76	441.25	449.34	441.37	447.76	446.31
IQR (ft)	3.75	7.31	7.75	8.381	7.97	2.64	7.49	0.997	3.19
Lower Bound (ft)	434.15	423.82	422.675	419.8075	421.325	442.74	422.645	445.2675	438.335
Upper Bound (ft)	449.16	453.05	453.675	453.3315	453.205	453.3	452.605	449.2555	451.095
Average (ft)[1]	441.70	438.20	438.20862	436.59464	437.201	447.9201	437.49879	447.27685	444.67959
Measurement Date[2]									

Notes:

ft = feet

IQR = Interquartile range

[1]The calculated average water level was used as the calibration head target in the numerical groundwater flow model

[2]The water levels for the site wells span the period 2011 through 2020. The regional wells had one water level reported with the well drilling log.

Table 4: Groundwater Elevation Data (continued)

	Site Wells									
	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16	MW-17	MW-18	MW-19
Groundwater Elevation:										
Minimum (ft)	435.786	437.089	447.83	436.842	441.69	446.05	441.164	440.83	440.86	440.76
Maximum (ft)	447.78	448.27	452.77	449.9	450.14	449.362	449.744	449	446.79	446.68
1st Quartile (ft)	440.006	440.57	449.53	437.93	445.81	446.732	443.995	446.0475	441.9575	441.42
3rd Quartile (ft)	441.45	444.13	451.33	443.74	447.4	448.1	447.69	448.3975	445.3175	445.335
IQR (ft)	1.444	3.56	1.8	5.81	1.59	1.368	3.695	2.35	3.36	3.915
Lower Bound (ft)	437.84	435.23	446.83	429.215	443.425	444.68	438.4525	442.5225	436.9175	435.5475
Upper Bound (ft)	443.616	449.47	454.03	452.455	449.785	450.152	453.2325	451.9225	450.3575	451.2075
Average (ft)[1]	441.22736	442.42131	450.43821	441.152	446.67354	447.50815	445.65673	447.32353	443.72111	443.59214
Measurement Date[2]										

Notes:

ft = feet

IQR = Interquartile range

[1]The calculated average water level was used as the calibration head target in the numerical groundwater flow model

[2]The water levels for the site wells span the period 2011 through 2020. The regional wells had one water level reported with the well drilling log.

Table 4: Groundwater Elevation Data (continued)

	Regional Wells											
	121790 025600	121790 013100	121790 012800	121790 012600	121792 379000	121792 379100	121792 378800	121792 378900	121792 237700	121792 237800	121792 564300	121792 515900
Groundwater Elevation:												
Water Level (ft)	438.00	442.00	460.51	443.88	452.00	451.50	454.00	440.29	445.28	441.28	425.00	443.00
Measurement Date[2]	Jul-24	unk	Jan-26	Jan-41	unk	unk	unk	unk	Jul-93	Jul-93	Sep-17	Sep-07

Notes:

ft = feet

unk = unknown

[2]The water levels for the site wells span the period 2011 through 2020. The regional wells had one water level reported with the well drilling log.

Table 5: Calculation of Average River Stage

Date	Water Level in MW-04	Average Daily Gage Height[1]	Average Daily Stage[1,2]	Difference[3]
	ft, amsl	ft	ft, amsl	ft
9/19/2011	431.63			
12/12/2011	433.28	5.46	433.13	0.15
3/19/2012	434.93	7.13	434.79	0.14
4/4/2012	434.15	6.28	433.94	0.21
6/25/2012	432.38	3.12	430.79	1.59
9/18/2012	430.34	2.29	429.95	0.39
12/12/2012	430.28	2.42	430.08	0.20
2/27/2013	434.36	6.75	434.42	-0.06
5/29/2013	443.93	15.99	443.66	0.27
7/31/2013	432.86	3.44	431.11	1.75
10/21/2013	430.6			
3/5/2014	442.09	14.05	441.71	0.38
5/27/2014	439.49			
8/25/2014	435.1	9.99	437.65	-2.55
10/27/2014	436.01			
2/25/2015	432.09	3.72	431.39	0.70
5/13/2015	439.29	12.60	440.27	-0.98
8/17/2015	436.02	4.30	431.97	4.05
11/16/2015	431.2	4.38	432.05	-0.85
2/22/2016	437.06	7.97	435.64	1.42
5/16/2016	441.95	14.53	442.20	-0.25
8/15/2016	434.1	7.11	434.77	-0.67
11/14/2016	435.14	6.35	434.02	1.12
2/13/2017	438.79			
5/1/2017	445.16	17.07	444.73	0.43
8/28/2017	432.08	4.01	431.68	0.40
11/7/2017	434.95	6.88	434.55	0.40
3/6/2018	449.5	20.44	448.11	1.39
5/15/2018	436.44	8.06	435.73	0.71
8/7/2018	431.34	2.68	430.35	1.00
10/30/2018	433.99	4.21	431.87	2.12
2/25/2019	445.12	16.73	444.39	0.73
4/29/2019	444.69	14.04	441.70	2.99
8/26/2019	433.22	3.61	431.27	1.95
11/11/2019	444.83	15.92	443.59	1.24
2/24/2020	440.76	12.84	440.50	0.26
4/27/2020	440.81	12.64	440.31	0.50
8/10/2020	435.17	4.38	432.04	3.13
12/7/2020	432.07	2.99	430.66	1.42
AVERAGE				0.76

Notes:

ft, amsl = feet above mean sea level

ft = feet

[1]Gage data from USGS Gage 5568500, Illinois River at Kingston Mines, IL

[2]Gage elevation = 427.665 ft, amsl (corrected for vertical datum)

Table 6: Calibrated Water Budget

Component	Conceptual Flux	Modeled Flux	
	af/yr	af/yr	cfd
INFLOWS			
Recharge	100	84	9,990
Flow from South	3,208	795	94,858
Inflow from Ponds and FAB	0	304	36,232
Total Inflows		1182	141,080
OUTFLOWS			
Discharge toward Lake Powerton	1,345	24	2,808
Discharge to Illinois River	1,966	1,157	138,056
Total Outflows		1180	140,865

Notes:
af/yr = acre-feet per year
cfd = cubic feet per day

Table 7: Calibration Residuals

Well	Easting	Northing	Target Value[1]	Weight	Modeled Water Level	Residual[2]
	NAD83, State Plane, IL West, ft		ft		ft	ft
MW-01	2433690.62	1412998.05	441.70	1	439.9	1.82
MW-02	2433847.08	1413749.00	438.20	1	437.6	0.58
MW-03	2433616.58	1414290.06	438.21	1	436.8	1.44
MW-04	2433012.49	1414198.68	436.59	1	436.7	-0.08
MW-05	2432767.38	1413950.38	437.20	1	436.8	0.37
MW-06	2432559.16	1413578.06	447.92	1	447.3	0.62
MW-07	2432329.58	1413466.26	437.50	1	437.3	0.20
MW-08	2432586.83	1412982.06	447.28	1	446.9	0.40
MW-09	2432948.62	1411493.04	444.68	1	444.7	0.00
MW-10	2433292.14	1412489.79	441.23	1	441.2	0.08
MW-11	2432975.81	1412173.14	442.42	1	442.1	0.34
MW-12	2432791.46	1412104.65	450.44	1	450.2	0.25
MW-13	2432491.87	1412182.91	441.15	1	441.3	-0.12
MW-14	2432383.61	1412597.16	446.67	1	446.7	-0.03
MW-15	2432550.11	1412637.58	447.51	1	447.3	0.23
MW-16	2432376.86	1410843.75	445.66	1	445.8	-0.17
MW-17	2432588.25	1412428.59	447.32	1	447.1	0.17
MW-18	2432962.62	1413181.32	443.72	1	443.4	0.32
MW-19	2432813.27	1411759.49	443.59	1	443.6	-0.03
MW-20	2432390.14	1412415.84	441.79	1	440.1	1.72
MW-21	2432394.58	1412258.23	440.07	1	440.7	-0.65
121790025600	2435796.86	1415284.43	438.00	0.1	438.4	-0.04
121790013100	2431499.62	1410489.72	442.00	0.1	446.4	-0.44
121790012800	2435381.38	1414262.36	460.51	0.1	440.0	2.05
121790012600	2434919.57	1416219.75	443.88	0.1	436.1	0.78
121792379000	2432781.30	1410872.41	452.00	0.1	446.2	0.58
121792379100	2432781.30	1410872.41	451.50	0.1	446.2	0.53
121792378800	2432781.30	1410872.41	454.00	0.1	446.2	0.78
121792378900	2432781.30	1410872.41	440.29	0.1	446.2	-0.59
121792237700	2435040.77	1416653.97	445.28	0.1	436.0	0.93
121792237800	2435040.77	1416653.97	441.28	0.1	436.0	0.53
121792564300	2433669.16	1415617.07	425.00	0.1	436.0	-1.10
121792515900	2434760.01	1415047.22	443.00	0.1	436.8	0.62

Notes:

RMS = root mean squared

ft = feet

[1]The target value for site-specific wells is the long-term average of measured water levels, discounting outliers, and for regional wells is the reported water level in well logs

[2]The residual for the regional (non-site) wells represents the weighted value

Table 8: Calibration Statistics

Parameter	All Wells[1]	Site Wells	Sand/Gravel[2]	Clay[3]
Average Residual (ft)	0.37	0.36	0.39	0.28
Minimum Residual (ft)	-1.10	-0.65	-0.65	-0.03
Maximum Residual (ft)	2.05	1.82	1.82	0.62
Sum of Squared Residuals (ft2)	19.53	10.25	6.17	0.70
RMS Error (ft)	0.77	0.70	0.64	0.34
%RMS[4]	2%	5%	7%	9%

Notes:

RMS = root mean squared

[1]Regional (non-site specific) wells were given a weight of 0.1

[2]MW-01 through MW-05, MW-07, MW-09 through -11, MW-13, MW-16, MW-18 through -21

[3]MW-06, MW-08, MW-12, MW-14, MW-15, MW-17

[4]Calculated by dividing the RMS error by the range in measured values

Table 9: Initial Concentrations Used for Surrogate Transport Modeling

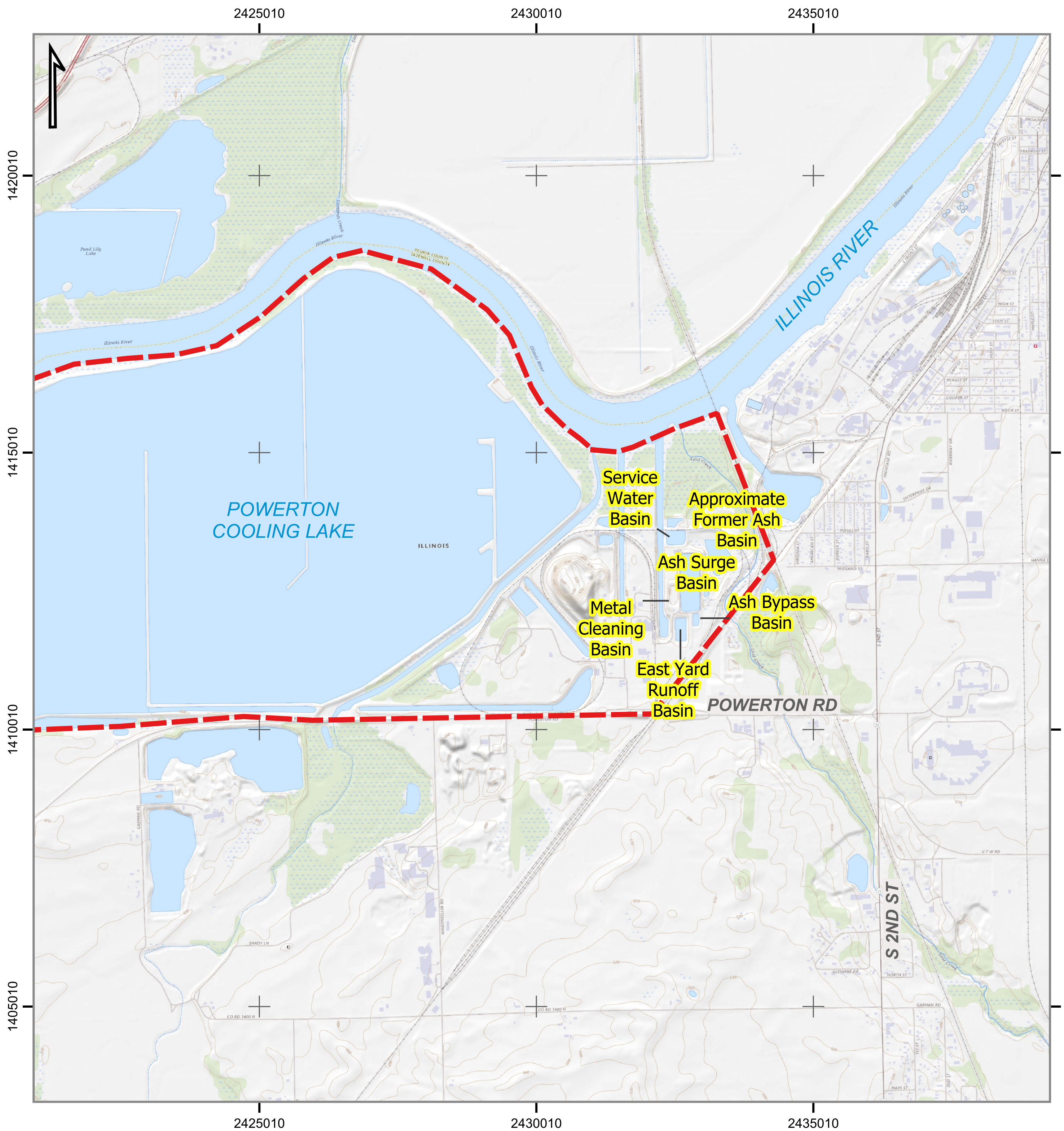
Parameter	MW-02	MW-03	MW-04	MW-05	Standard
	mg/l	mg/l	mg/l	mg/l	mg/l
Boron	0.22	0.30	0.51	0.68	2.00
Chloride	41	47	56	67	200
Sulfate	36.00	23.00	62.00	92.00	400
Arsenic	0.0017	0.0014	0.0012	0.0011	0.01
Lithium	0.0045	0.0040	0.0035	0.0052	0.04

Notes:

mg/l = miligrams per liter

Concentrations are from the November 30, 2021 sampling event

FIGURES



LEGEND

SITE BOUNDARY

0 0.5 mi

FEET

Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure1_LocationMap.qgz

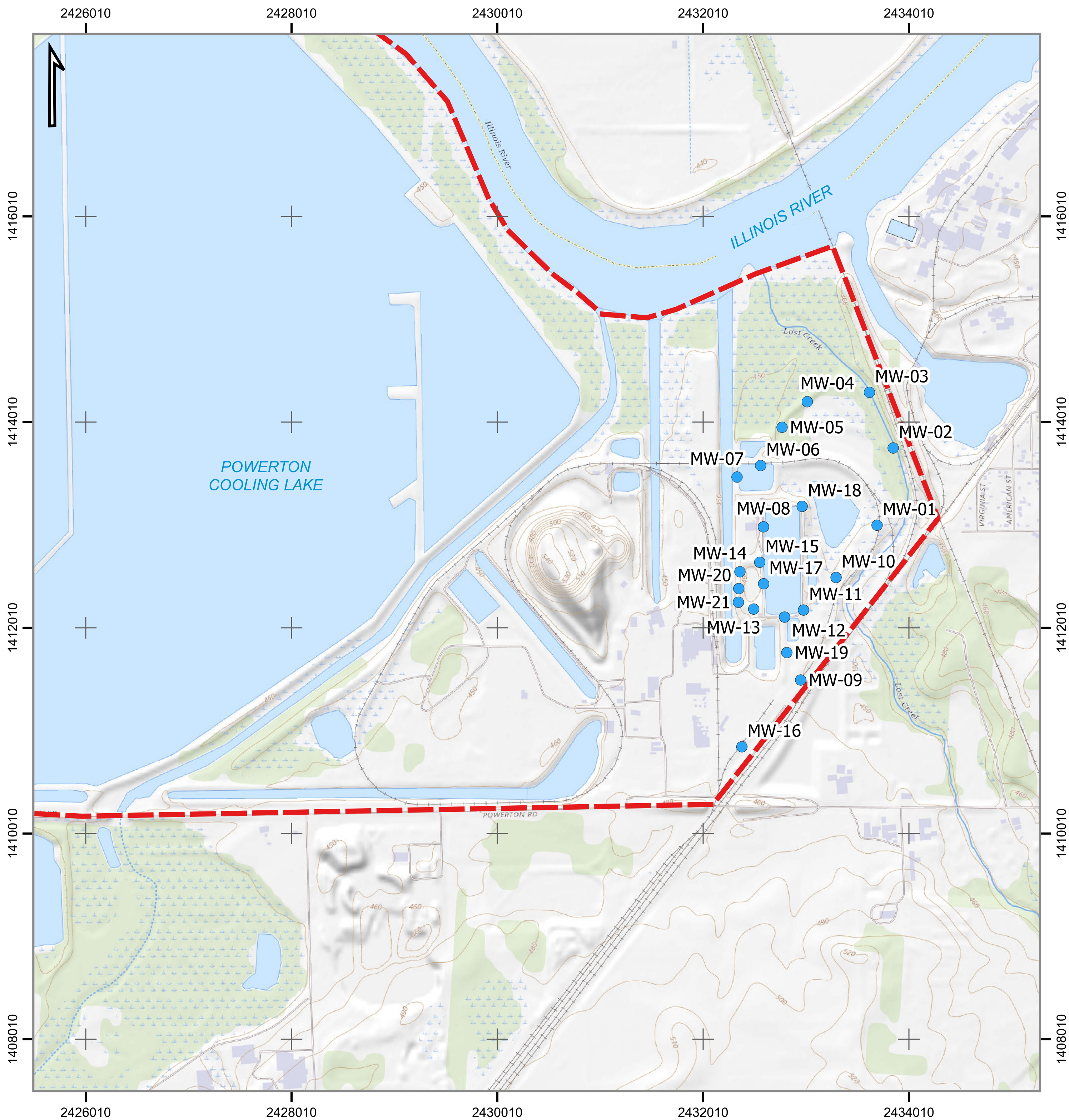
BAS GROUNDWATER CONSULTING

K P R G

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**LOCATION MAP**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:30,000	CHECKED	BAS	10/27/2022

BAS PROJECT No.	FIGURE:
21141401	1



LEGEND

- SITE MONITORING WELL
- SITE BOUNDARY

0 800 1,600 ft

FEET

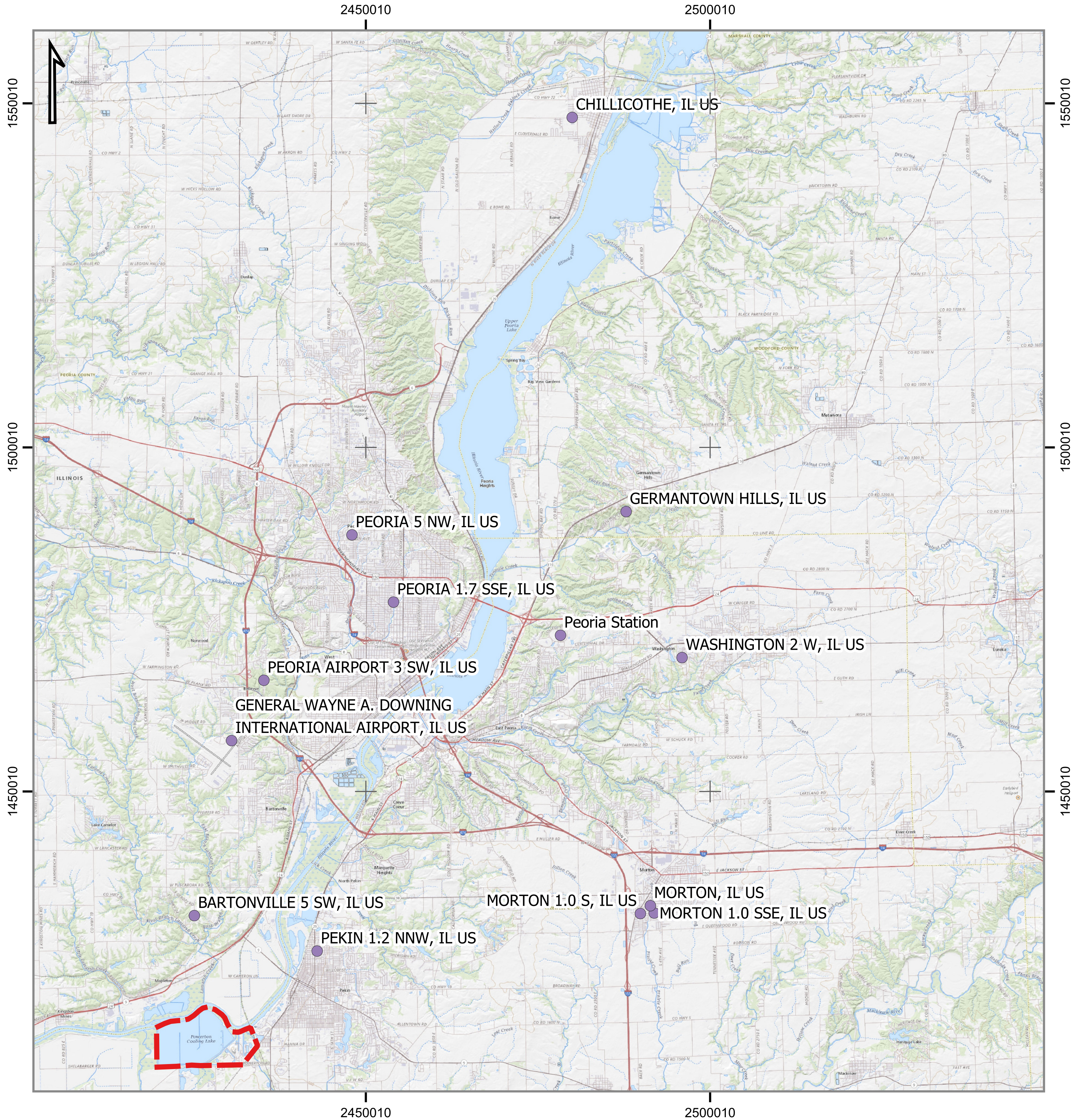
Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure2_SiteWells.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**SITE WELLS**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:16,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **2**	



LEGEND

- CLIMATE STATION
- SITE BOUNDARY

0 2 4 mi

FEET

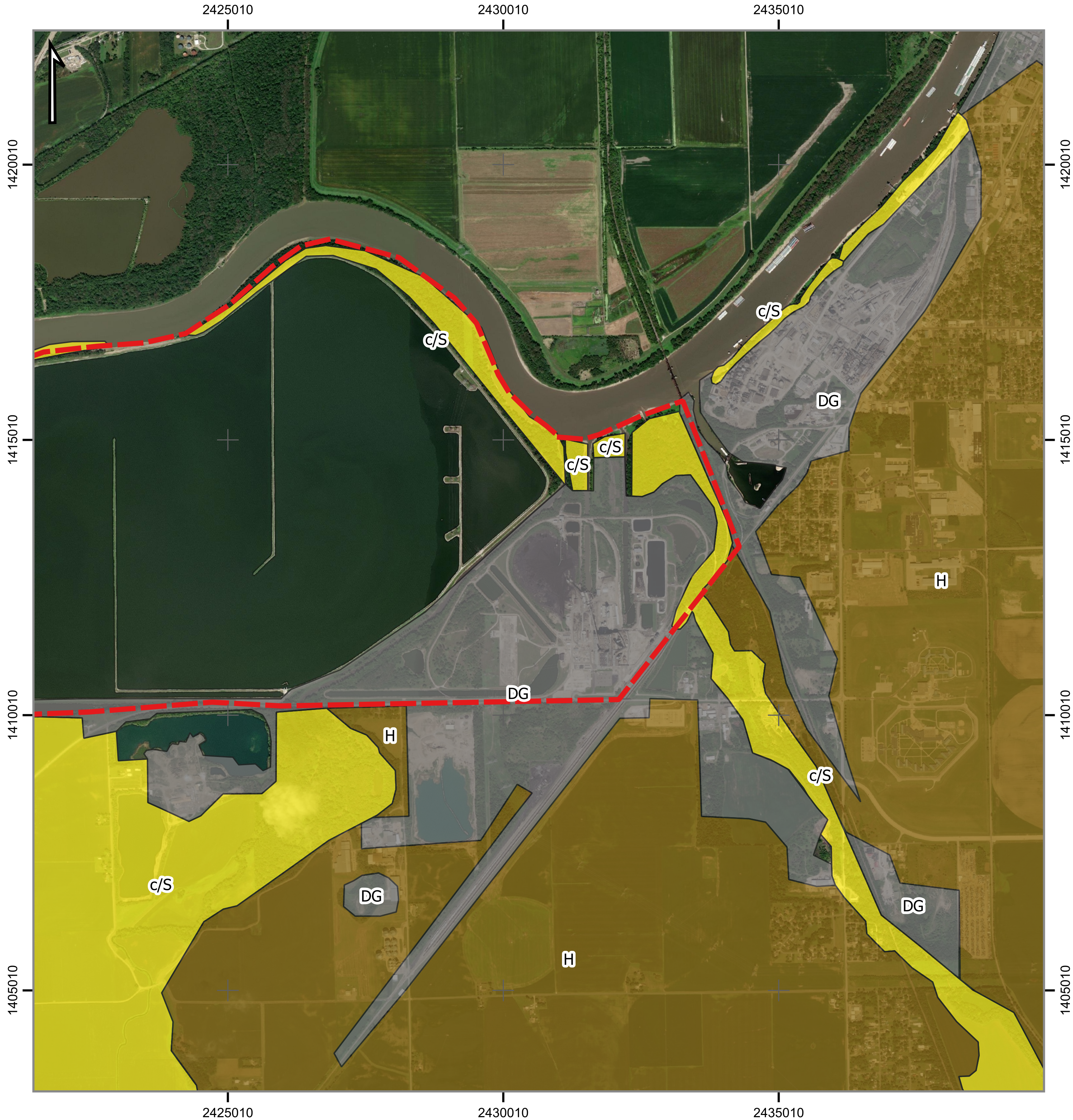
Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure3_ClimateStations.qgz

BAS GROUNDWATER CONSULTING

K P R G

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**SITE WELLS**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:240,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE:	**3**



LEGEND

SITE BOUNDARY

SURFACE GEOLOGY

CAHOKIA FORMATION

DISTURBED GROUND

HENRY FORMATION

0 1,000 2,000 ft

FEET

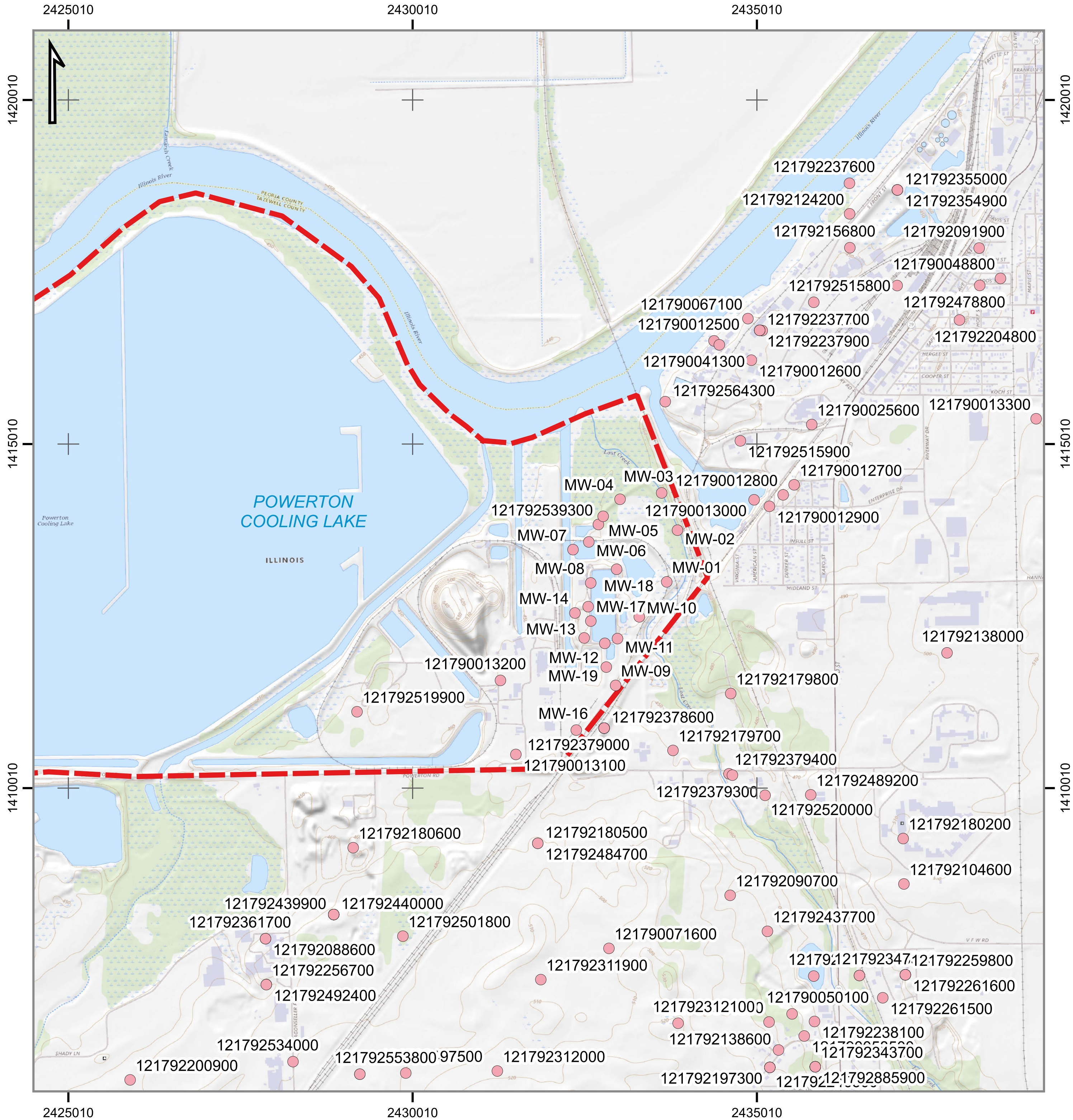
Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure4_Geology.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT	MIDWEST GENERATION
SITE	WAUKEGAN 401 E GREENWOOD AVE, WAUKEGAN, IL
TITLE	**SURFACE GEOLOGY**

SCALE AT ANSI A	*DRAWN*	*DZF*	10/27/2022
1:30,000	*CHECKED*	*BAS*	10/27/2022
BAS PROJECT No. 21141101	*FIGURE:* **4**		



LEGEND

- WELLS WITH BOREHOLE LITHOLOGY DATA
- SITE BOUNDARY

0 1,000 2,000 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure5_WellsWBoreholes.qgz

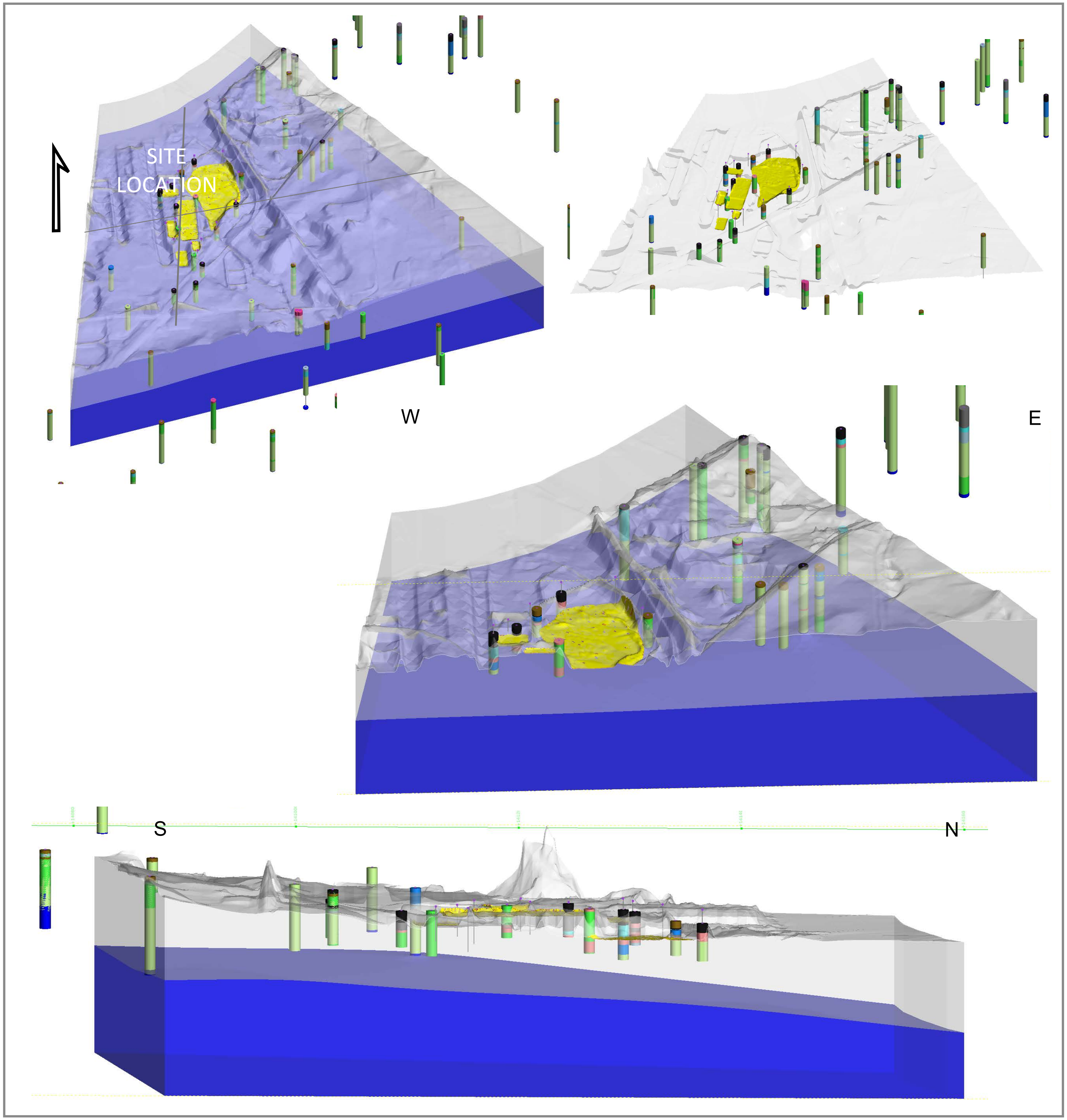
BAS GROUNDWATER CONSULTING

KPRG

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**WELLS WITH BOREHOLE LITHOLOGY DATA**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:24,000	CHECKED	BAS	10/27/2022

BAS PROJECT No.	FIGURE:
21141401	5



LEGEND

Leapfrog_Geology
- FILL
- Topsoil
- cinders
- Organic
- clay
- loam
- clay, sand
- sand
- clay, sand, gravel
- silt and clay
- coal
- coarse sand and/or gravel
- dirty coarse sand and/or gravel
- hardpan
- limestone
- shale

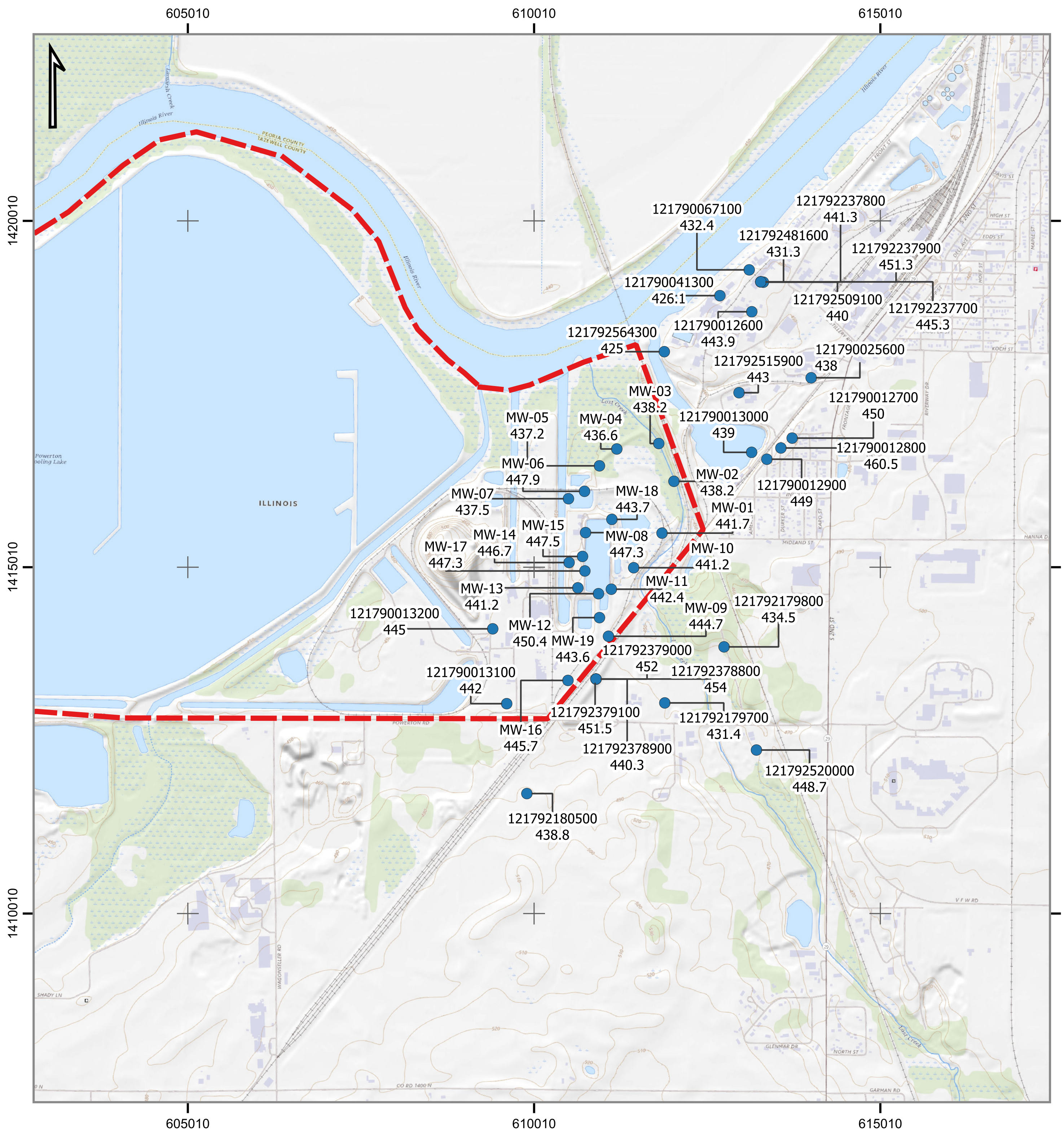
Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure6_LeapfrogGeology.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**BOREHOLE LITHOLOGY DATA**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **6**	



LEGEND

- AVERAGE WATER LEVEL ELEVATION (FT, AMSL)
- SITE BOUNDARY

0 1,000 2,000 ft

FEET

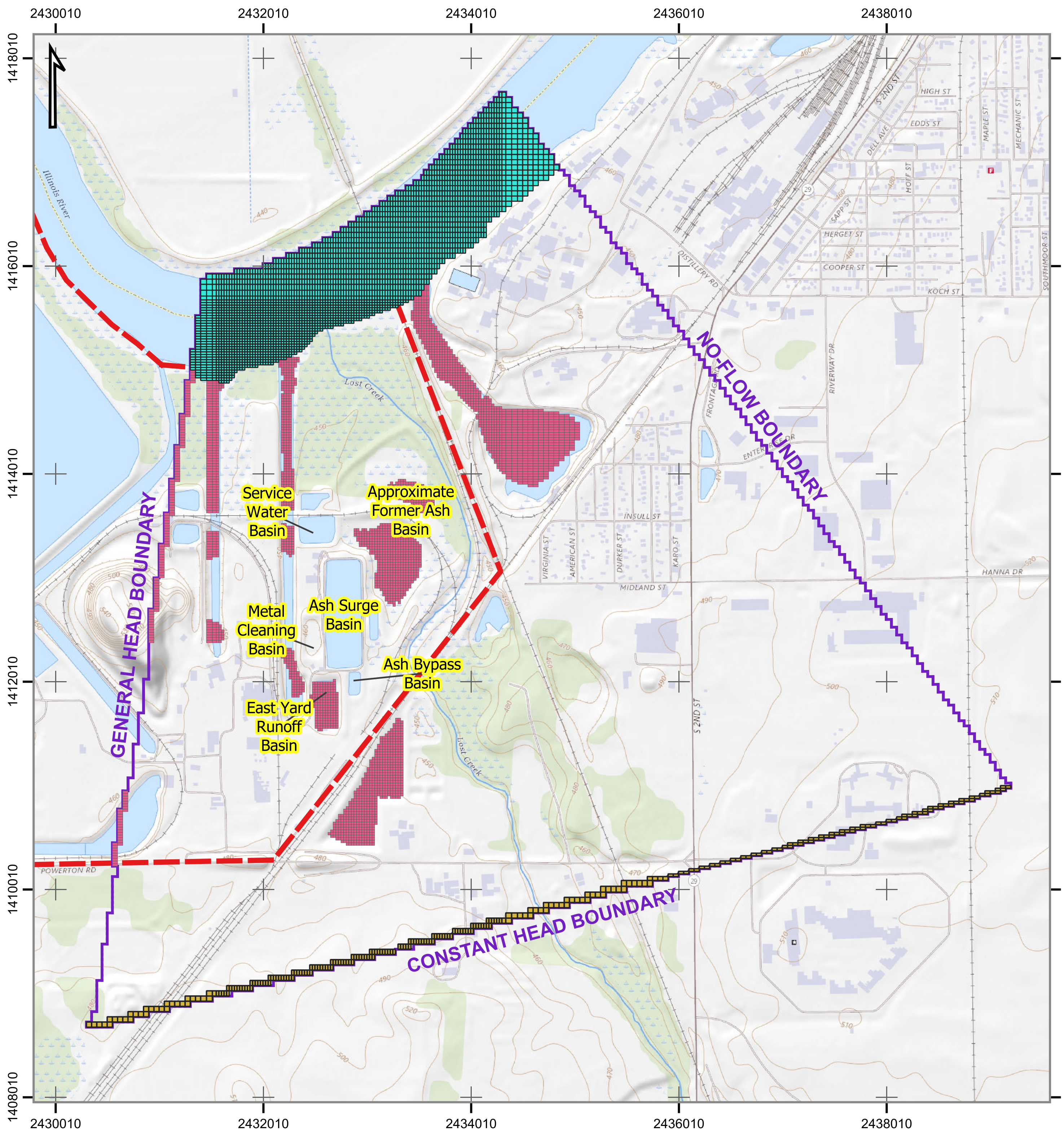
Coordinate System: NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure7_WellsWWaterLevelData.qgz

BAS GROUNDWATER CONSULTING

K P R G

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**WELLS WITH WATER LEVEL DATA**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:24,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: 7	

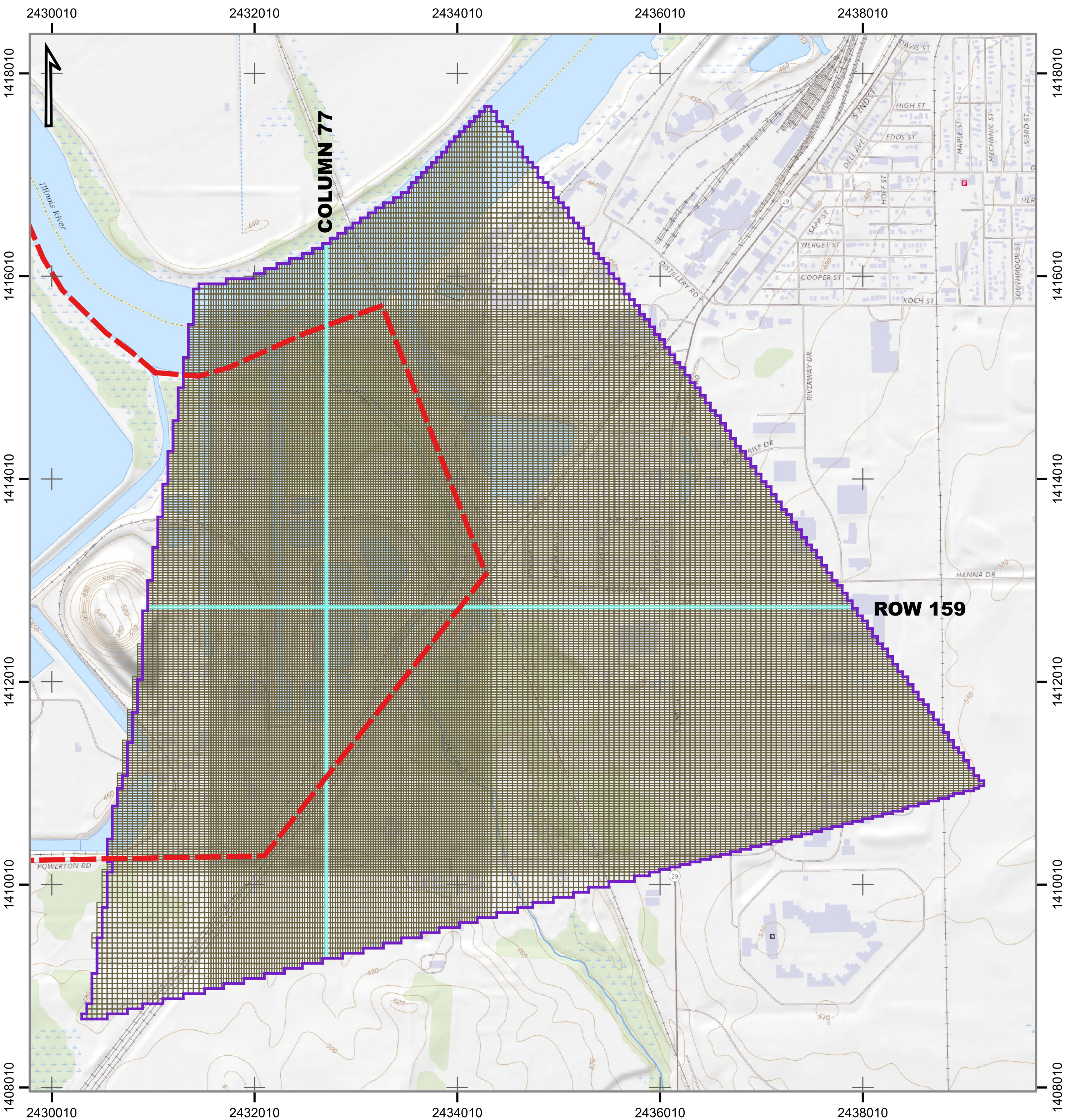


Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure8_ModelBoundary.qgz

BAS GROUNDWATER CONSULTING | K P R G

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**MODEL BOUNDARY CONDITIONS**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:16,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401	FIGURE: 8		



LEGEND

- MODEL GRID
- MODEL BOUNDARY
- SITE BOUNDARY

HIGHLIGHTED SECTIONS SHOWN ON FIGURE 10

0 800 1,600 ft

FEET

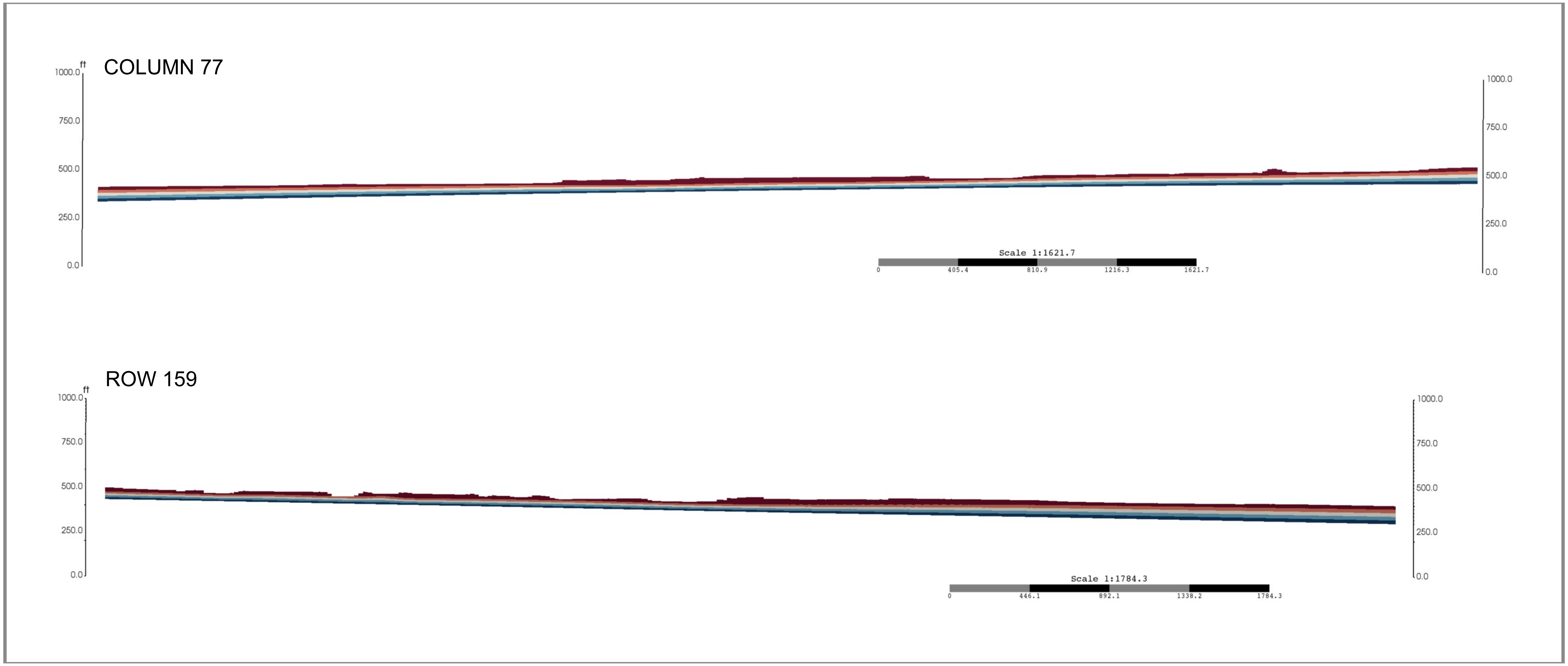
Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure9_ModelGrid.qgz

BAS GROUNDWATER CONSULTING

KPRG

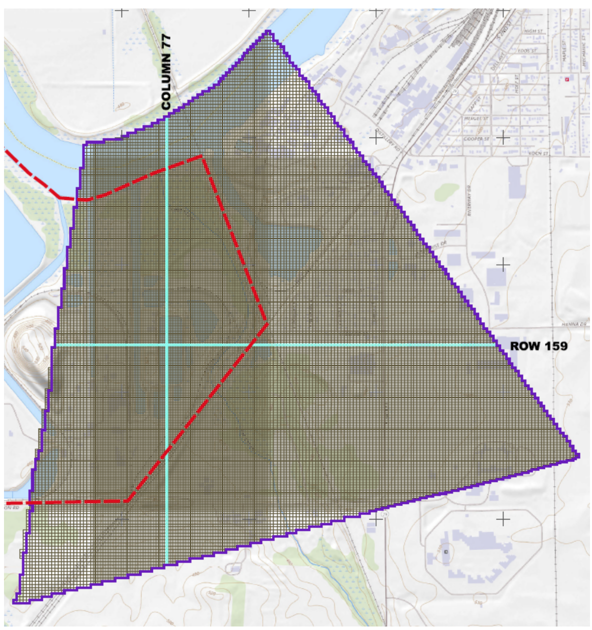
CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**MODEL GRID**

SCALE AT ANSI A			
1:16,234	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: 9	



LEGEND

- LAYER 1
- LAYER 2
- LAYER 3
- LAYER 5
- LAYER 6



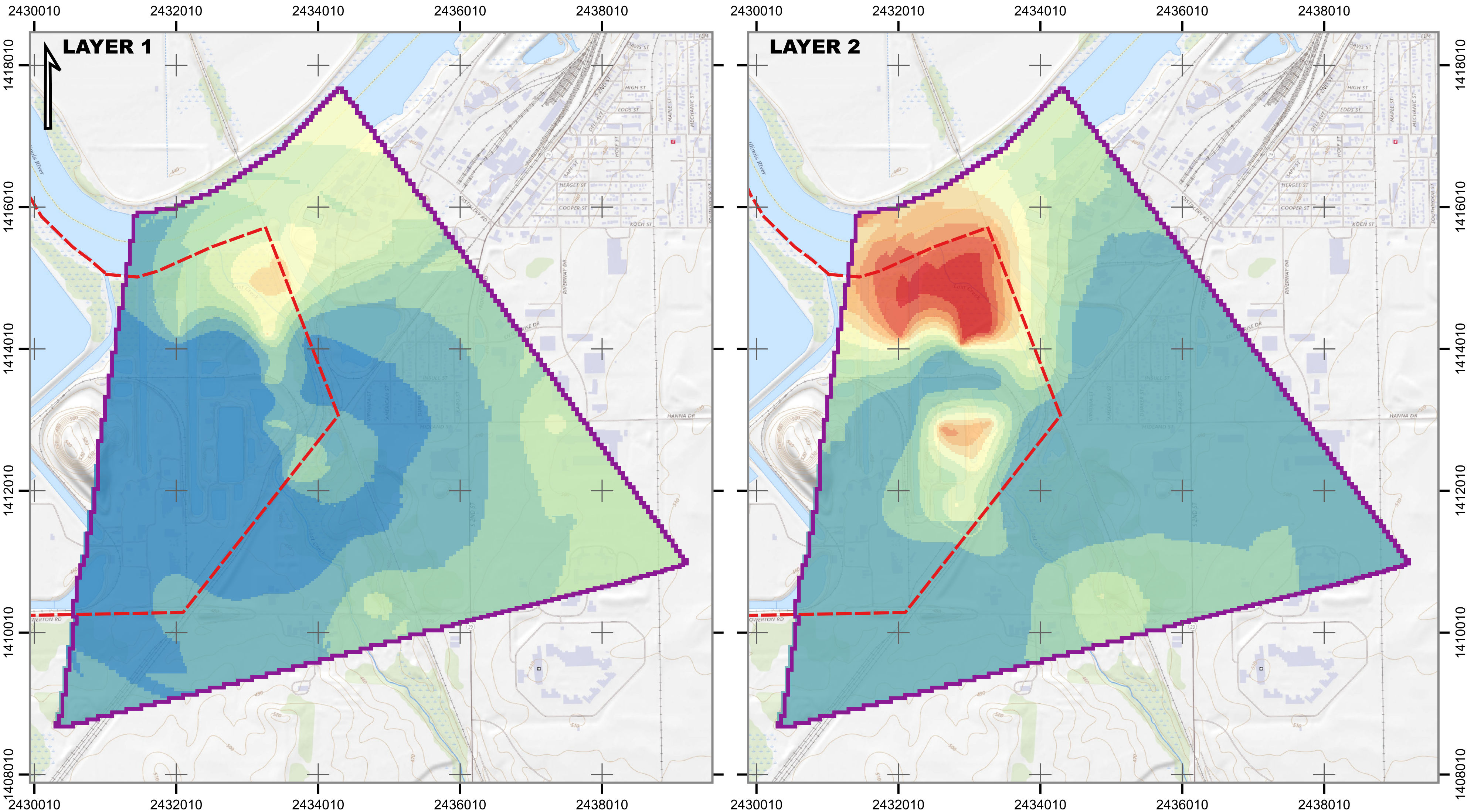
Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure10_ModelLayering.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**MODEL LAYERING**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **10**	



LEGEND

MODEL BOUNDARY

SITE BOUNDARY

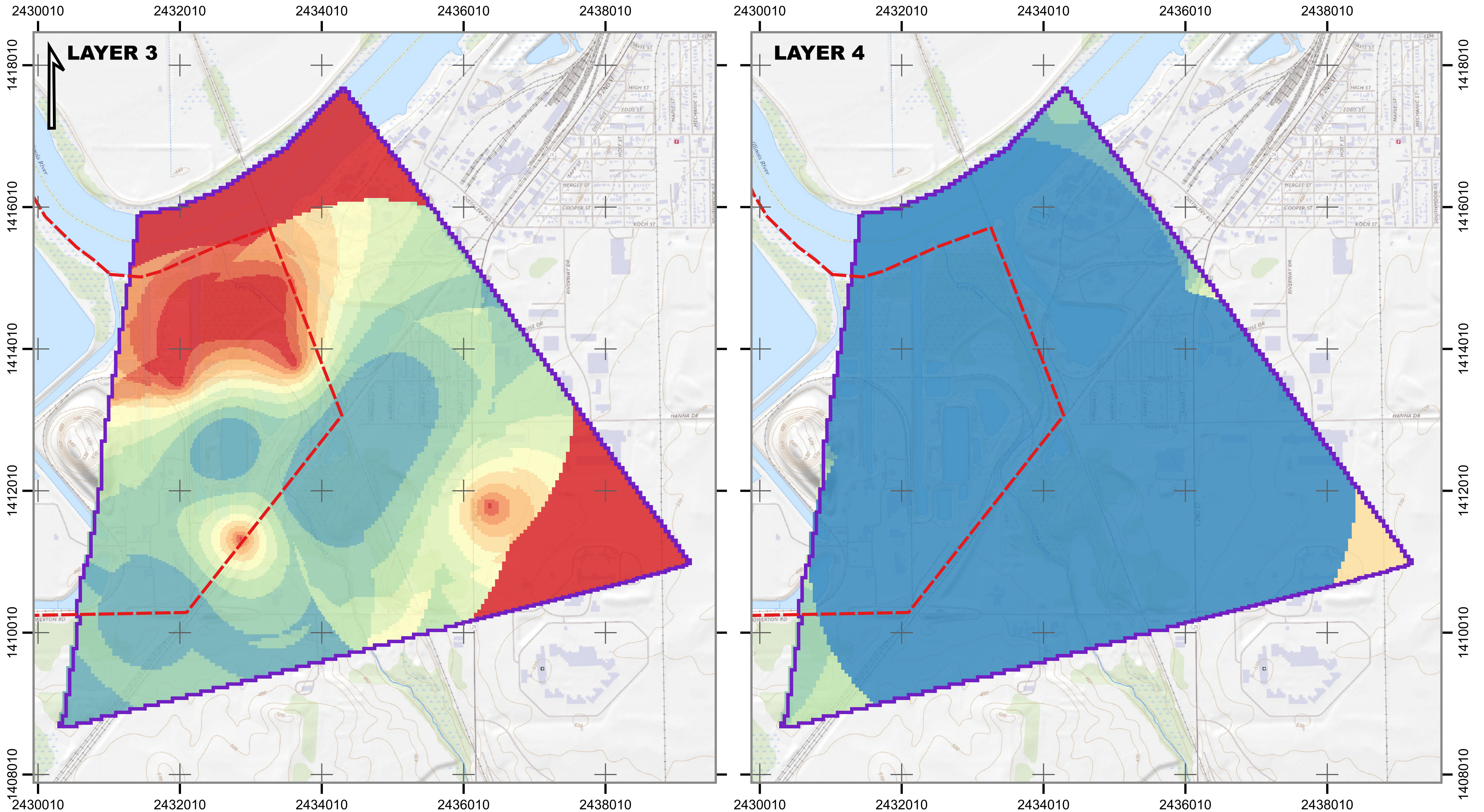
CALIBRATED HYDRAULIC CONDUCTIVITY VALUES, FT/D

- 0 - 23
- 23 - 84
- 84 - 167
- 167 - 290
- 290 - 456
- 456 - 648
- 648 - 832
- 832 - 1017
- 1017 - 1196
- 1196 - 1371
- 1371 - 1677

0 1,000 2,000 ft
FEET

Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure11a_CalibratedKsLayers1_2.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CALIBRATED HYDRAULIC CONDUCTIVITY DISTRIBUTION IN MODEL LAYERS 1 & 2**
SCALE AT ANSI A	1:24,000
DRAWN	DZF 10/27/2022
CHECKED	BAS 10/27/2022
BAS PROJECT No.	21141401
FIGURE:	**11a**



LEGEND

MODEL BOUNDARY

SITE BOUNDARY

CALIBRATED HYDRAULIC CONDUCTIVITY VALUES, FT/D

- 0 - 26
- 26 - 118
- 118 - 202
- 202 - 303
- 303 - 428
- 428 - 569
- 569 - 727
- 727 - 911
- 911 - 1083
- 1083 - 1237
- 1237 - 1388

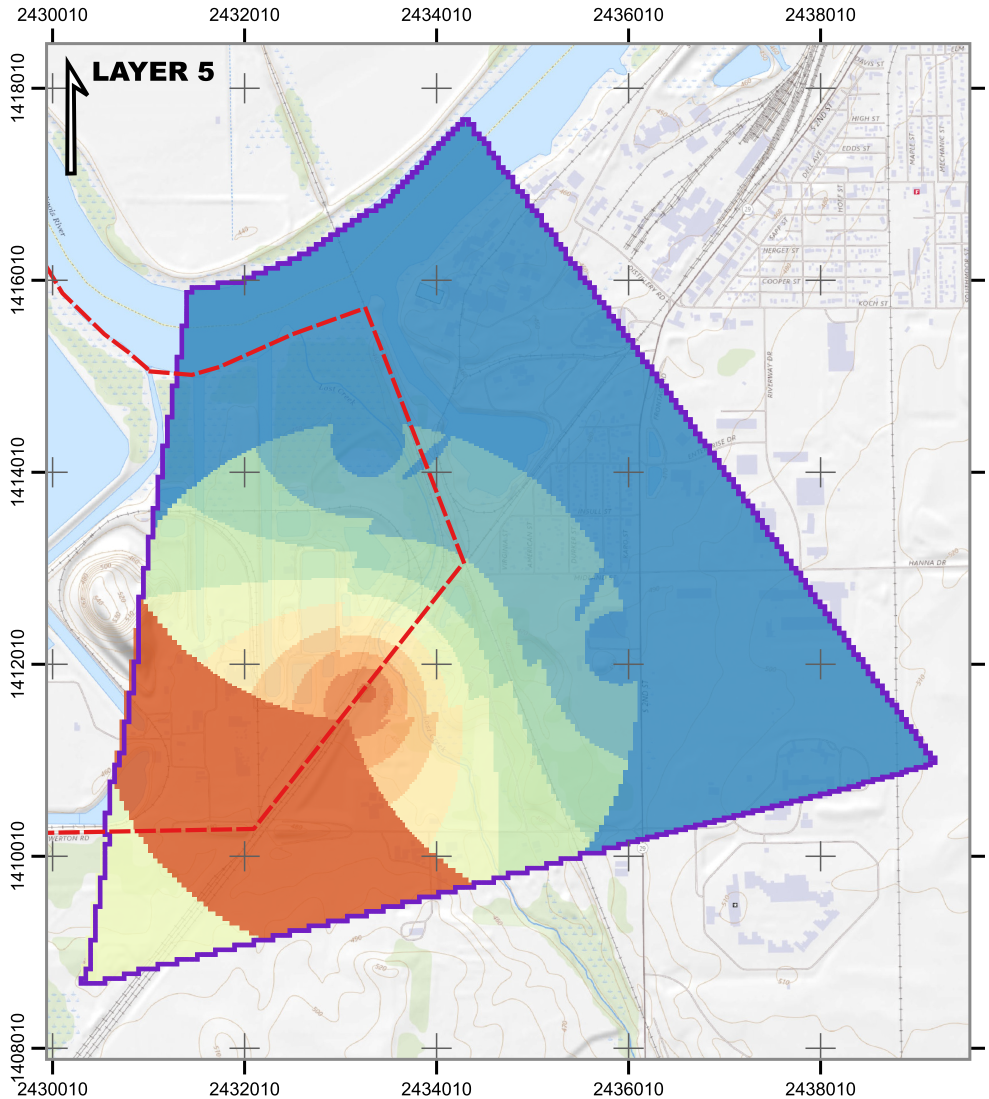
0 1,000 2,000 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure11b_CalibratedKsLayers3_4.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CALIBRATED HYDRAULIC CONDUCTIVITY DISTRIBUTION IN MODEL LAYERS 3 & 4**

SCALE AT ANSI A			
1:24,000	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401	FIGURE: **11b**		



LEGEND

MODEL BOUNDARY

SITE BOUNDARY

CALIBRATED HYDRAULIC CONDUCTIVITY VALUES, FT/D

- 6 - 19
- 19 - 33
- 33 - 50
- 50 - 69
- 69 - 92
- 92 - 121
- 121 - 158
- 158 - 202
- 202 - 267
- 267 - 311

BAS GROUNDWATER CONSULTING

K P R G

0 1,000 2,000 ft

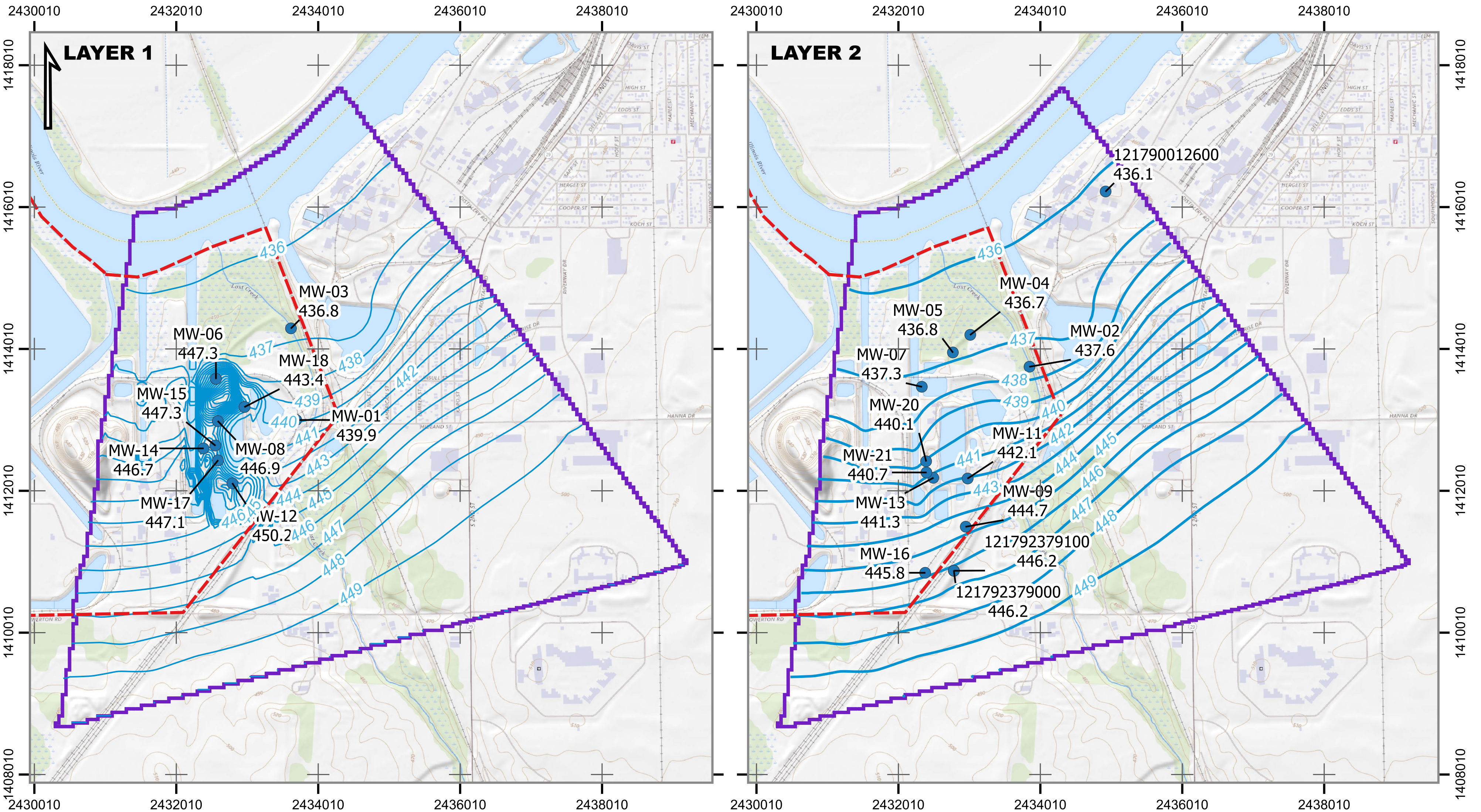
FEET

Coordinate System:

Project File: Figure11c_CalibratedKsLayers5.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CALIBRATED HYDRAULIC CONDUCTIVITY DISTRIBUTION IN MODEL LAYER 5**

SCALE AT ANSI A 1:	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **11c**	



LEGEND

- MODELED WATER LEVEL ELEVATION (FT, AMSL)
- MODELED WATER LEVEL ELEVATION CONTOUR (FT, AMSL)
- MODEL BOUNDARY
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

KPRG

0 1,000 2,000 ft

FEET

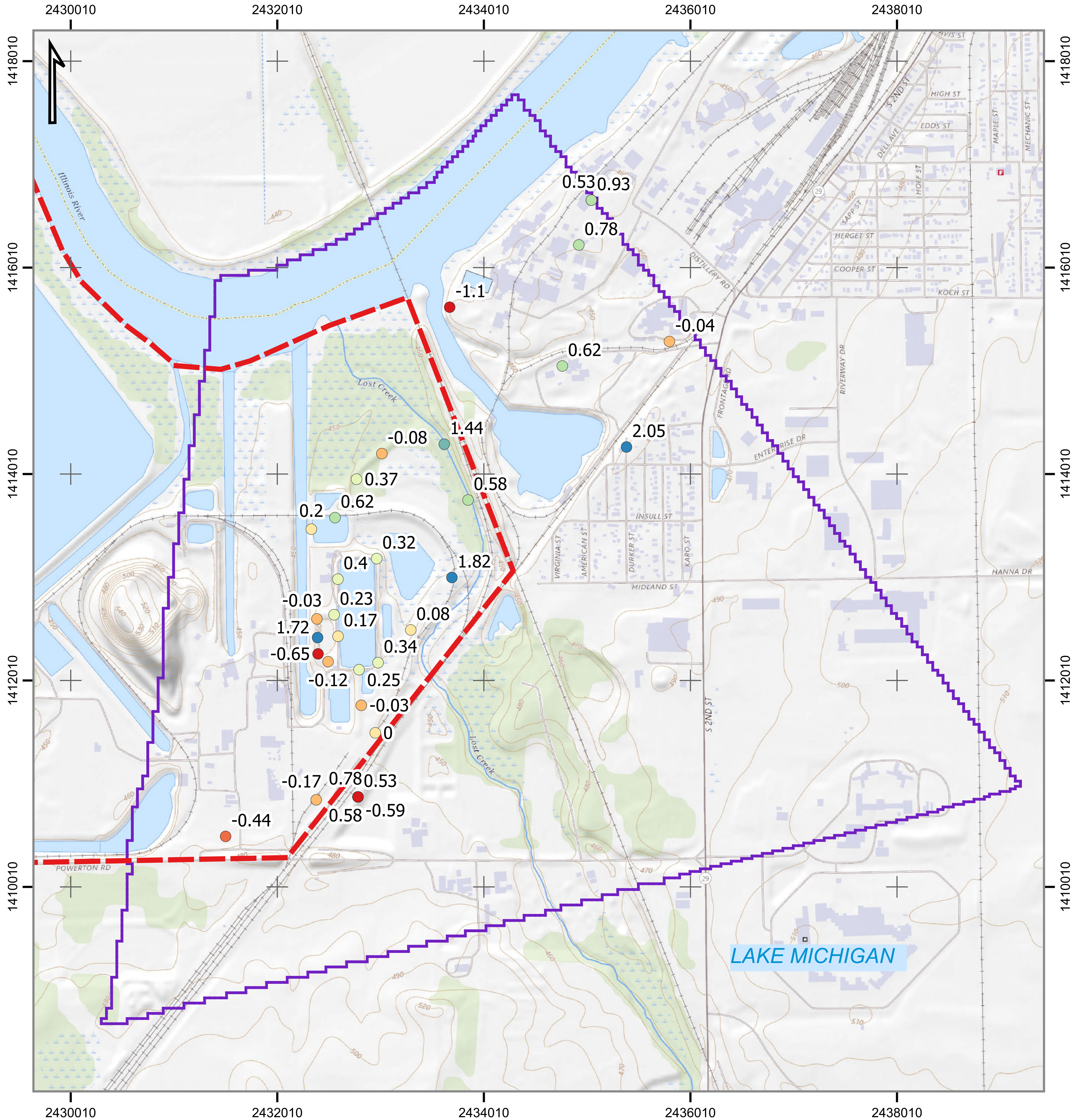
Coordinate System:

Project File: Figure12_CalibratedWLs.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CALIBRATED WATER LEVEL ELEVATIONS**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:24,000	CHECKED	BAS	10/27/2022

BAS PROJECT No.	FIGURE:
21141401	**12**



LEGEND

RESIDUAL (FT.)

- -1.5 - -0.5
- -0.5 - -0.2
- -0.2 - 0
- 0 - 0.2
- 0.2 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2.2
- MODEL BOUNDARY
- SITE BOUNDARY

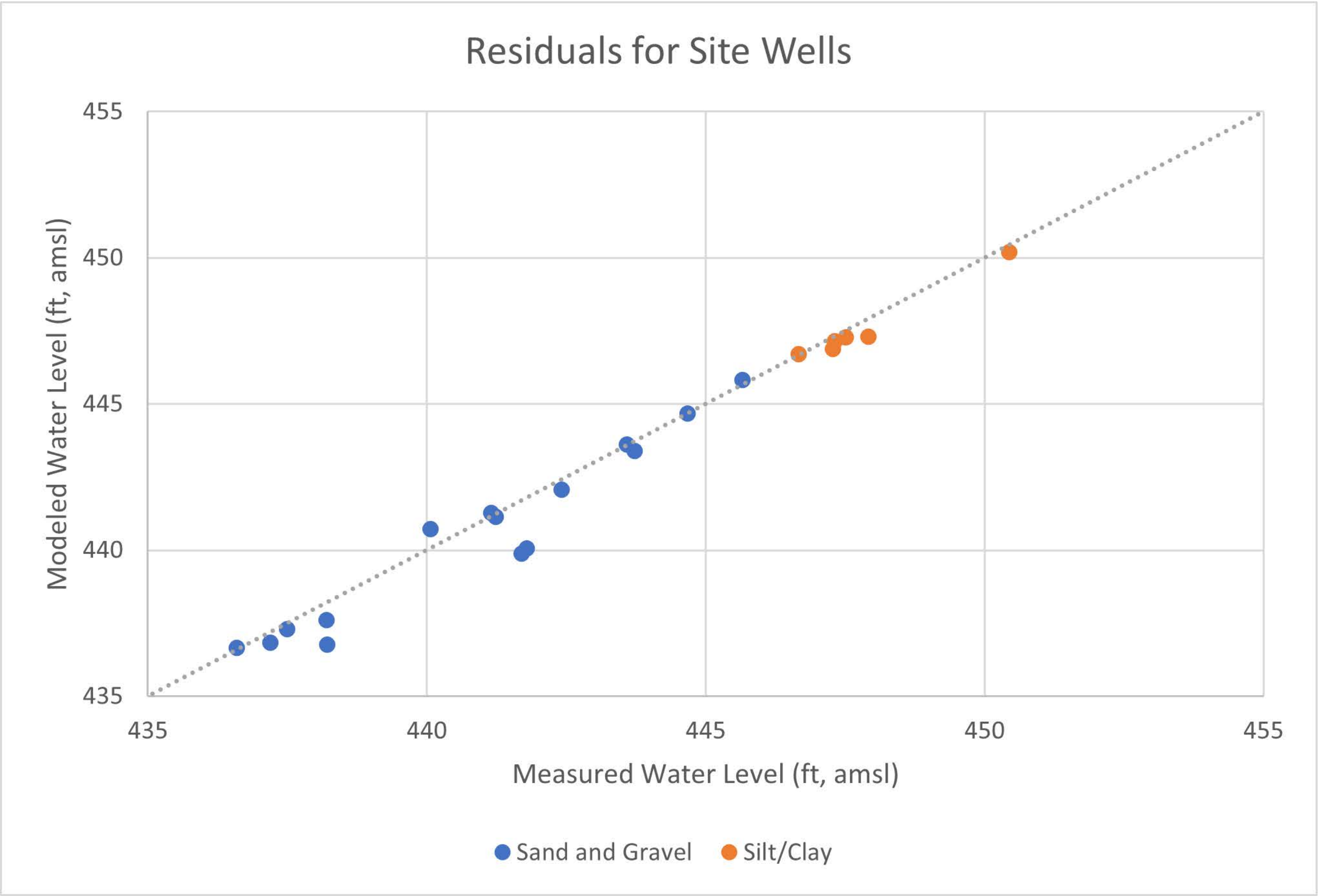
Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure13_CalibratedResiduals.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT	MIDWEST GENERATION
SITE	WAUKEGAN 401 E GREENWOOD AVE, WAUKEGAN, IL
TITLE	**CALIBRATED WATER LEVEL RESIDUALS**

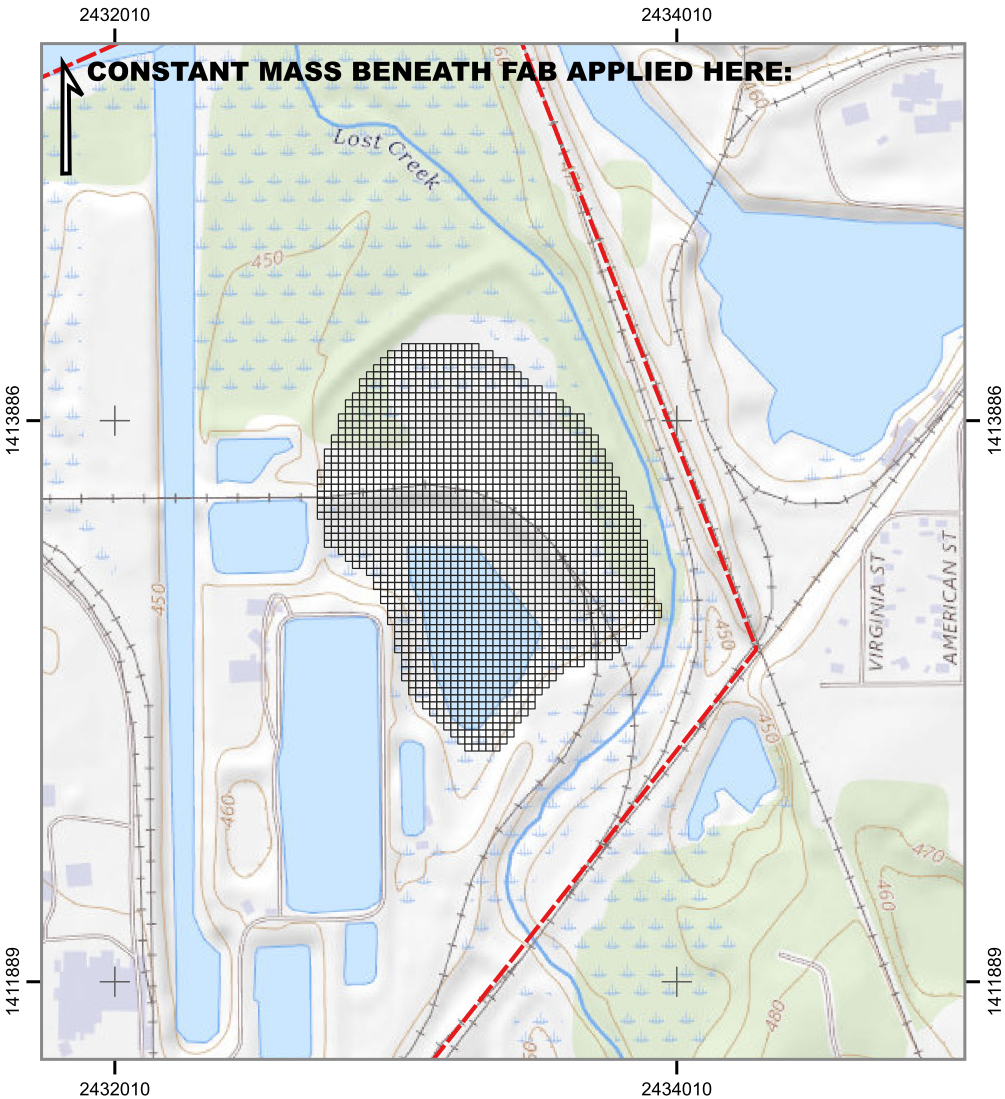
SCALE AT ANSI A 1:16,000	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141101	FIGURE: **13**		



CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CALIBRATION SCATTER PLOT**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **14**	

Project File: Figure14_CalibrationScatterPlot.qgz



LEGEND

MODEL DOMAIN

SITE BOUNDARY

AREA OF MASS DEFINITION BENEATH FAB

0 400 800 ft

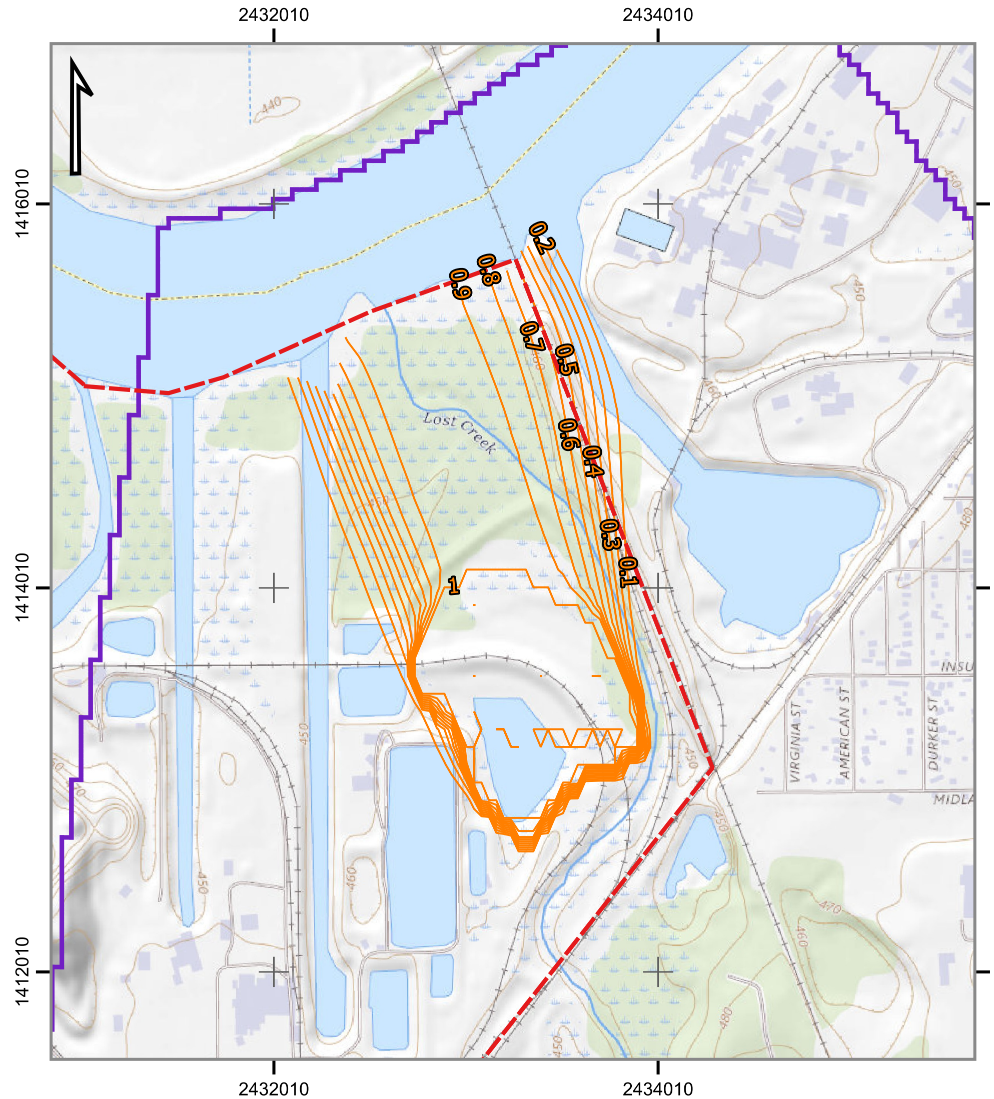
FEET

Coordinate System:
Project File: Figure15_AreaOfMassDefinitionBeneathFAB.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**AREA OF MASS DEFINITION BENEATH FAB**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:8,200	CHECKED	BAS	10/27/2022

BAS PROJECT No.	FIGURE:
21141401	**15**



LEGEND

PERCENT CONCENTRATIONS OF A SURROGATE MASS

MODEL DOMAIN

SITE BOUNDARY

BAS GROUNDWATER CONSULTING

K P R G

0 600 1,200 ft

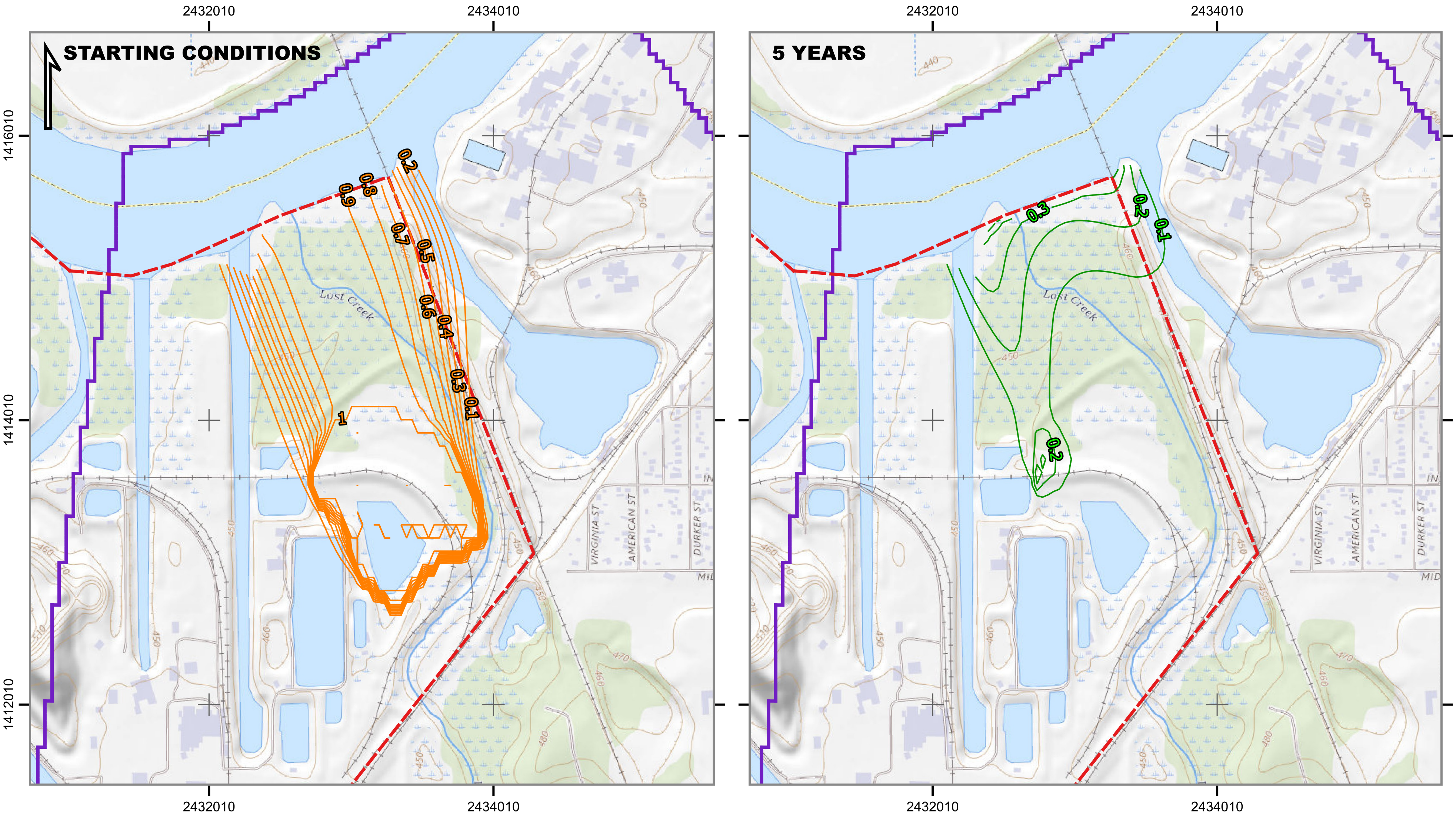
FEET

Coordinate System:

Project File: Figure16_HypotheticalPlumeAfter100Years.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**HYPOTHETICAL PLUME AFTER 100 YEARS**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:12,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401	FIGURE: **16**		



LEGEND

- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- MODEL BOUNDARY
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

K P R G

0 600 1,200 ft

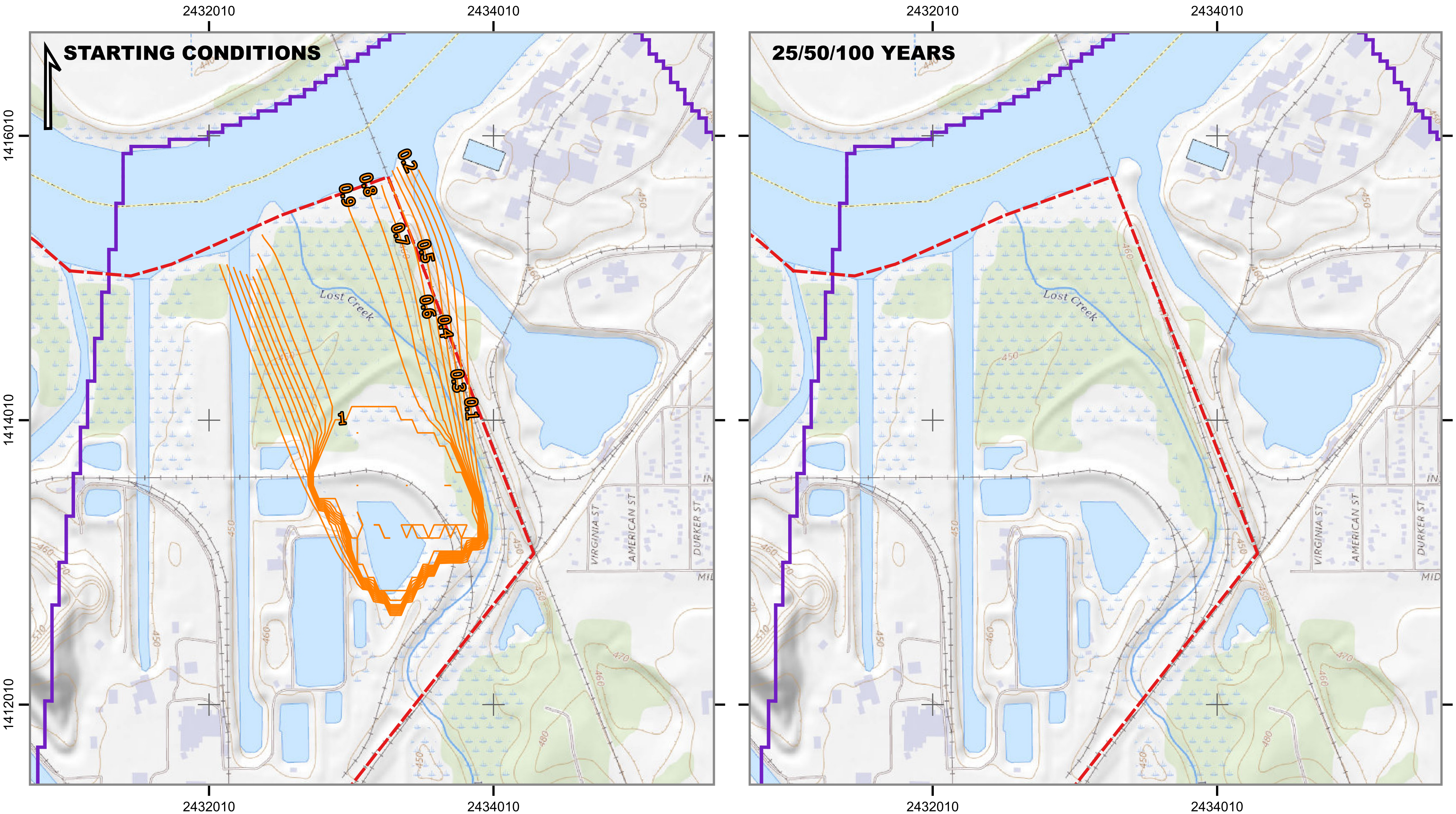
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure17_Scenario1_5YearPlumeDistribution.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CLOSURE ALTERNATIVE 1, 5-YEAR PLUME DISTRIBUTION**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:12,000	CHECKED	BAS	10/27/2022

BAS PROJECT No.	FIGURE:
21141401	**17**



LEGEND

- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- MODEL BOUNDARY
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

K P R G

0 600 1,200 ft

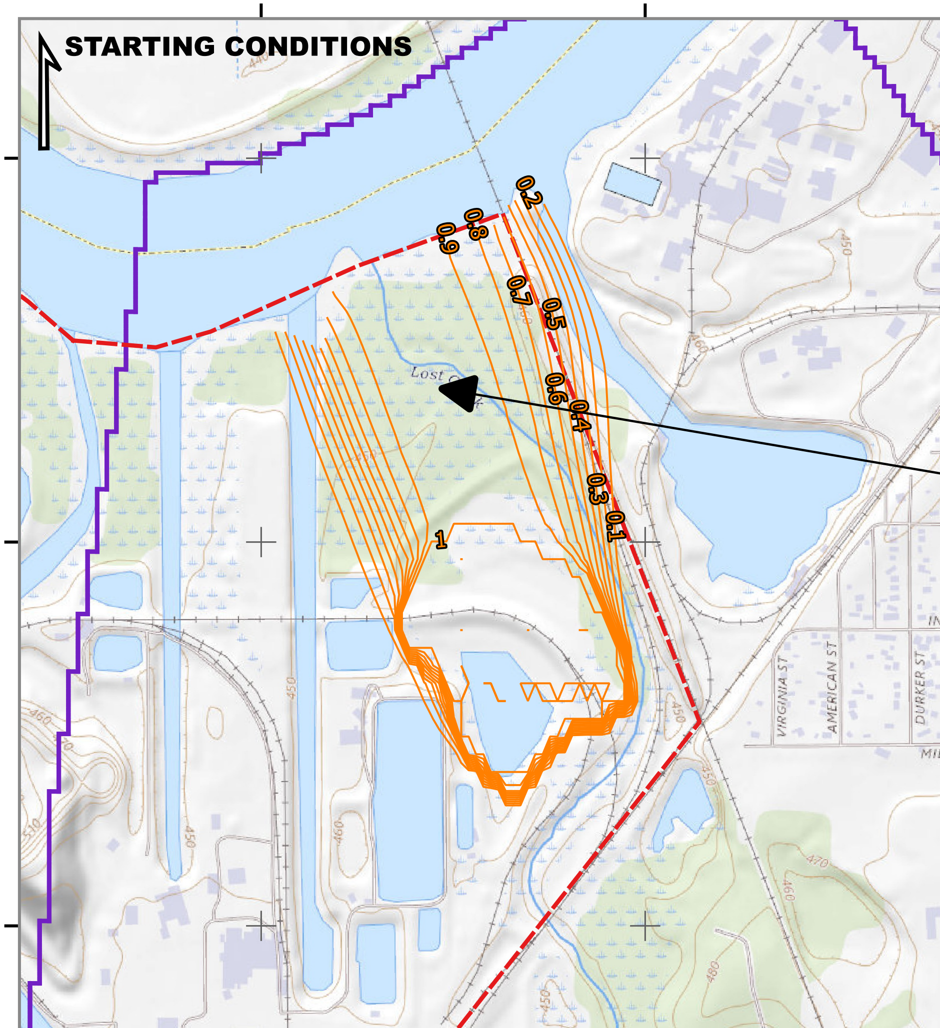
FEET

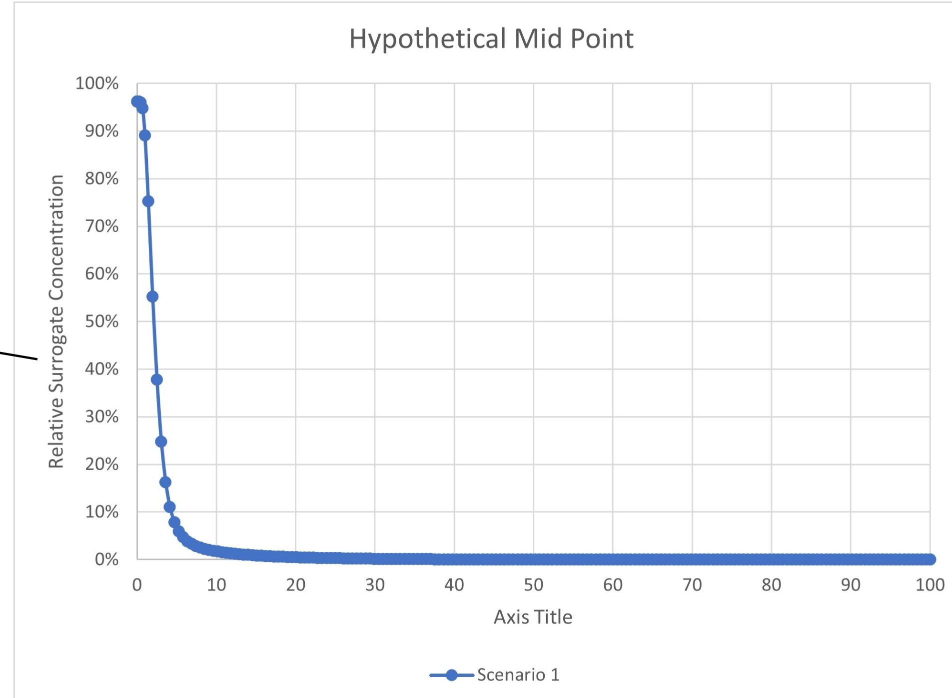
Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure18_Scenario1_25YearPlumeDistribution.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CLOSURE ALTERNATIVE 1, 25+ YEAR PLUME DISTRIBUTION**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:12,000	CHECKED	BAS	10/27/2022

BAS PROJECT No.	FIGURE:
21141401	**18**





LEGEND

- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- MODEL BOUNDARY
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

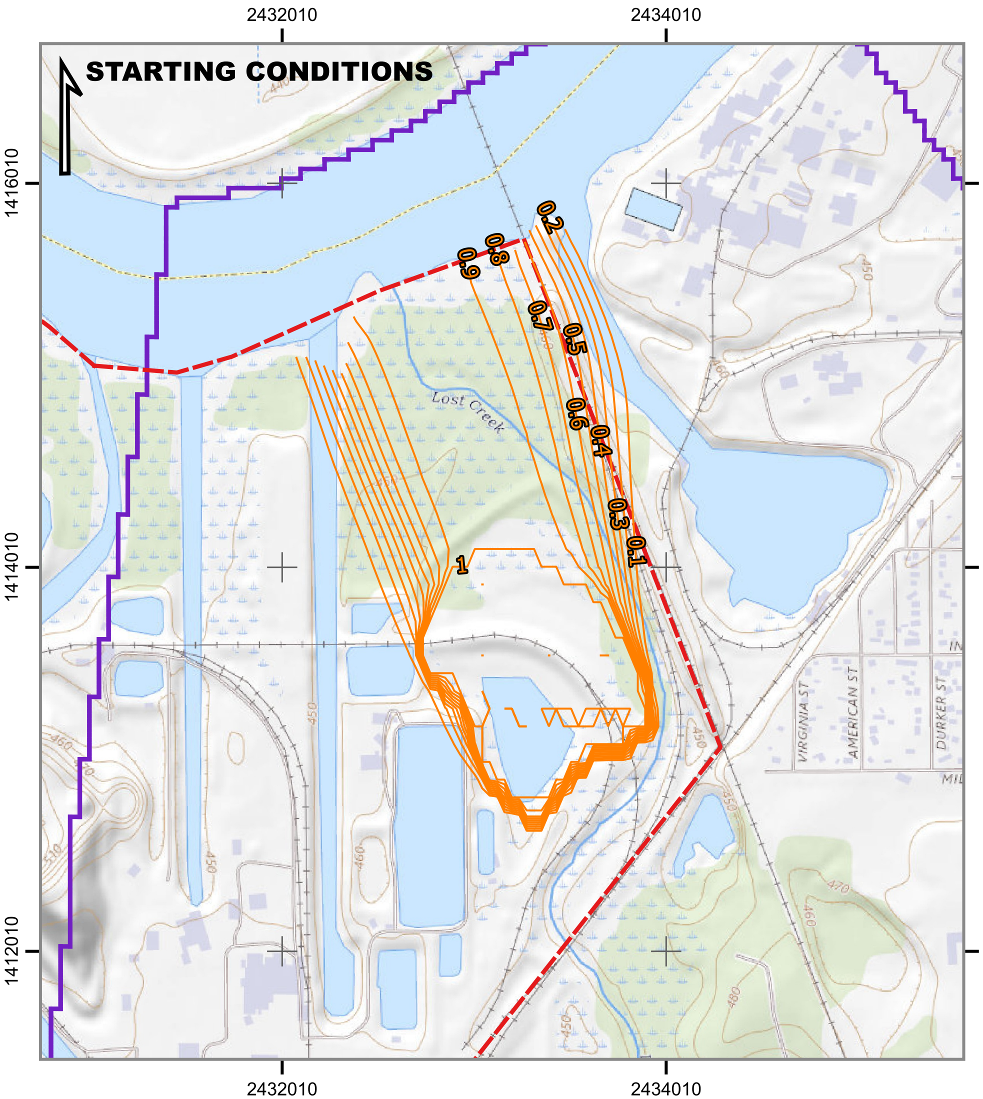
K P R G

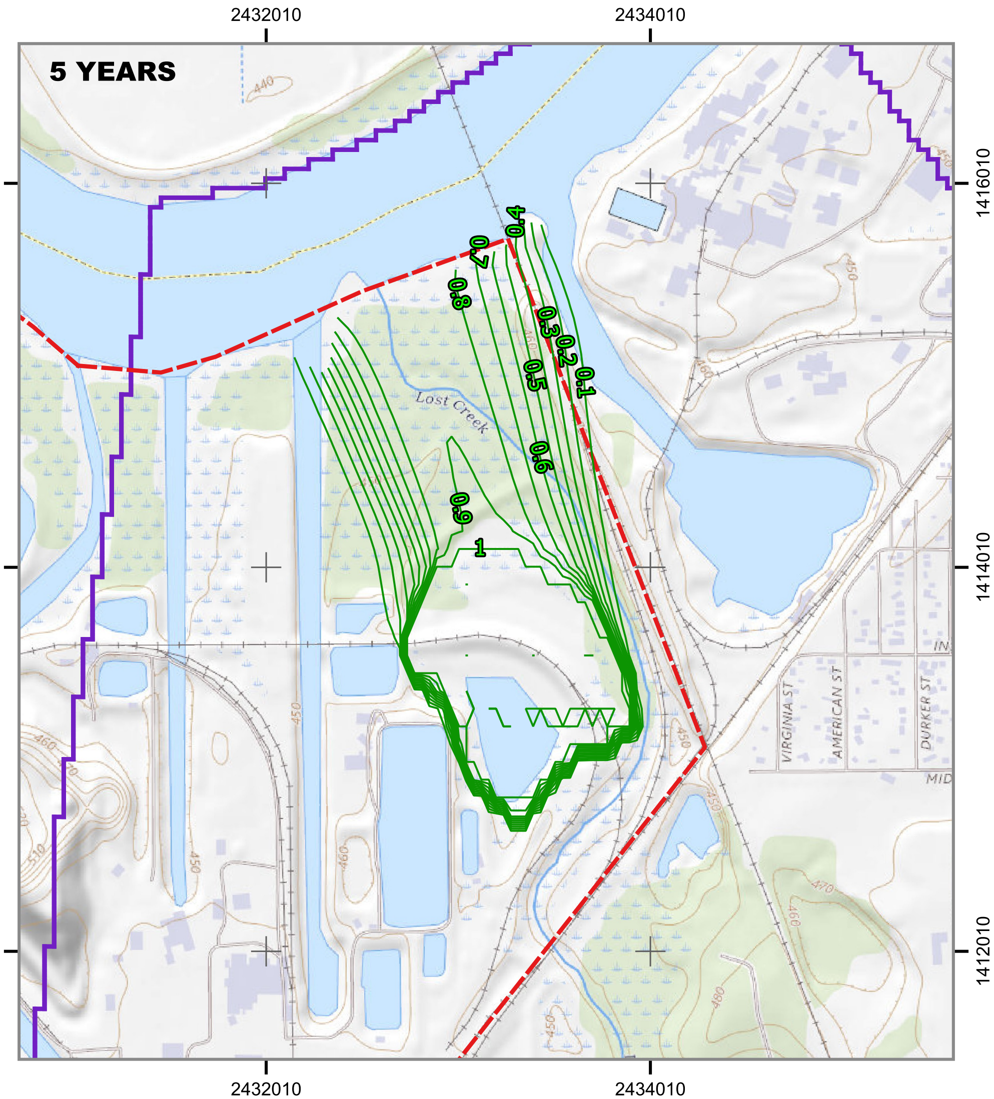
0 600 1,200 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure19_Scenario1_DecayOverTime.qgz

CLIENT	MIDWEST GENERATION		
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554		
TITLE	**CLOSURE ALTERNATIVE 1, DECAY OVER TIME**		
SCALE AT ANSI A 1:12,000	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **19**	





LEGEND

- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- MODEL BOUNDARY
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

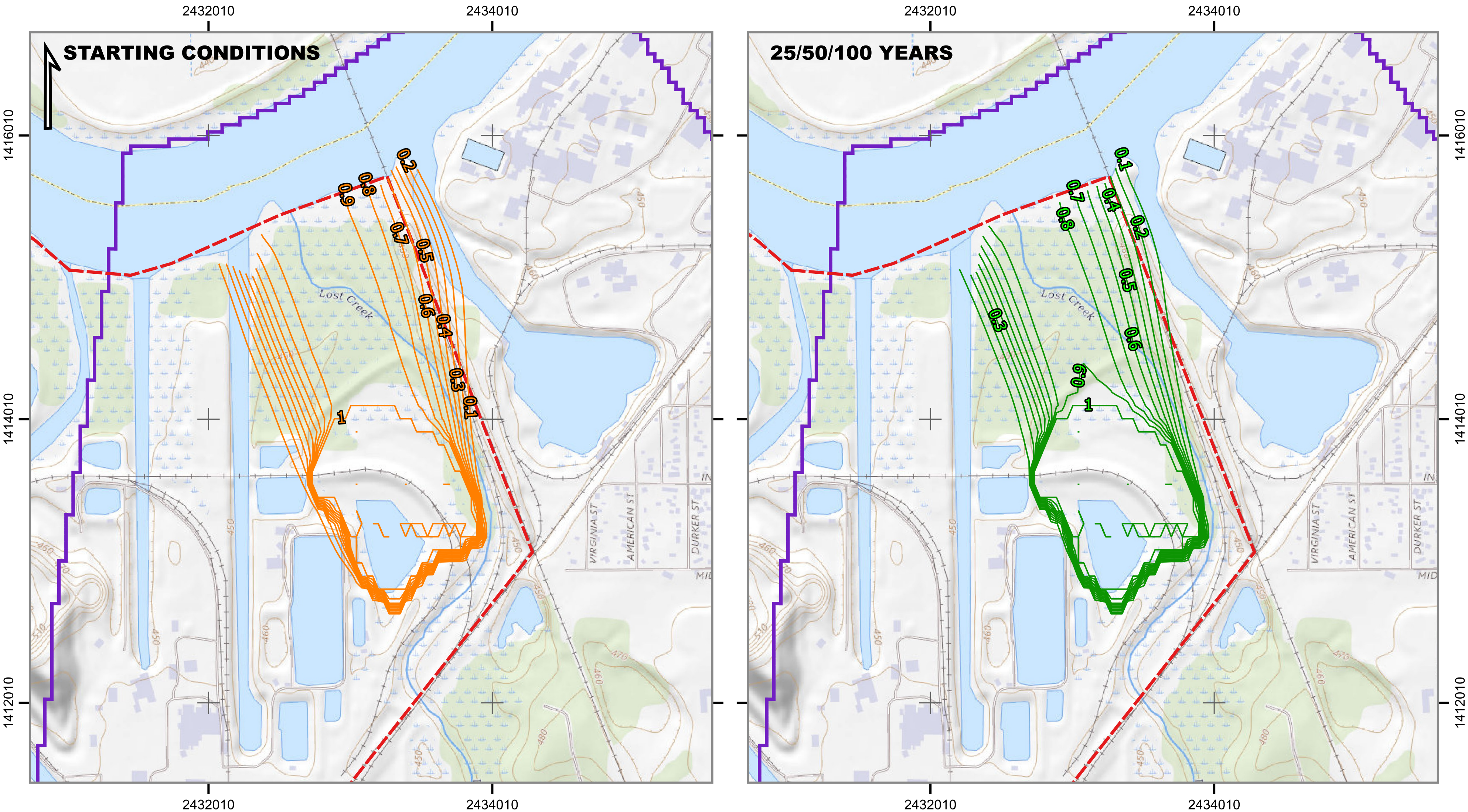
KPRG

0 600 1,200 ft
FEET

Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure20_Scenario2_5YearPlumeDistribution.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CLOSURE ALTERNATIVE 2, 5-YEAR PLUME DISTRIBUTION**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:12,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **20**	



LEGEND

PERCENT CONCENTRATIONS OF A SURROGATE MASS

MODEL BOUNDARY

SITE BOUNDARY

BAS GROUNDWATER CONSULTING

K P R G

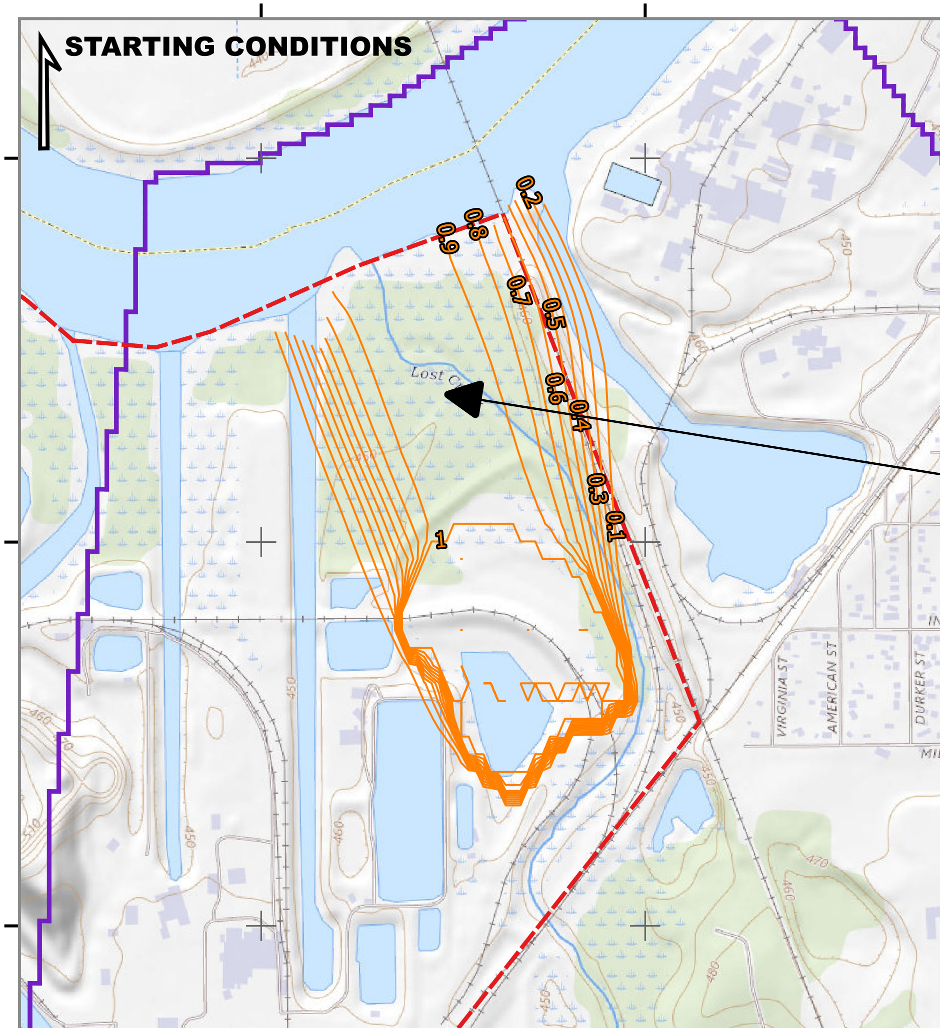
0 600 1,200 ft

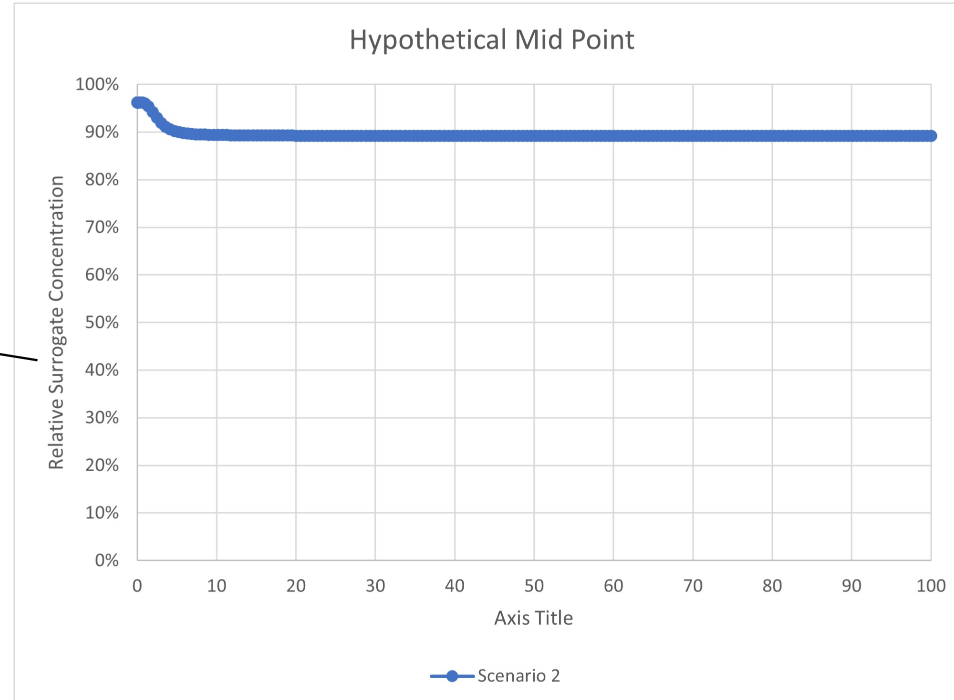
FEET

Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure21_Scenario2_25YearPlumeDistribution.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CLOSURE ALTERNATIVE 2, 25+ YEAR PLUME DISTRIBUTION**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:12,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **21**	





LEGEND

PERCENT CONCENTRATIONS OF A SURROGATE MASS

MODEL BOUNDARY

SITE BOUNDARY

BAS GROUNDWATER CONSULTING

K P R G

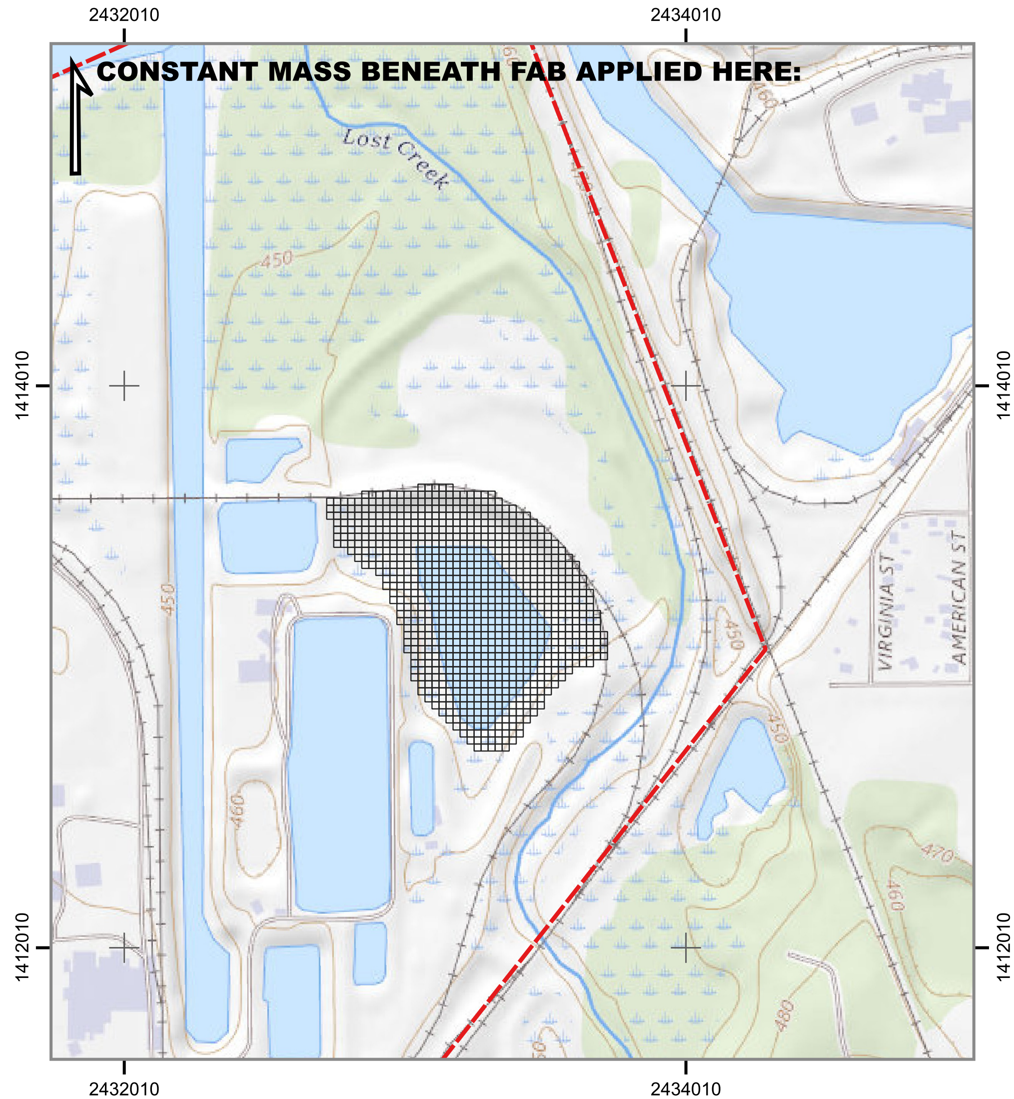
0 600 1,200 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure22_Scenario2_DecayOverTime.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	CLOSURE ALTERNATIVE 2, DECAY OVER TIME

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:12,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401	FIGURE: 22		



LEGEND

SITE BOUNDARY

AREA OF MASS DEFINITION BENEATH FAB

BAS GROUNDWATER CONSULTING

K P R G

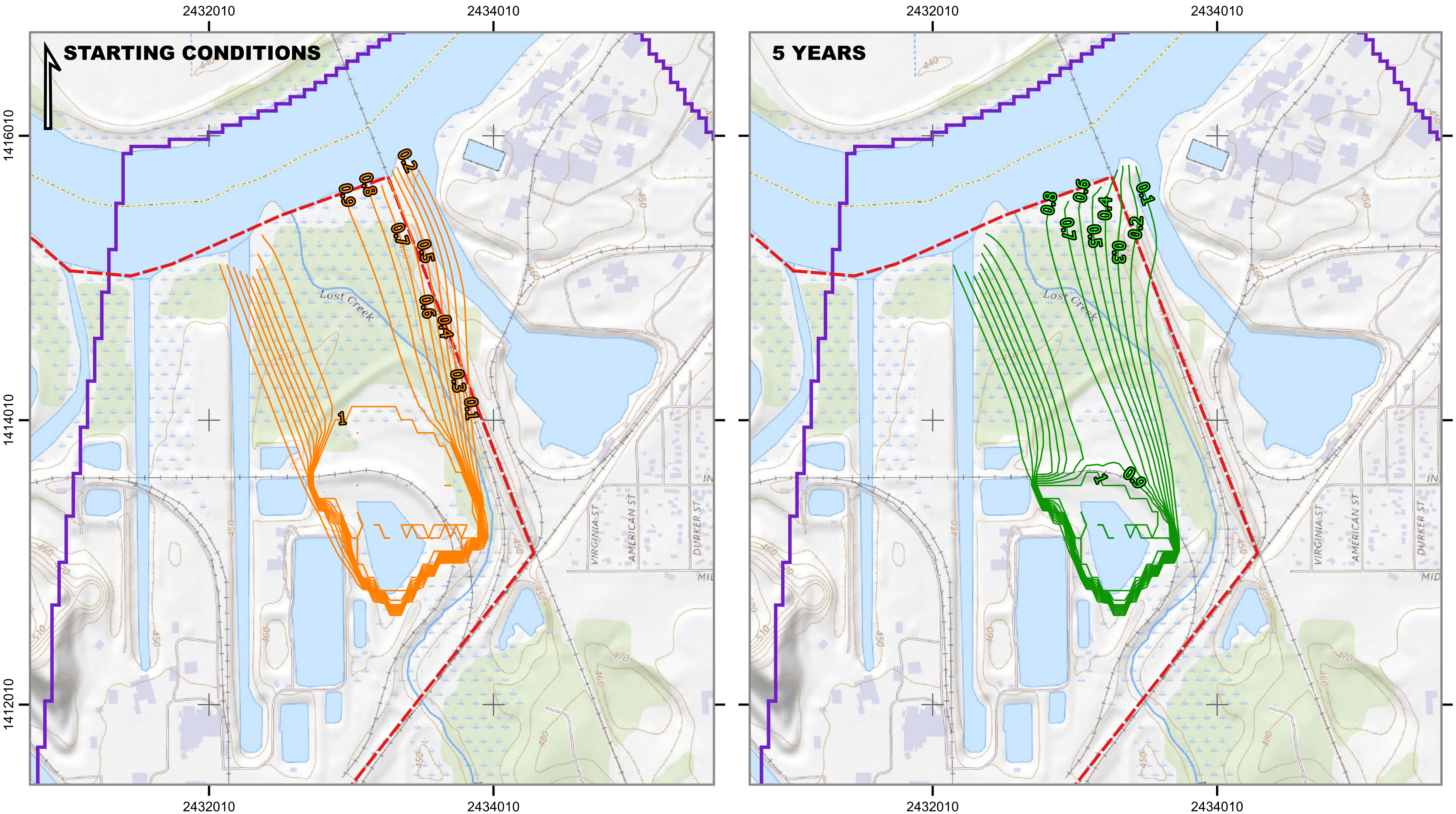
0 400 800 ft

FEET

Coordinate System:
Project File:
Figure23_AreaOfMassDefinitionBeneathFAB_Scenario3.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**AREA OF MASS DEFINITION BENEATH FAB IN CLOSURE ALTERNATIVE 3**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:8,200	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **23**	



LEGEND

PERCENT CONCENTRATIONS OF A SURROGATE MASS

MODEL BOUNDARY

SITE BOUNDARY

BAS GROUNDWATER CONSULTING

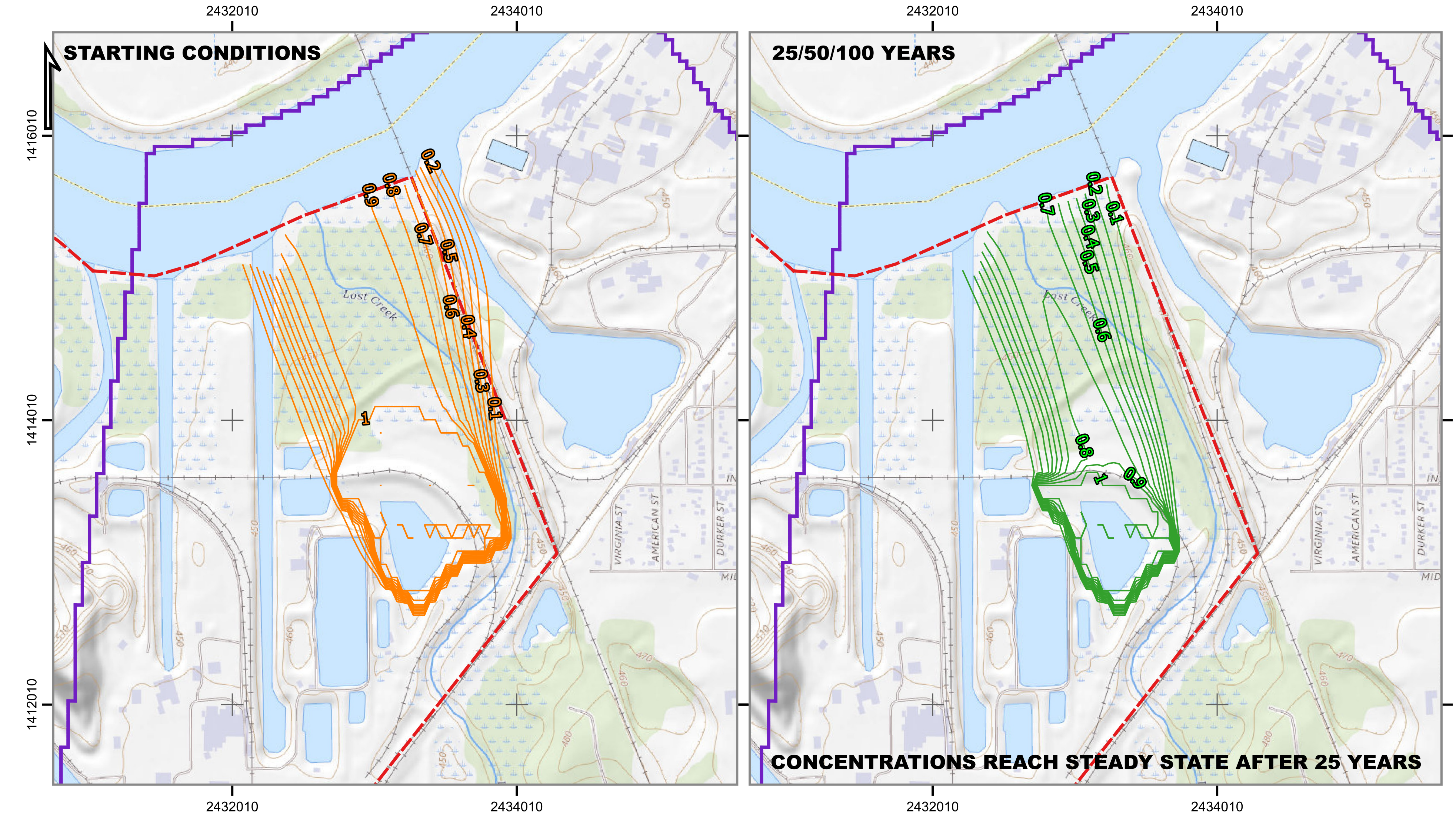
K P R G

0 600 1,200 ft

FEET

Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure24_Scenario3_5YearPlumeDistribution.qgz

CLIENT	MIDWEST GENERATION		
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554		
TITLE	**CLOSURE ALTERNATIVE 3, 5-YEAR PLUME DISTRIBUTION**		
SCALE AT ANSI A 1:12,000	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401	FIGURE: **24**		



LEGEND

- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- MODEL BOUNDARY
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

K P R G

0 600 1,200 ft

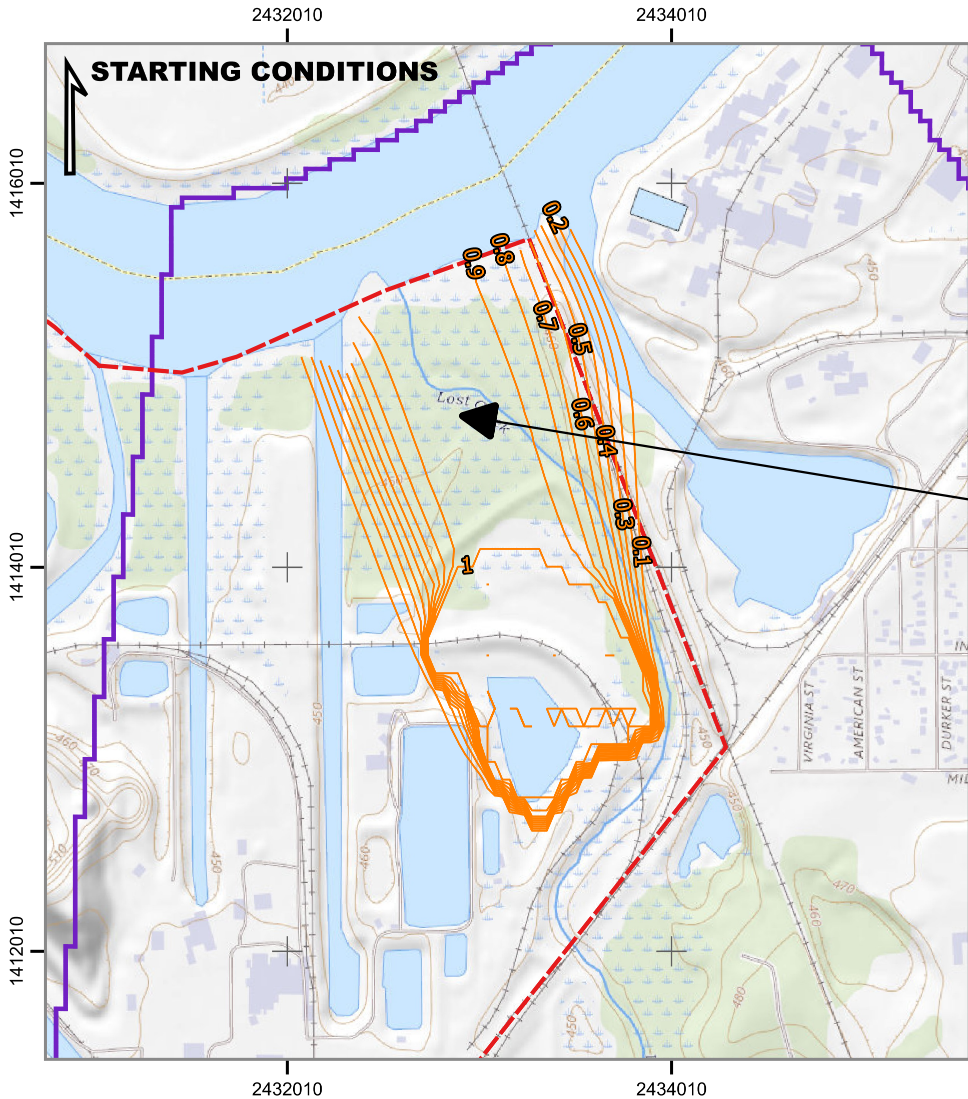
FEET

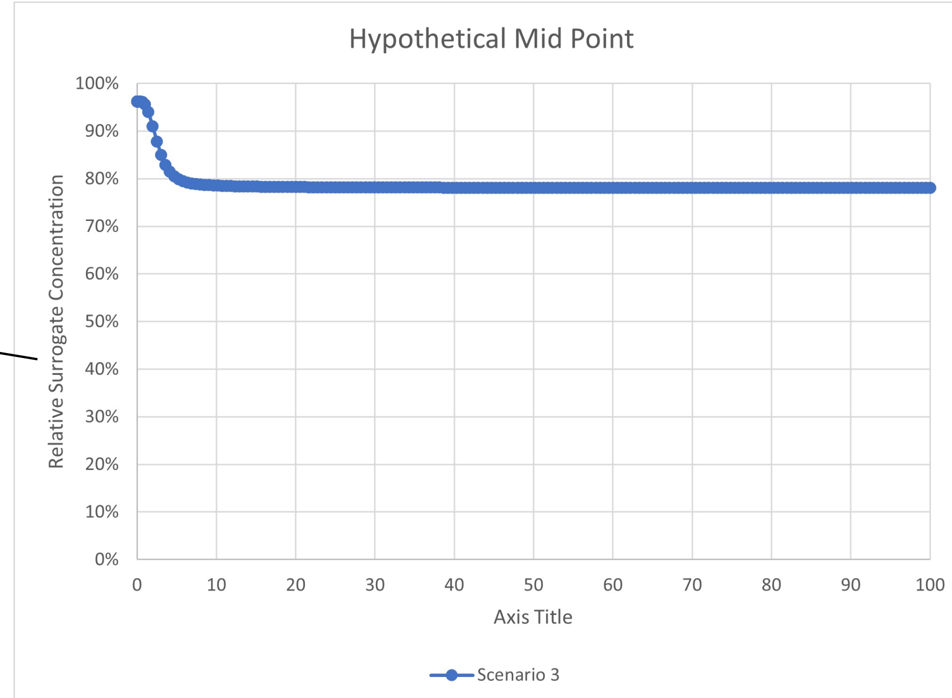
Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure25_Scenario3_25YearPlumeDistribution.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CLOSURE ALTERNATIVE 3, 25+ YEAR PLUME DISTRIBUTION**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:12,000	CHECKED	BAS	10/27/2022

BAS PROJECT No.	FIGURE:
21141401	**25**





LEGEND

PERCENT CONCENTRATIONS OF A SURROGATE MASS

MODEL BOUNDARY

SITE BOUNDARY

BAS GROUNDWATER CONSULTING

KPRG

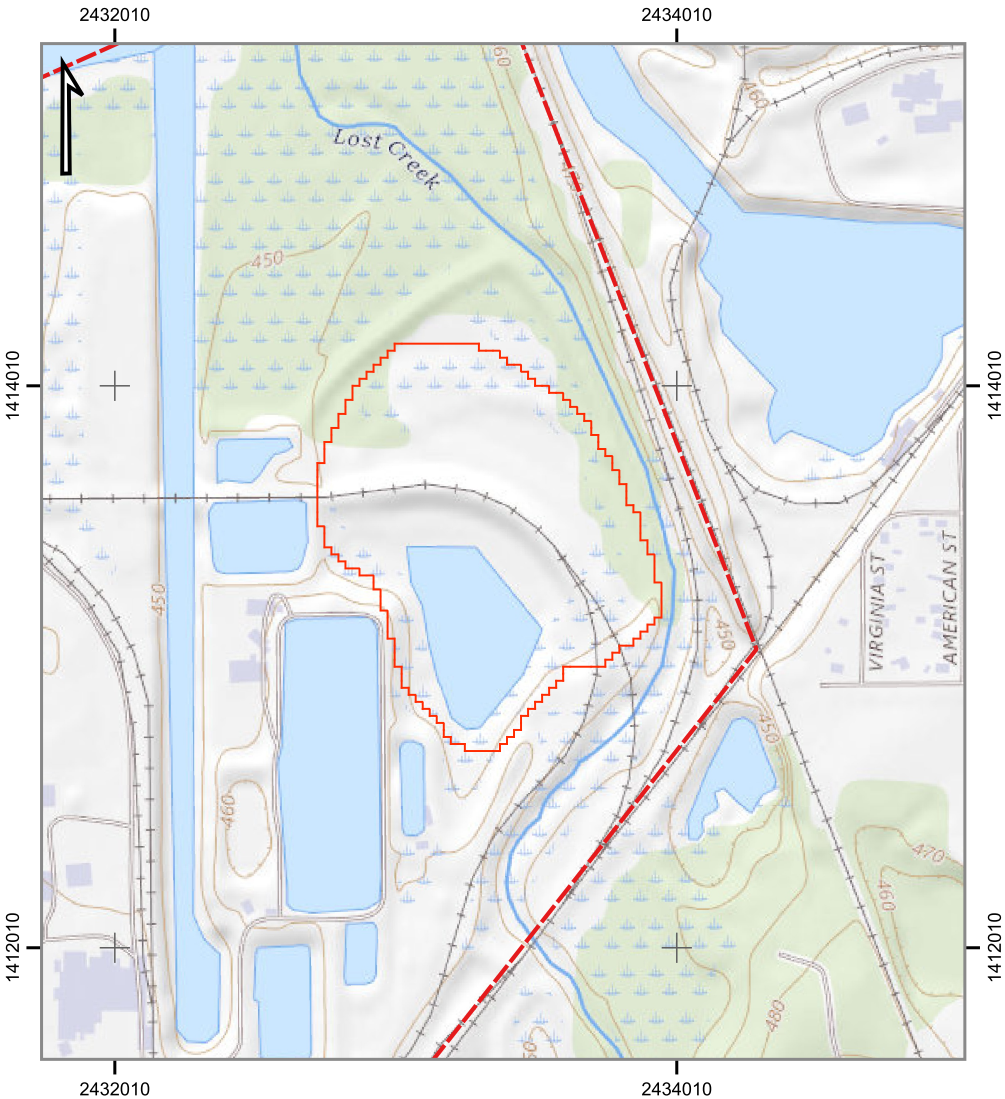
0 600 1,200 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure26_Scenario3_DecayOverTime.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CLOSURE ALTERNATIVE 3, DECAY OVER TIME**

SCALE AT ANSI A 1:12,000	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401	FIGURE: **26**		



LEGEND

SITE BOUNDARY

BARRIER WALL

BAS GROUNDWATER CONSULTING

K P R G

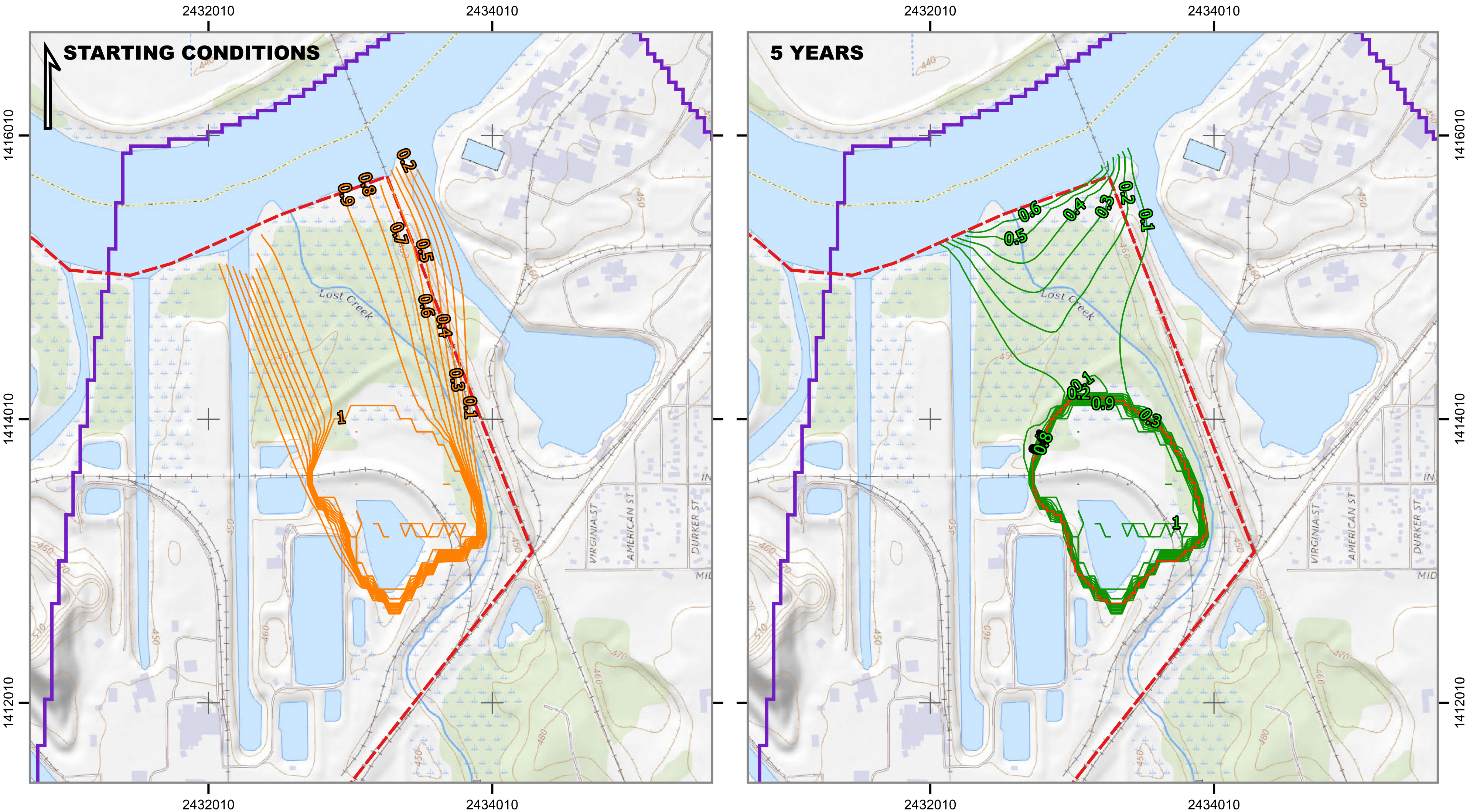
0 400 800 ft

FEET

Coordinate System:
Project File: Figure27_AreaOfBarrierWallforScenario4.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**AREA OF BARRIER WALL FOR CLOSURE ALTERNATIVE 4**

SCALE AT ANSI A 1:8,200	DRAWN	DZF	10/28/2022
	CHECKED	BAS	10/28/2022
BAS PROJECT No. 21141401		FIGURE: **27**	



LEGEND

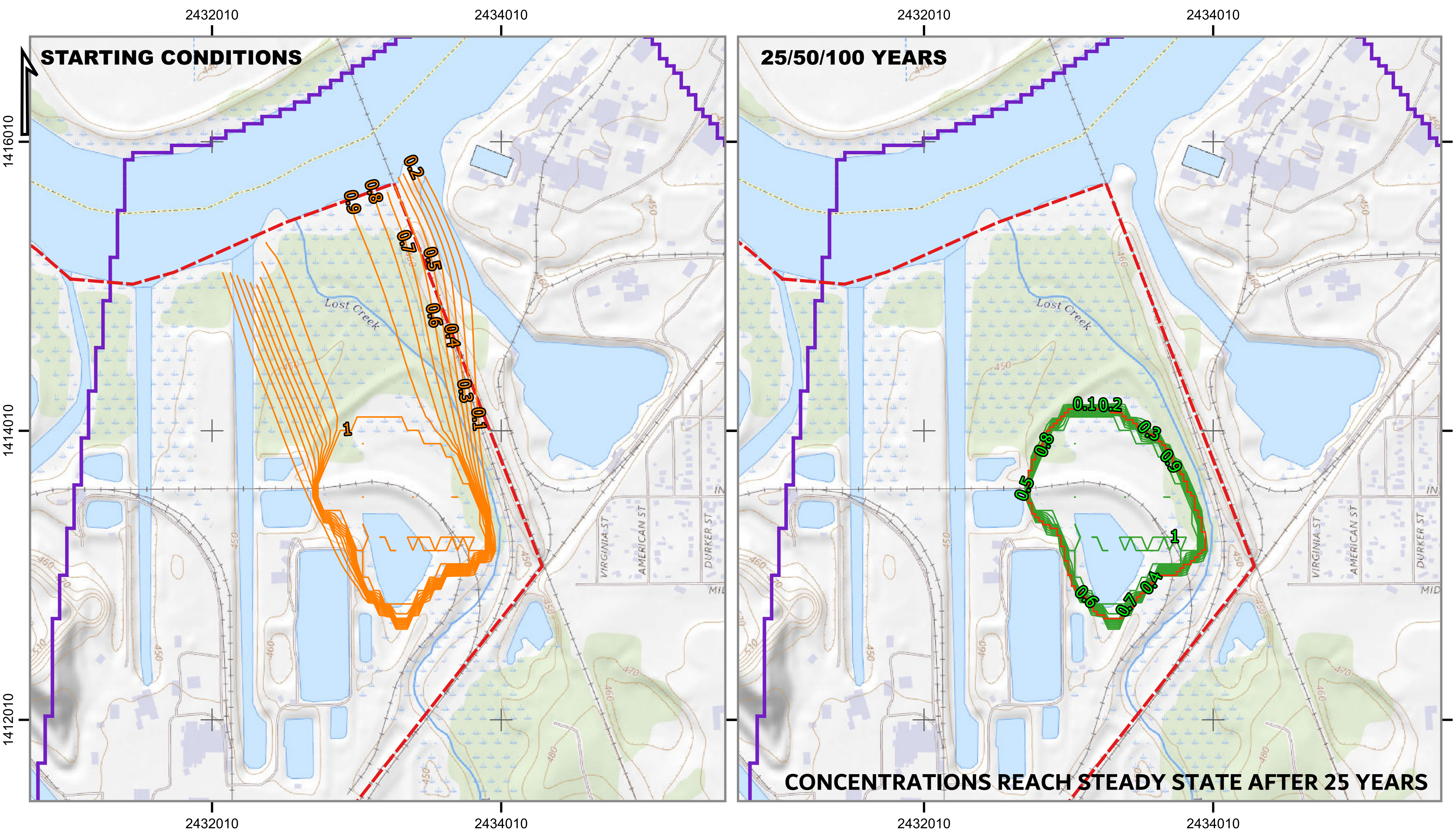
- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- MODEL BOUNDARY
- AREA OF BARRIER WALL FOR CLOSURE ALTERNATIVE 4
- SITE BOUNDARY

0 600 1,200 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure28_Scenario4_5YearPlumeDistribution.qgz

CLIENT	MIDWEST GENERATION		
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554		
TITLE	**CLOSURE ALTERNATIVE 4, 5-YEAR PLUME DISTRIBUTION**		
SCALE AT ANSI A: 1:12,000	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No.: 21141401	FIGURE: **28**		



LEGEND

- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- AREA OF BARRIER WALL FOR CLOSURE ALTERNATIVE 4
- MODEL BOUNDARY
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

K P R G

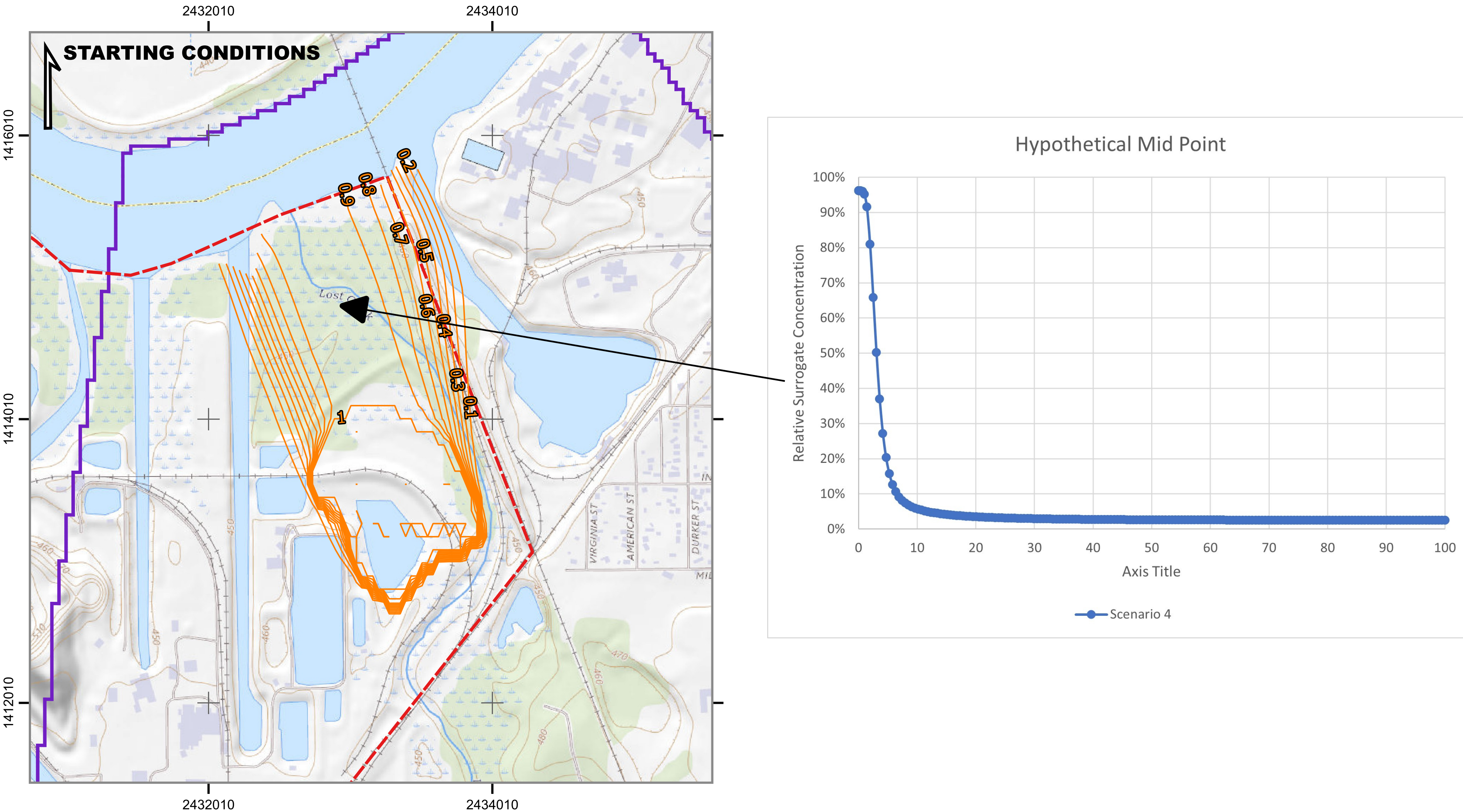
0 600 1,200 ft

FEET

Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure29_Scenario4_25YearPlumeDistribution.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CLOSURE ALTERNATIVE 4, 25+ YEAR PLUME DISTRIBUTION**

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:12,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401	FIGURE: **29**		



LEGEND

- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- MODEL BOUNDARY
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

K P R G

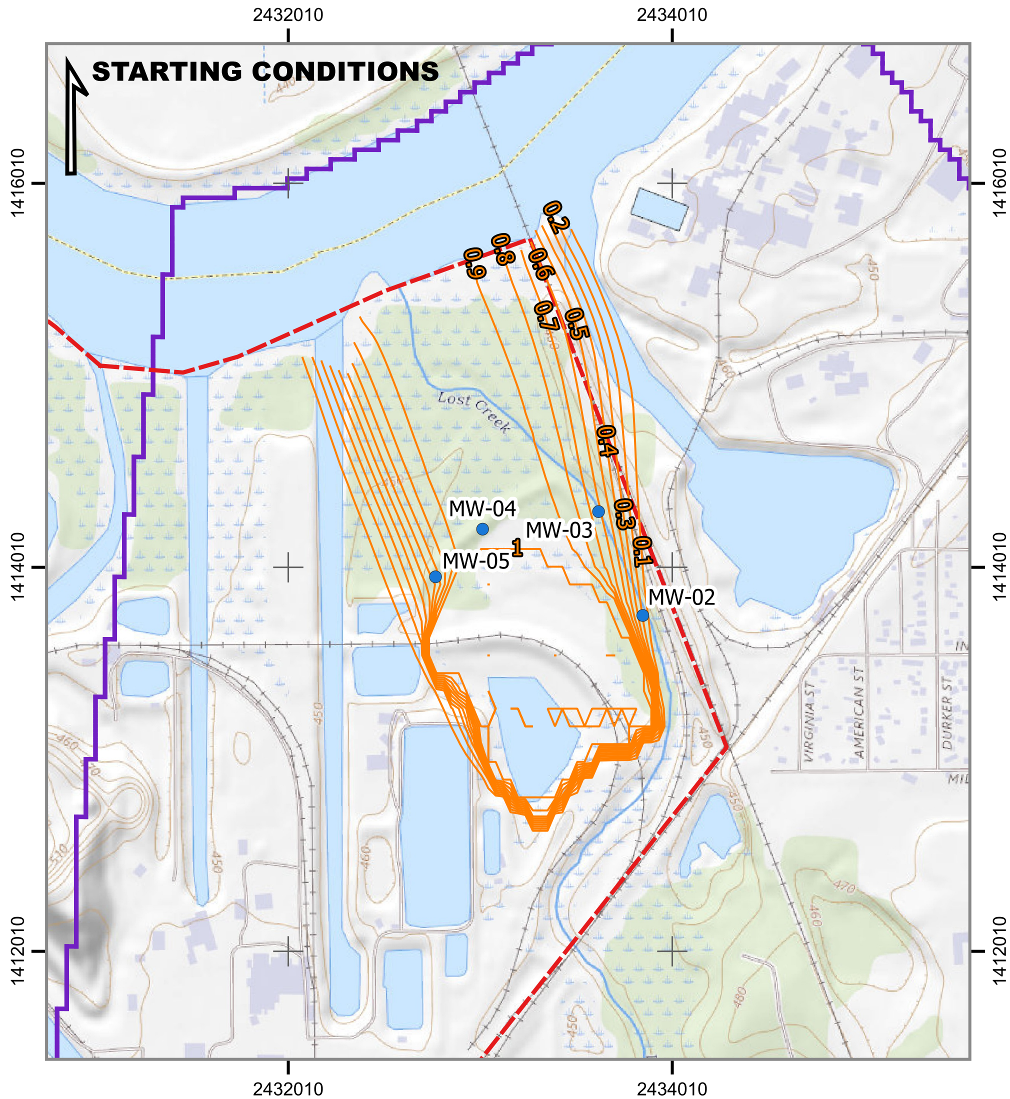
0 600 1,200 ft

FEET

Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure30_Scenario4_DecayOverTime.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CLOSURE ALTERNATIVE 4, DECAY OVER TIME**

SCALE AT ANSI A			
1:12,000	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No.	*21141401*	FIGURE:	**30**



LEGEND

- WELL LOCATION
- 100-YEAR RELATIVE SURROGATE CONCENTRATIONS
- MODEL BOUNDARY
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

KPRG

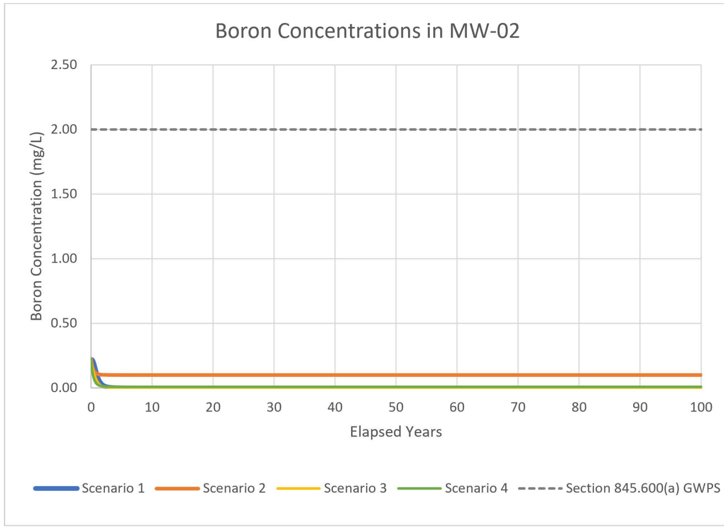
0 600 1,200 ft

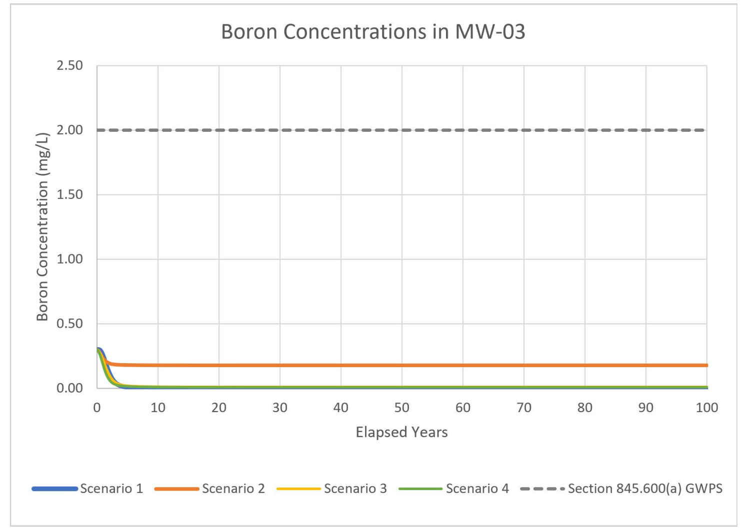
FEET

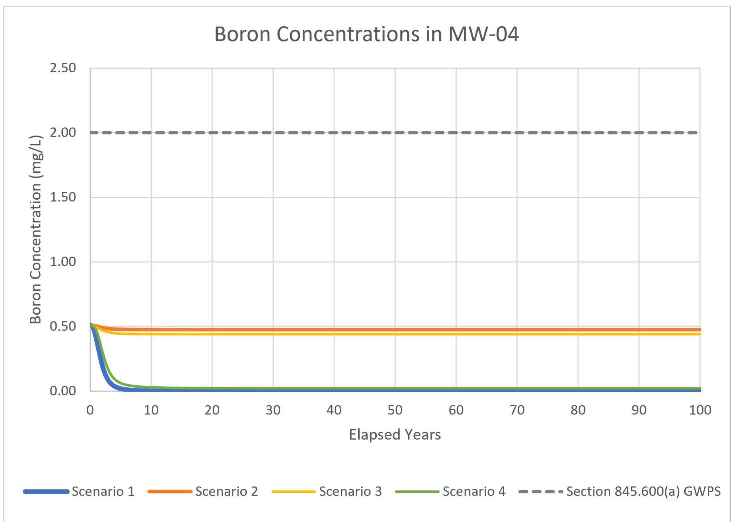
Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File:
Figure31_SelectedMonitoringLocationsToEvaluateDecay.qgz

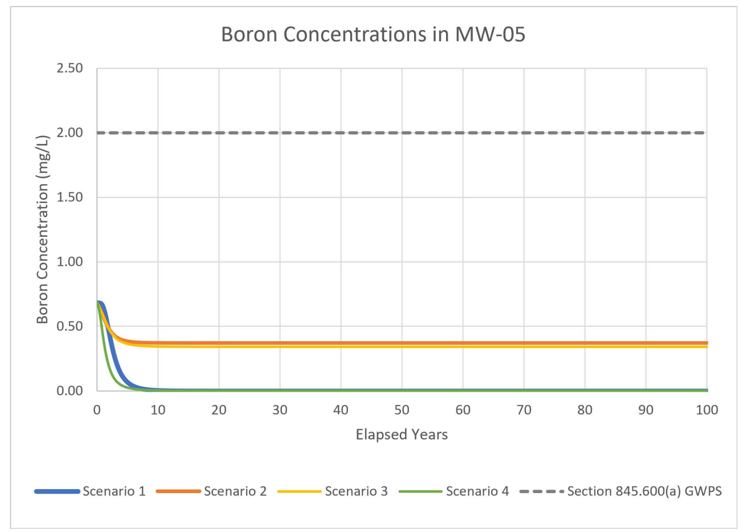
CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	SELECTED MONITORING LOCATIONS TO EVALUATE DECAY

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
1:12,000	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: 31	









- - - - - - - - Section 845.600(a) GWPS

BAS GROUNDWATER CONSULTING

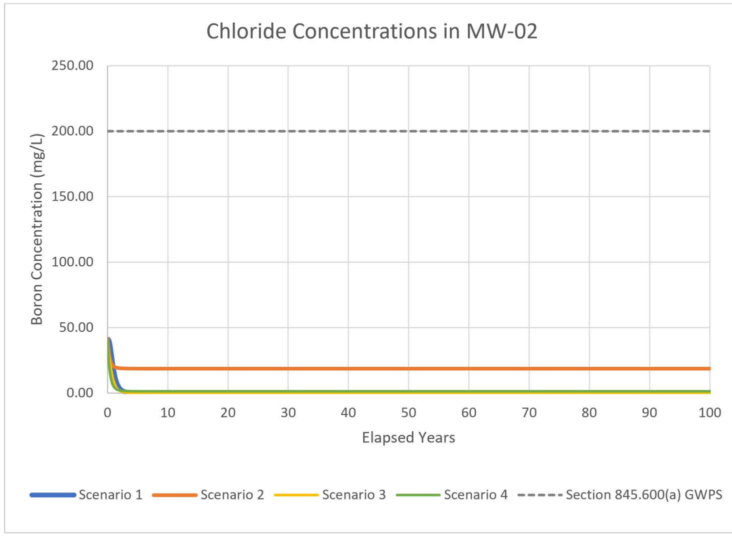
KPRG

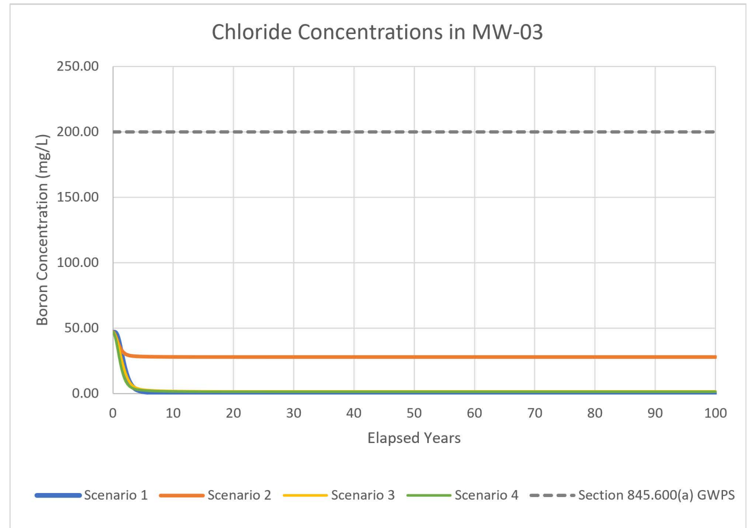
SCALE AT ANSI A	DRAWN DZF 10/27/2022
	CHECKED BAS 10/27/2022
BAS PROJECT No. 21141401	FIGURE: **32**

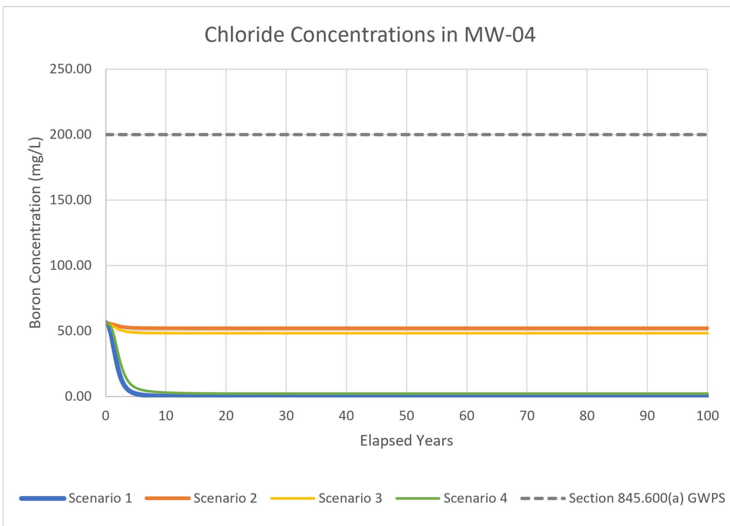
CLIENT: MIDWEST GENERATION

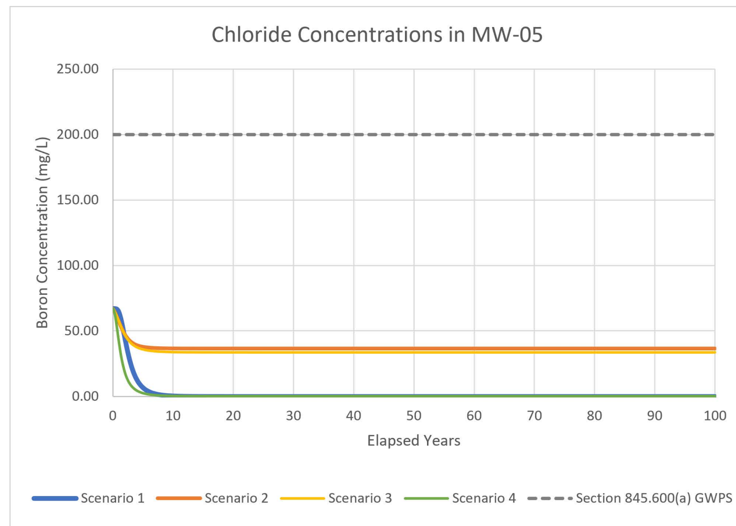
SITE: POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554

TITLE: **BORON CONCENTRATIONS OVER TIME**









- - - - - - - - Section 845.600(a) GWPS

BAS GROUNDWATER CONSULTING

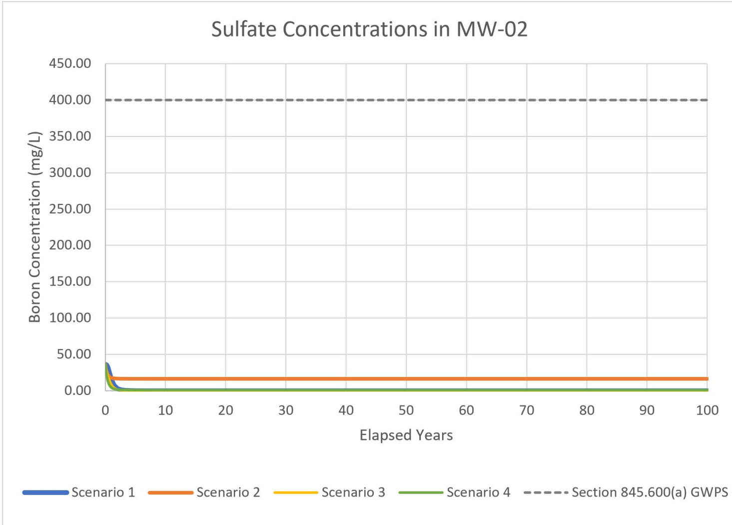
KPRG

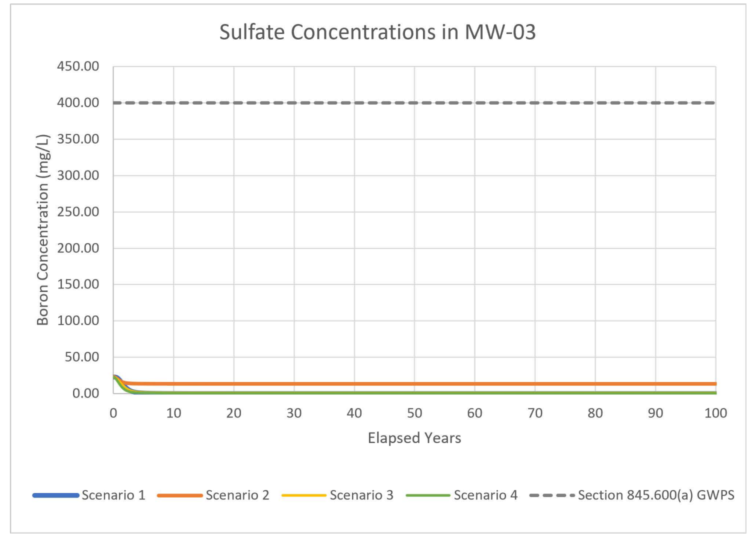
SCALE AT ANSI A	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: 33	

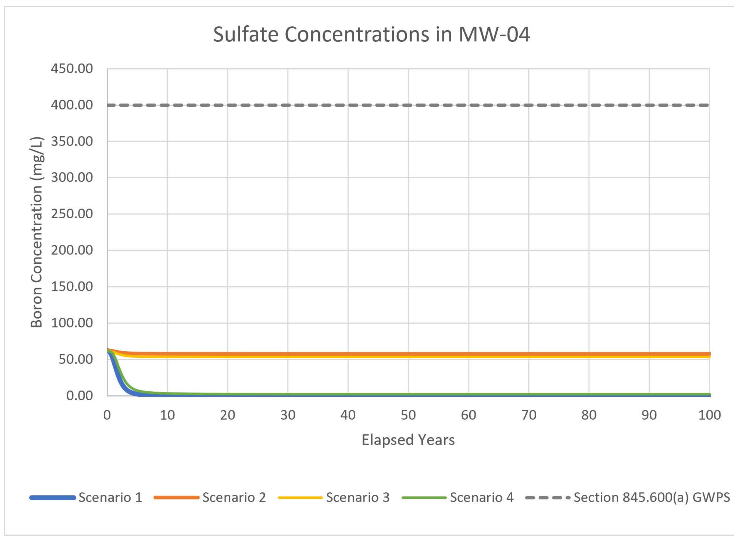
CLIENT
MIDWEST GENERATION

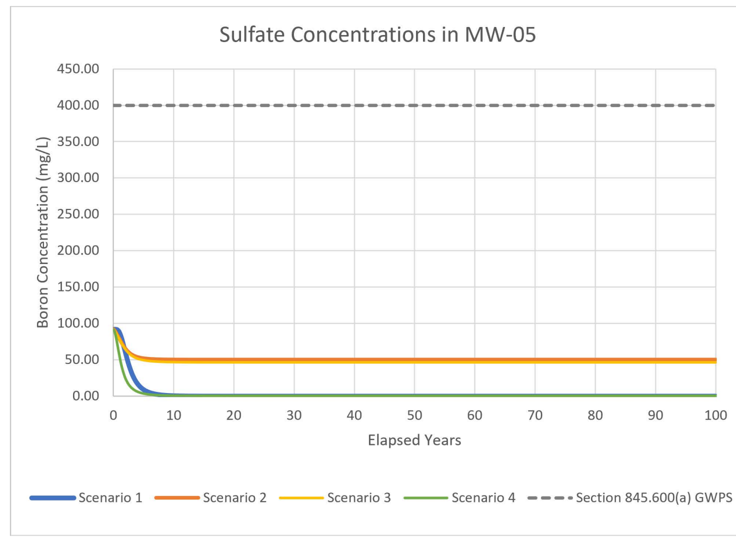
SITE
POWERTON
13082 E MANITO ROAD, PEKIN, IL 61554

TITLE
CHLORIDE CONCENTRATIONS OVER TIME









- - - - - - - - Section 845.600(a) GWPS

BAS GROUNDWATER CONSULTING

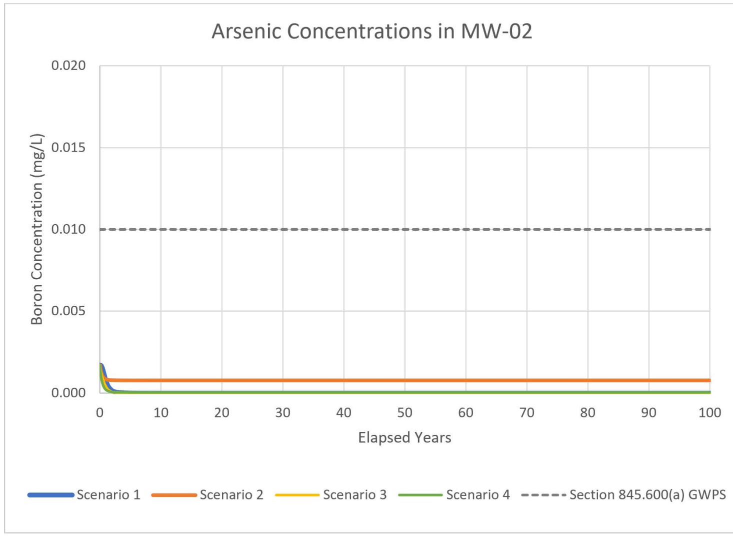
K P R G

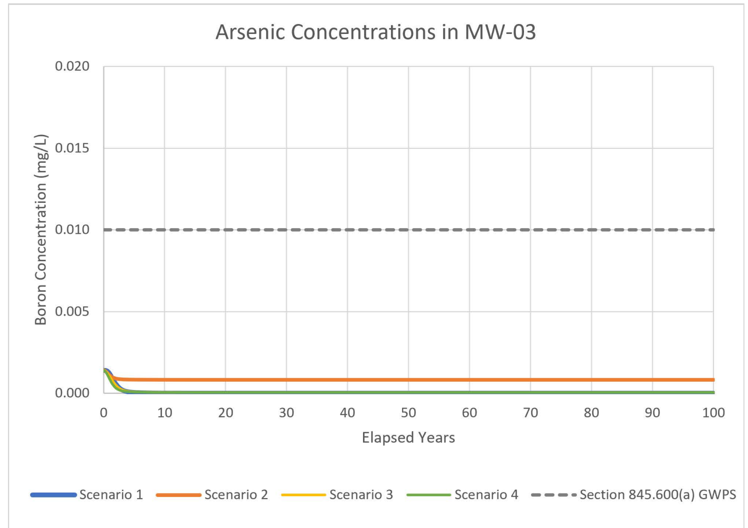
SCALE AT ANSI A	*DRAWN*	*DZF*	10/27/2022
	CHECKED	*BAS*	10/27/2022
BAS PROJECT No. 21141401	*FIGURE:* **34**		

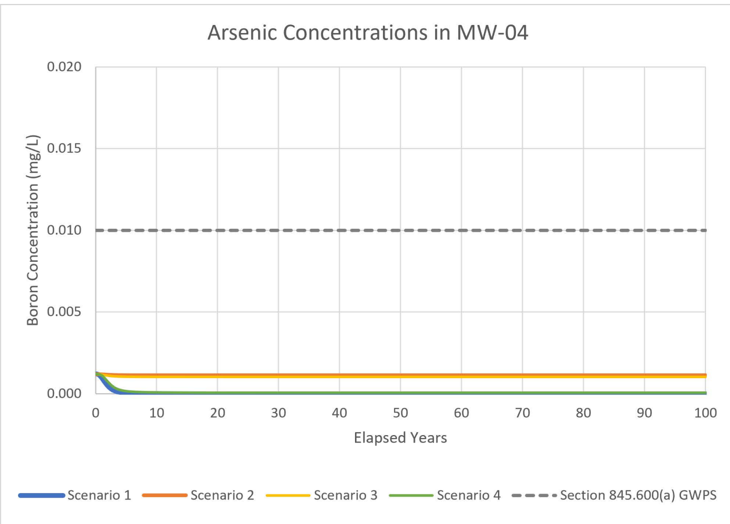
CLIENT MIDWEST GENERATION

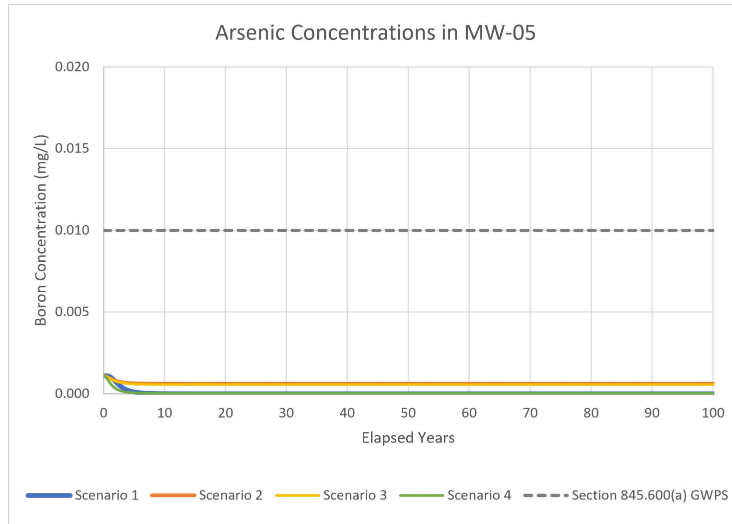
SITE POWERTON
13082 E MANITO ROAD, PEKIN, IL 61554

TITLE **SULFATE CONCENTRATIONS OVER TIME**









- - - - - - - - Section 845.600(a) GWPS

BAS GROUNDWATER CONSULTING

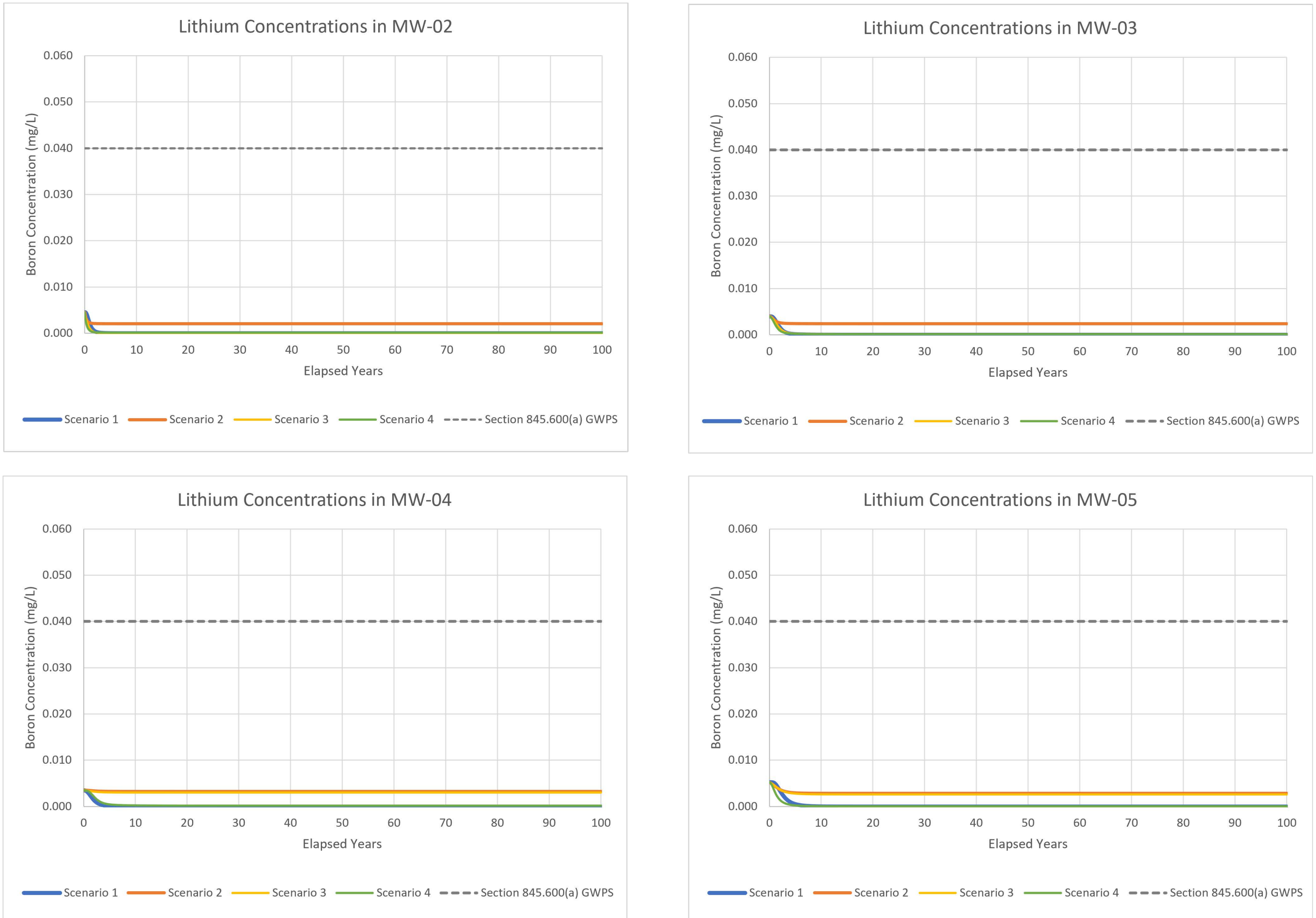
KPRG

SCALE AT ANSI A	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: 35	

CLIENT: MIDWEST GENERATION

SITE: POWERTON
13082 E MANITO ROAD, PEKIN, IL 61554

TITLE: **ARSENIC CONCENTRATIONS OVER TIME**



Section 845.600(a) GWPS

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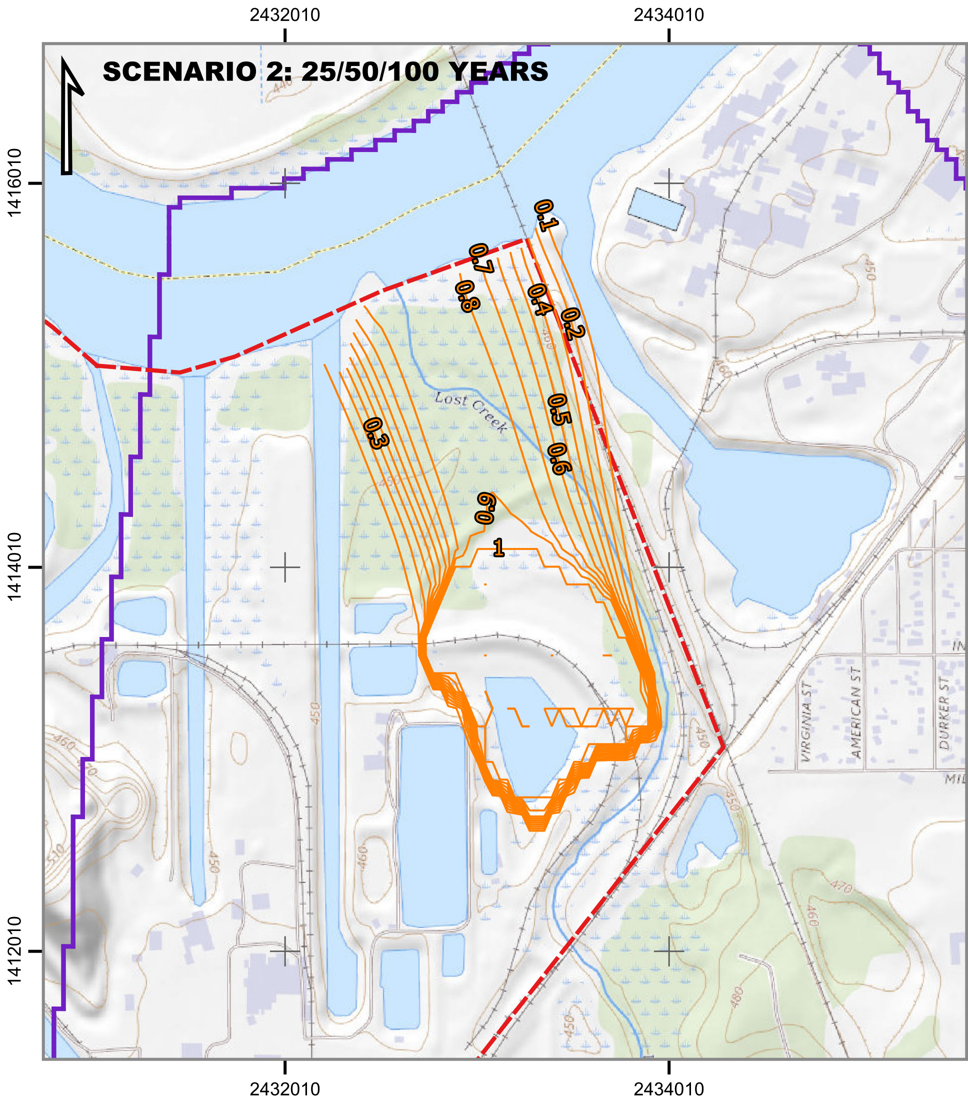
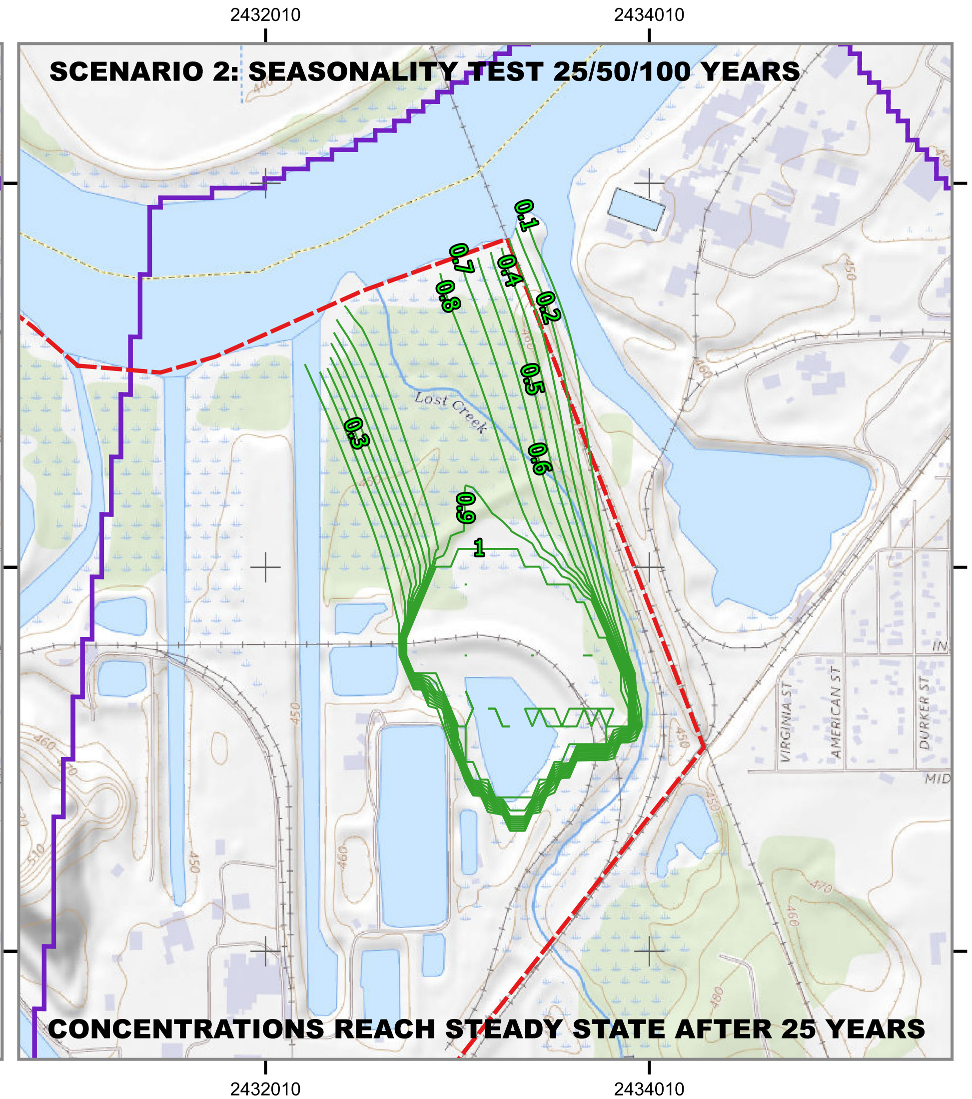
SCALE AT ANSI A	DRAWN	DZF	10/27/2022
	CHECKED	BAS	10/27/2022
BAS PROJECT No. 21141401		FIGURE: **36**	

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**LITHIUM CONCENTRATIONS OVER TIME**





LEGEND

- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- MODEL BOUNDARY
- SITE BOUNDARY

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K P R G

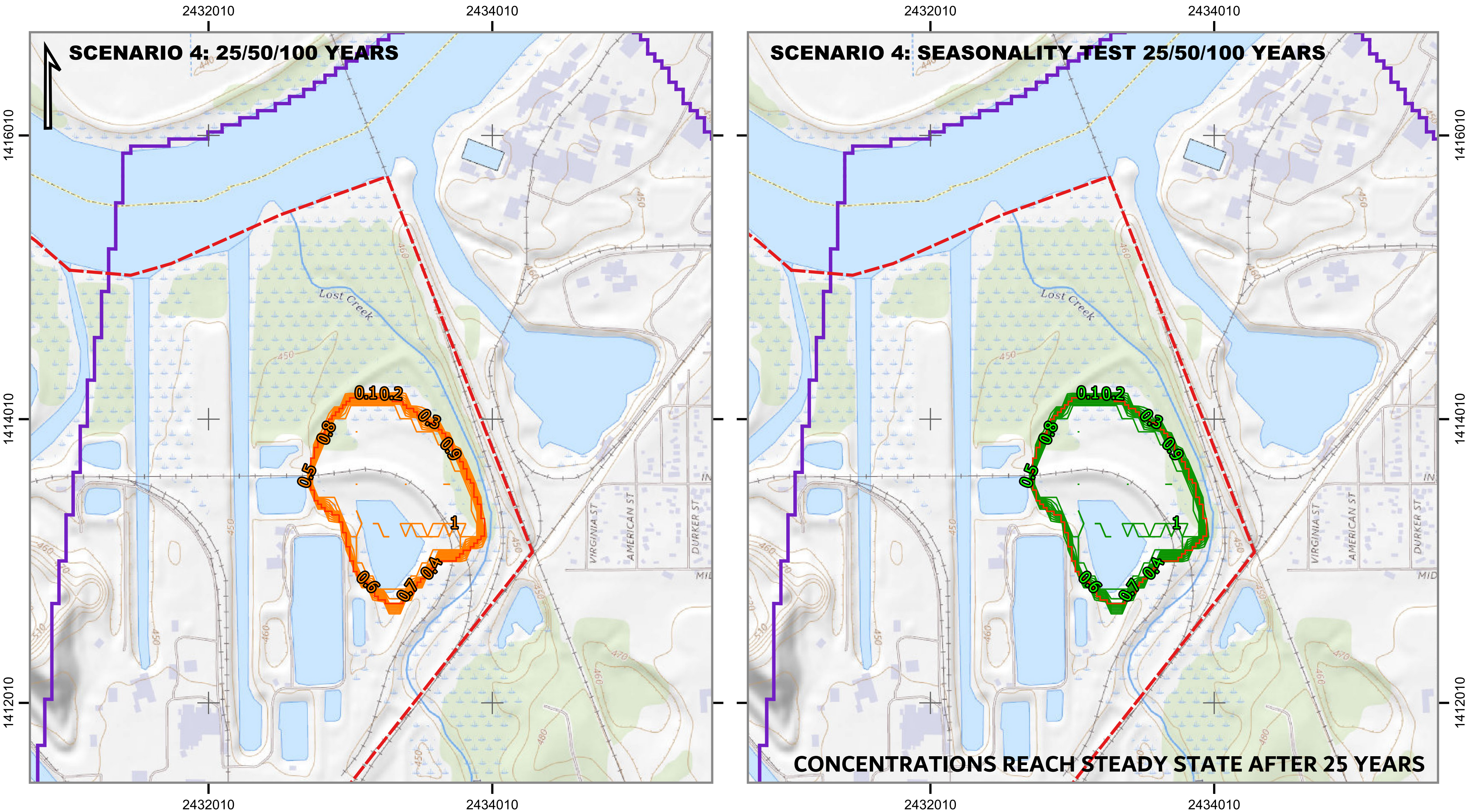
0 600 1,200 ft

FEET

Coordinate System: NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File: Figure37_Scenario2_25PlusYearPlumeDistribution_SeasonalitTest.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	**CLOSURE ALTERNATIVE 2, 25+ YEAR PLUME DISTRIBUTION, SEASONALITY TEST**

SCALE AT ANSI A	DRAWN	DZF	10/28/2022
1:12,000	CHECKED	BAS	10/28/2022
BAS PROJECT No. 21141401		FIGURE: **37**	



LEGEND

- PERCENT CONCENTRATIONS OF A SURROGATE MASS
- MODEL BOUNDARY
- AREA OF BARRIER WALL FOR CLOSURE ALTERNATIVE 4
- SITE BOUNDARY

BAS GROUNDWATER CONSULTING

KPRG

0 600 1,200 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_West_FIPS_1202_Feet
Project File:
Figure38_Scenario4_5YearPlumeDistribution_SeasonalityTest.qgz

CLIENT	MIDWEST GENERATION
SITE	POWERTON 13082 E MANITO ROAD, PEKIN, IL 61554
TITLE	CLOSURE ALTERNATIVE 4, 25-YEAR PLUME DISTRIBUTION, SEASONALITY TEST

SCALE AT ANSI A	DRAWN	DZF	10/28/2022
1:12,000	CHECKED	BAS	10/28/2022
BAS PROJECT No. 21141401	FIGURE: 38		

BAS GROUNDWATER CONSULTING

basgroundwater.com

ATTACHMENT 9
GROUNDWATER MONITORING INFORMATION

Attachment 9-1 – Local Well Stratigraphy Information

Attachment 9-1
Local Well Statrigraphy Information. Midwest Generation, LLC, Powerton Generating Station, Pekin, IL.

ID	Well_Count	Well_ID	From	To	Original Logged Description	Grouped As_ToUseToDefine_K_interval	Base of Model	Notes	Ignored
11	3	121790013000	70	70	shale at	shale	x		
30	5	121790012800	76	76	shale at	shale	x		
51	9	121790013200	59	61	shale	shale	x		
58	10	121790052800	49	49	blue shale at	shale	x		
68	12	121790048800	120	121	gray shale	shale	x		
97	14	121790012700	76	76	shale at	shale	x		
101	15	121790012600	36	36	shale at	shale	x		
103	16	121790012500	85	85	shale at	shale	x		
114	18	121792462600	99	103	dk gray shale & hd dk color limestone	shale	x		
128	22	121792453000	44	45	shale bedrock	shale	x		
133	23	121792323500	93	93	shale at	shale	x		
139	24	121792489200	63	63	shale below	shale	x		
178	31	121792478800	99	104	gray shale	shale	x		
194	35	121792481600	102	103	dark gray shale	shale	x		
214	39	121792534000	70	70	boulders or bedrock at	shale	x		
238	45	121792501800	73	73	shale at	shale	x		
258	49	121792492400	60	85	blue-green shale below 60'	shale	x		
334	65	121792379400	61	65.5	light gray, hard, shale	shale	x		
352	70	121792361700	39	40	shale gray	shale	x		
358	72	121792552000	141	141	shale below	shale	x		
421	87	121792438000	45.5	50.25	clayey shale, gray & rust brown-extremely dense	shale	x		
442	90	121792440300	60	70	clayey shale;medium dark gray	shale	x		
451	91	121792440000	35	48.1	clayey shale-gray weathered-very dense	shale	x		
500	99	121792515900	72	72	gray shale at	shale	x		
508	100	121792515800	93	100	soft and hard shale	shale	x		
525	104	121792519900	56	58	shale	shale	x		
536	106	121792312100	103	103	shale at	shale	x		
540	107	121792200900	47	47	shale at	shale	x		
558	111	121792311900	106	106	shale at	shale	x		
572	114	121792180200	104	104	rocks	shale	x	(Assumed to be bedrock)	
581	115	121792179800	78	79	shale	shale	x		
584	116	121792179700	48	67	rock	shale	x	(Assumed to be bedrock)	
599	121	121792180500	88	88	shale	shale	x		
616	123	121792090700	105	107	shale	shale	x		
629	125	121792088600	54	54	cap rock & gray shale at	shale	x		
641	130	121792238000	105	105	rocks at	shale	x	(Assumed to be bedrock)	
650	131	121792237900	95	100	firm gray shale	shale	x		
661	133	121792237700	81	85	firm gray shale	shale	x		
667	135	121792157500	42	42	shale	shale	x		
669	136	121792156800	105	108	black shale	shale	x		
681	138	121792219300	136	136	shale at	shale	x		
693	141	121792138000	80	108	rocks	shale	x	(Assumed to be bedrock)	x
701	142	121792237600	118	120	gray shale	shale	x		
715	146	121792285300	133	133	shale at	shale	x		
730	148	121792204800	96	100	dark gray shale	shale	x		
750	152	121790067100	100	100	hardpan at	shale	x	(Assumed to be bedrock)	

Attachment 9-2 – Boring Logs

PATRICK ENGINEERING INC.

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

LOGGED BY **MPG**
GROUND ELEVATION **461.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □ Water Content ○ LL △ (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
461.7	0.0		Brown coarse to fine sand, dry FILL				
				SS-1 1.0-2.5 14"R	3 4 4		qu=NT
				SS-2 3.5-5.0 12"R	3 3 5		Bentonite seal 3.0'-18.0'. Stickup protective cover installed. qu=NT
				SS-3 6.0-7.5 12"R	2 6 8		qu=NT
				SS-4 8.5-10.0 10"R	2 5 8		qu=NT
			Trace coarse gravel	SS-5 11.0-12.5 8"R	5 9 10		qu=NT
				SS-6 13.5-15.0 12"R	3 6 6		qu=NT
				SS-7 16.0-17.5 16"R	4 6 7		qu=NT
443.2	18.5		Brown coarse to medium sand, trace fine gravel, medium dense, saturated SW	SS-8 18.5-20.0 14"R	4 5 6		Sand pack 18.0'-30.0' qu=NT

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/4/10** ENDED **10/4/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **22.0**
▼
▼

PATRICK ENGINEERING INC.

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

LOGGED BY **MPG**
GROUND ELEVATION **461.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □---○---△ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✱ (1 2 3 4 5)	NOTES & TEST RESULTS
441.7	20.0						Set screen (slot 0.010") 20.5'-30.5'
				SS-9 21.0-22.5 15"R	4 5 5		qu=NT
439.7	22.0		∇				
				SS-10 23.5-25.0 18"R	4 4 4		qu=NT
				SS-11 26.0-27.5 18"R	4 4 6		qu=NT
433.7	28.0		Coarse to fine gravel, some coarse sand, medium dense, saturated GP				
				SS-12 28.5-30.0 18"R	4 5 6		qu=NT
				SS-13 31.0-32.5 18"R	4 6 7		qu=NT
429.2	32.5		End of Boring at 32.5'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/4/10** ENDED **10/4/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **22.0**
∇
∇

PATRICK ENGINEERING INC.

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

LOGGED BY **MPG**
GROUND ELEVATION **459.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content: PL □ ○ △ LL (10 20 30 40 50); Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
459.2	0.0		Dark brown topsoil, silty clay, dry FILL				
457.7	1.5			SS-1 1.0-2.5 10"R	4 4 4		qu=NT
			Light brown coarse to fine sand, loose, dry FILL				
				SS-2 3.5-5.0 10"R	2 3 2		Bentonite seal 3.0'-20.0'. Stickup protective cover installed. qu=NT
				SS-3 6.0-7.5 12"R	3 3 4		qu=NT
			Dry	SS-4 8.5-10.0 14"R	4 5 4		qu=NT
				SS-5 11.0-12.5 15"R	2 2 3		qu=NT
			Some fine gravel	SS-6 13.5-15.0 15"R	3 6 5		qu=NT
				SS-7 16.0-17.5 18"R	2 5 6		qu=NT
			Dry	SS-8 18.5-20.0 18"R	3 3 4		qu=NT
439.2	20.0						

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/5/10** ENDED **10/5/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **24.0**

PATRICK ENGINEERING INC.

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

LOGGED BY **MPG**
GROUND ELEVATION **459.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □---○---△ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
439.2	20.0		Light brown fine to medium sand, well graded, medium dense, dry FILL				Sand pack 20.0'-33.5'
				SS-9 21.0-22.5 18"R	4 10 11		qu=NT
435.7	23.5		Gray coarse to fine gravel, coarse sand, trace fine sand and silt, poorly graded, medium dense GP	SS-10 23.5-25.0 18"R	5 13 13		qu=NT Set screen (slot 0.010") 23.5'-33.5'
435.2	24.0		▽				
				SS-11 26.0-27.5 18"R	4 6 8		qu=NT
				SS-12 28.5-30.0 18"R	7 10 10		qu=NT
				SS-13 31.0-32.5 18"R	7 8 7		qu=NT
				SS-14 33.5-35.0 18"R	6 9 10		qu=NT
424.2	35.0		End of Boring at 35.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/5/10** ENDED **10/5/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **24.0**
▼
▼

PATRICK ENGINEERING INC.

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

LOGGED BY **MPG**
GROUND ELEVATION **459.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL Water Content LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) (1 2 3 4 5)	NOTES & TEST RESULTS
459.1 / 458.6	0.0 / 0.5		Dark brown silty clay topsoil				
			Light brown coarse to medium sand, trace fine gravel, trace fine sand, very loose to loose, dry FILL	SS-1 1.0-2.5 16"R	2 1 2		qu=NT
				SS-2 3.5-5.0 14"R	1 1 2		Bentonite seal 3.0'-20.0'. Stickup protective cover installed. qu=NT
				SS-3 6.0-7.5 16"R	2 2 3		qu=NT
			Some fine sand	SS-4 8.5-10.0 18"R	2 3 2		qu=NT
			Light brown medium to fine sand, loose, dry	SS-5 11.0-12.5 17"R	1 2 2		qu=NT
				SS-6 13.5-15.0 18"R	4 5 6		qu=NT
				SS-7 16.0-17.5 16"R	2 2 3		qu=NT
440.1	19.0		Brown coarse sand, trace fine gravel, well graded, very loose, wet	SS-8 18.5-20.0 16"R	3 4 3		qu=NT

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/5/10** ENDED **10/5/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **23.0**

PATRICK ENGINEERING INC.

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

LOGGED BY **MPG**
GROUND ELEVATION **459.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content (PL □ – ○ – △ LL, 10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
439.1	20.0		SW				Sand pack 20.0'-34.0'
				SS-9 21.0-22.5 18"R	1 1 1		qu=NT
436.1	23.0		∇ Saturated				
				SS-10 23.5-25.0 0"R	1 2 2		qu=NT Set screen (slot 0.010") 24.0'-34.0'
				SS-11 26.0-27.5 18"R	1 2 2		qu=NT
				SS-12 28.5-30.0 18"R	2 1 2		qu=NT
				SS-13 31.0-32.5 18"R	1 2 2		qu=NT
425.1	34.0		End of Boring at 34.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/5/10** ENDED **10/5/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **23.0**
∇
∇

PATRICK ENGINEERING INC.	BORING NUMBER **B-MW-4-Po**	SHEET 1 OF 2
	CLIENT **Midwest Generation**	
	PROJECT & NO. **21053.070**	
	LOCATION **Powerton**	

LOGGED BY **MPG**

GROUND ELEVATION **457.3**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL 10 20 30 40 50 LL / Unconfined Compressive Strength (TSF) 1 2 3 4 5	NOTES & TEST RESULTS
457.3	0.0		Brown silty clay, roots, topsoil FILL				
456.5	0.8		Light brown sand, medium to fine brown silty clay, fine gravel, dry FILL	SS-1 1.0-2.5 10"R	6 3 4		
				SS-2 3.5-5.0 8"R	3 4 4		Bentonite seal 3.0'-20.0'. Stickup protective cover installed.
				SS-3 6.0-7.5 18"R	4 6 9		qu=4.0**tsf
			Brown clayey silt	SS-4 8.5-10.0 18"R	4 5 5		qu=4.0**tsf
				SS-5 11.0-12.5 17"R	3 3 4		qu=3.5**tsf
				SS-6 13.5-15.0 17"R	2 2 3		qu=3.5**tsf
			Black clayey silt to silty clay				
441.3	16.0		Light brown coarse to fine sand, fine gravel, loose, dry SP	SS-7 16.0-17.5 18"R	2 2 3		
				SS-8 18.5-20.0 18"R	2 3 5		
437.3	20.0						

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/16/10** ENDED **10/16/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **24.0**
▼
▼

PATRICK ENGINEERING INC.

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

LOGGED BY **MPG**
GROUND ELEVATION **457.3**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
437.3	20.0		Brown coarse to fine gravel, trace coarse to medium sand, loose to medium dense, poorly graded GP				Sand pack 20.0'-34.0'
				SS-9 21.0-22.5 12"R	4 6 6		qu=NT
433.3	24.0		⊻ Saturated	SS-10 23.5-25.0 18"R	6 5 7		qu=NT Set screen (slot 0.010") 24.0'-34.0'
				SS-11 26.0-27.5 14"R	2 3 3		qu=NT
				SS-12 28.5-30.0 18"R	5 6 10		qu=NT
			Coarse to fine gravel, trace silt	SS-13 31.0-32.5 10"R	4 4 8		qu=NT
423.3	34.0		End of Boring at 34.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/16/10** ENDED **10/16/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
⊻ **24.0**
⊻
⊻

PATRICK ENGINEERING INC.	
BORING NUMBER **B-MW-5-Po**	SHEET 1 OF 2
CLIENT **Midwest Generation**	
PROJECT & NO. **21053.070**	
LOCATION **Powerton**	

LOGGED BY **MPG**
GROUND ELEVATION **455.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □- - -○- - -△ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
455.8	0.0		Dark brown silty clay, black coal cinders, topsoil FILL				
				SS-1 1.0-2.5 12"R	2 2 3		qu=NT
			Dry				Bentonite seal 2.0'-19.0'. Stickup protective cover installed.
				SS-2 3.5-5.0 14"R	6 8 10		qu=NT
			Coarse gravel, red coal cinders				
			Gray silty clay with coarse sand and fine gravel, medium stiff, dry	SS-3 6.0-7.5 16"R	2 3 3		qu=1.25**tsf
				SS-4 8.5-10.0 18"R	1 2 2		qu=1.0**tsf
				SS-5 11.0-12.5 18"R	2 2 3		qu=0.5**tsf
			Trace black coal cinders Trace coarse sand, moist				
			Gray clayey silt	SS-6 13.5-15.0 18"R	WOH 2 2		
				SS-7 16.0-17.5 18"R	WOH 6 6		
438.8	17.0		Gray coarse to fine gravel, coarse to fine sand, poorly graded, medium dense, dry GP				
				SS-8 18.5-20.0 18"R	4 8 7		Sand pack 19.0'-31.0'
435.8	20.0						

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/5/10** ENDED **10/6/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **20.5**
∇
▼

PATRICK ENGINEERING INC.

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

LOGGED BY **MPG**
GROUND ELEVATION **455.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □- - -○- - -△ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✱ (1 2 3 4 5)	NOTES & TEST RESULTS
435.8 / 435.3	20.0 / 20.5		⊽ Coarse to fine gravel, trace coarse to fine sand, poorly graded, medium dense, saturated GP				
				SS-9 21.0-22.5 0"R	4 6 6		qu=NT Set screen (slot 0.010") 21.0'-31.0'
				SS-10 23.5-25.0 10"R	4 6 6		qu=NT
			Loose	SS-11 26.0-27.5 10"R	3 4 4		qu=NT
				SS-12 28.5-30.0 10"R	4 5 6		qu=NT
424.8	31.0		End of Boring at 31.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/5/10** ENDED **10/6/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
⊽ **20.5**
⊽
⊽

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-6-Po** SHEET **1** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **461.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ ○ △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
461.2	0.0		Gravel, clay, coal cinders FILL				
				SS-1 1.0-2.5			
				SS-2 3.5-5.0			Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
451.2	10.0		Dark gray clayey silt, organics, very soft, moist FILL				
				SS-5 11.0-12.5 17"R	WOH 1 1		qu=0.25**tsf
447.2	14.0		Black coal cinders, loose, wet FILL	SS-6 13.5-15.0 16"R	WOH 3 3		qu=0.25**tsf
				SS-7 16.0-17.5 14"R	2 3 3		
444.2	17.0	∇					
443.2	18.0		Olive gray and gray organic silt, trace clay, trace peat, low plasticity, wet OL	SS-8 18.5-20.0	2 2 1		Sand pack 18.0'-28.0' qu=NT Set screen (slot 0.010") 19.0'-29.0'

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/6/10** ENDED **10/6/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **17.0**
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-6-Po** SHEET **2** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **461.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ 10 20 ○ 30 40 △ LL 50 / Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
441.2	20.0		Trace fine sand, dark gray mottled black organic silt, trace fine sand, wet	SS-9 21.0-22.5 16"R	WOH 1 2		qu=0.25**tsf
				SS-10 23.5-25.0 18"R	1 2 3		qu=0.50**tsf
				SS-11 26.0-27.5 18"R	3 3 3		qu=0.75**tsf
433.7	27.5		Dark gray organic clay, trace fine sand, medium stiff, moist OL	SS-12 28.5-30.0 18"R	2 2 3		qu=1.25**tsf
431.2	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 **10/6/10** ENDED **10/6/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **17.0**
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-7-Po** SHEET **1** OF **3**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **459.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content: PL □ 10 20 ○ 30 40 △ LL 50 / Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
459.6	0.0		Sand, gravel, black cinders, dry FILL				
				SS-1 1.0-2.5			
				SS-2 3.5-5.0			Bentonite seal 3.0'-32.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
449.6	10.0		Sand, gravel, clay, black coal cinders FILL				
				SS-5 11.0-12.5 6"R	5 3 3		
446.1	13.5		Dark gray organic clay, soft, moist OH	SS-6 13.5-15.0 10"R	2 2 2		qu=0.5**tsf
			Moist	SS-7 16.0-17.5 18"R	2 1 2		qu=0.5**tsf
			Trace fine sand, organic silt, moist	SS-8 18.5-20.0 18"R	WOH 2 2		qu=0.75**tsf
439.6	20.0						

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/4/10** ENDED **10/5/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **36.0**
∇
∇

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-7-Po** SHEET **2** OF **3**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **459.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL 10 20 30 40 50 LL / Unconfined Compressive Strength (TSF) 1 2 3 4 5	NOTES & TEST RESULTS
439.6	20.0		Dark gray organic clay, mottled black, medium stiff, dry OH				
				SS-9 21.0-22.5 18"R	3 2 4		qu=1.0**tsf
				SS-10 23.5-25.0 18"R	2 3 4		qu=1.25**tsf
433.6	26.0		Gray organic silt, trace shells, fibers, very soft, moist OL	SS-11 26.0-27.5 18"R	2 2 2		qu=0.25**tsf
			Dry	SS-12 28.5-30.0 18"R	2 3 3		qu=1.75**tsf
428.6	31.0		Dark gray organic clay, trace fine gravel, moist OH	SS-13 31.0-32.5 18"R	2 4 3		qu=1.25**tsf Sand pack 32.0'-45.0'
426.1	33.5		Gray clayey gravel, coarse sand, clay, silt, moist GC	SS-14 33.5-35.0 18"R	WOH 2 2		qu=NT Set screen (slot 0.010") 35.0'-45.0'
423.6	36.0		▽ Medium dense, saturated	SS-15 36.0-37.5 18"R	2 7 6		qu=NT
				SS-16 38.5-40.0 10"R	2 4 7		
419.6	40.0						

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/4/10** ENDED **10/5/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **36.0**
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-8-Po** SHEET **1** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **468.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □---○---△ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
468.7	0.0		Fine gravel, sand, silt, clay, black cinders, dry FILL				
				SS-1 1.0-2.5			
				SS-2 3.5-5.0			Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
458.7	10.0		Black cinders FILL				
				SS-5 11.0-12.5 14"R	15 28 15/3"		
				SS-6 13.5-15.0 18"R	11 15 12		
			Silty clay seam 15.5'-16.5'	SS-7 16.0-17.5 17"R	15 15 14		
				SS-8 18.5-20.0 18"R	7 11 11		Sand pack 18.0'-30.0'
449.2	19.5		⊻				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **9/30/10** ENDED **9/30/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
⊽ **21.0**
⊻ **19.5**
⊻

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-8-Po** SHEET **2** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **468.7**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content (PL □, ○, LL △; 10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
448.7	20.0		Black cinders FILL				Set screen (slot 0.010") 20.0'-30.0'
447.7	21.0		▽ Saturated	SS-9 21.0-22.5 18"R	5 5 3		
				SS-10 23.5-25.0 18"R	1 1 2		
444.2	24.5		Dark gray organic clay, soft, moist OH				qu=0.75**tsf
				SS-11 26.0-27.5 18"R	1 2 2		qu=1.0**tsf
441.2	27.5		Dark gray organic silt, medium stiff to soft, low plasticity, moist OL	SS-12 28.5-30.0 18"R	2 4 4		qu=1.25**tsf
438.7	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 **9/30/10** ENDED **9/30/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **21.0**
▼ **19.5**
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-9-Po** SHEET **1** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **466.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ 10 20 30 40 50 ○ △ LL / Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
466.2	0.0		Black cinders, fine gravel, crushed rock, dry FILL				
				SS-1 1.0-2.5			
				SS-2 3.5-5.0			Bentonite seal 3.0'-20.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
456.2	10.0		Black cinders, coarse to fine sand, brick, fine gravel, dry FILL				
				SS-5 11.0-12.5 14"R	6 12 15		qu=NT
				SS-6 13.5-15.0 18"R	5 6 7		qu=NT
				SS-7 16.0-17.5 18"R	6 9 10		qu=NT
449.2	17.0		Moist				
			Brown clayey silt, trace fine sand, moist CL				
447.2	19.0			SS-8 18.5-20.0 18"R	3 6 11		qu=NT
			Light brown fine to medium sand, loose, well graded				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **9/28/10** ENDED **9/28/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **23.5**
▼ **21.6**
▼

PATRICK ENGINEERING INC.	BORING NUMBER	**B-MW-9-Po**	SHEET	**2** OF **2**
	CLIENT	**Midwest Generation**		
	PROJECT & NO.	**21053.070**		
	LOCATION	**Powerton**		

LOGGED BY **MPG**

GROUND ELEVATION **466.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □---○---△ LL Water Content 10 20 30 40 50 / Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
446.2	20.0		SW				Sand pack 20.0'-32.0'
444.6	21.6		▼	SS-9 21.0-22.5 18"R	3 3 4		Set screen (slot 0.010") 22.0'-32.0'
442.7	23.5		∇ Saturated	SS-10 23.5-25.0 18"R	1 3 6		
				SS-11 26.0-27.5 18"R	0 2 2		
			Medium dense	SS-12 28.5-30.0 18"R	2 6 13		
			Trace fine gravel	SS-13 31.0-32.5 18"R	2 5 10		
433.7	32.5		End of Boring at 32.5'				

DRILLING CONTRACTOR **Groff Testing**	REMARKS	WATER LEVEL (ft.)
DRILLING METHOD **4.25" I.D. HSA**	**Installed 2" diameter PVC monitoring well.**	∇ **23.5**
DRILLING EQUIPMENT **CME 550 ATV**		▼ **21.6**
DRILLING STARTED **9/28/10** ENDED **9/28/10**		▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-10-Po** SHEET **1** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **454.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □ Water Content ○ LL △ (10 20 30 40 50) / Unconfined Compressive Strength (TSF) * (1 2 3 4 5)	NOTES & TEST RESULTS
454.1	0.0		Black and brown silty clay topsoil CL				
				SS-1 1.0-2.5			
				SS-2 3.5-5.0			Bentonite seal 3.0'-17.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
444.1	10.0		Brown organic silt, some clay, trace peat, soft, moist OL				
				SS-5 11.0-12.5 16"R	1 2 2		qu=0.5**tsf
440.6	13.5		Black organic clay, medium plasticity, medium stiff, dry OL	SS-6 13.5-15.0 18"R	2 3 4		qu=1.5**tsf
438.1	16.0		Brown and gray silty clay, trace to little coarse to fine sand, medium stiff, dry CL	SS-7 16.0-17.5 18"R	4 4 4		qu=2.0**tsf Sand pack 17.0'-29.0'
				SS-8 18.5-20.0			Set screen (slot 0.010") 19.0'-29.0'

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/4/10** ENDED **10/4/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **21.0'**
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-10-Po** SHEET **2** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **454.1**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - ○ - - △ LL (10, 20, 30, 40, 50) / Unconfined Compressive Strength (TSF) ✳ (1, 2, 3, 4, 5)	NOTES & TEST RESULTS
434.1	20.0						
433.1	21.0		Gray coarse to fine sand, trace fine gravel, silt, poorly graded, loose, saturated SP	SS-9 21.0-22.5 18"R	2 2 1		qu=NT
				SS-10 23.5-25.0 10"R	2 4 3		qu=NT
429.6	24.5		Brown and gray coarse to fine gravel, poorly graded, loose, saturated GP				
				SS-11 26.0-27.5 10"R	2 4 7		qu=NT
				SS-12 28.5-30.0 14"R	5 7 8		qu=NT
424.1	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 **10/4/10** ENDED **10/4/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ 21.0'
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER B-MW-11-Po SHEET 1 OF 2
CLIENT Midwest Generation
PROJECT & NO. 21053.070
LOCATION Powerton

LOGGED BY MPG
GROUND ELEVATION 468.1

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □ Water Content ○ LL △ (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
468.1	0.0		Cinders, gravel, sand, silt FILL				
				SS-1 1.0-2.5			
				SS-2 3.5-5.0			Bentonite seal 3.0'-28.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
458.1	10.0		Black and brown clay, fine gravel, cinders, bricks, silt, coarse sand, dry FILL				
				SS-5 11.0-12.5 16"R	8 10 10		qu=NT
				SS-6 13.5-15.0 17"R	2 2 3		qu=2.5**tsf
452.1	16.0		Brown and gray silty clay, trace fine gravel, trace fine sand, stiff, dry CL	SS-7 16.0-17.5 18"R	1 3 4		qu=1.5**tsf
449.6	18.5		Gray clayey silt, organics, very soft, moist ML	SS-8 18.5-20.0 18"R	WOH 2 2		qu=0.5**tsf

DRILLING CONTRACTOR Groff Testing
DRILLING METHOD 4.25" I.D. HSA
DRILLING EQUIPMENT CME 550 ATV
DRILLING STARTED 9/28/10 ENDED 9/29/10

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ 32.5 while drilling
▼ 26.5 after 12 hours
▼ 26.5 after 48 hours

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-11-Po** SHEET **2** OF **2**

CLIENT **Midwest Generation**

PROJECT & NO. **21053.070**

LOCATION **Powerton**

LOGGED BY **MPG**

GROUND ELEVATION **468.1**

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □ Water Content ○ △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✱ (1 2 3 4 5)	NOTES & TEST RESULTS
448.1	20.0						
				SS-9 21.0-22.5 0"R	1 2 3		qu=NT
				SS-10 23.5-25.0 18"R	WOH WOH 1		qu=0.5**tsf
442.1	26.0						
441.6	26.5		▼ Dark gray silty clay, some organics, medium stiff, dry CL	SS-11 26.0-27.5 18"R	1 3 4		qu=1.5**tsf
				SS-12 28.5-30.0 18"R	3 4 6		Sand pack 28.0'-40.0' qu=2.5**tsf
				SS-13 31.0-32.5 18"R	3 4 6		Set screen (slot 0.010") 30.0'-40.0' qu=2.5**tsf
435.6	32.5		▽ Brown and gray coarse to fine gravel, coarse to fine sand, loose, saturated GP	SS-14 33.5-35.0 18"R	1 2 1		qu=NT
431.6	36.5		Light brown fine sand, well graded, very loose, saturated SW	SS-15 36.0-37.5 18"R	1 0 0		qu=NT
428.1	40.0		End of Boring at 40.0'	SS-16 38.5-40.0 18"R	2 3 4		qu=NT

DRILLING CONTRACTOR **Groff Testing**

DRILLING METHOD **4.25" I.D. HSA**

DRILLING EQUIPMENT **CME 550 ATV**

DRILLING STARTED **9/28/10** ENDED **9/29/10**

REMARKS

Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)

▽ **32.5** while drilling

▼ **26.5** after 12 hours

▼ **26.5** after 48 hours

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-12-Po** SHEET 1 OF 2
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **470.0**

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □- - -O- - -Δ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✱ (1 2 3 4 5)	NOTES & TEST RESULTS
470.0	0.0		Black cinders, fine gravel, silty clay, dry FILL				
				SS-1 1.0-2.5			
				SS-2 3.5-5.0			Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
460.0	10.0		Black cinders FILL				
				SS-5 11.0-12.5 18"R	17 18 11		qu=NT
				SS-6 13.5-15.0 18"R	12 20 17		qu=NT
			Seam of l ight brown coarse sand	SS-7 16.0-17.5 18"R	6 7 6		qu=NT
451.5	18.5		Gray silt, little to some coarse to fine sand, trace clay, very soft,	SS-8 18.5-20.0 18"R	1 5 2		Sand pack 18.0'-35.0' qu=NT
450.5	19.5		▼ saturated				Set screen (slot 0.010") 19.0'-29.0'

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **9/29/10** ENDED **9/29/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **20.5**
▼ **19.5**
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-12-Po** SHEET **2** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **470.0**

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □ Water Content ○ LL △ (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✱ (1 2 3 4 5)	NOTES & TEST RESULTS
450.0 449.5	20.0 20.5		∇ ML				
				SS-9 21.0-22.5 18"R	1 2 1		qu=0.25**tsf
			Trace peat	SS-10 23.5-25.0 18"R	WOH 2 1		qu=0.5**tsf
444.0	26.0		Gray mottled black clayey silt, with some organics, trace peat, very soft, medium stiff, moist OH	SS-11 26.0-27.5 18"R	WOH WOH 2		qu=0.5**tsf
				SS-12 28.5-30.0 18"R	1 3 4		qu=1.75**tsf
				SS-13 31.0-32.5 18"R	2 3 3		qu=2.0**tsf
437.5	32.5		Dark brown and gray silty clay, trace coarse sand, trace organics, stiff to very stiff, dry CL	SS-14 33.5-35.0 18"R	4 6 6		qu=2.5**tsf
435.0	35.0		End of Boring at 35.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **9/29/10** ENDED **9/29/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **20.5**
▼ **19.5**
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-13-Po** SHEET **1** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **467.7**

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ ○ △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
467.7	0.0		Black cinders, sand, rock, dry FILL				
				SS-1 1.0-2.5			
				SS-2 2.5-4.0			Bentonite seal 3.0'-28.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
457.7	10.0		Black cinders, medium sand FILL				
				SS-5 11.0-12.5 14"R	5 9 7		qu=NT
				SS-6 13.5-15.0 15"R	3 3 2		qu=NT
			Some organic silt, moist	SS-7 16.0-17.5 18"R	WOH 1 1		qu=NT
450.2	17.5		Gray/olive gray organic silt, very soft OL				
				SS-8 18.5-20.0 18"R	1 0 0		qu=0.0**tsf
447.7	20.0						

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **9/29/10** ENDED **9/29/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **31.5**
▼ **29.5**
▼

PATRICK ENGINEERING INC.

BORING NUMBER B-MW-13-Po SHEET 2 OF 2
CLIENT Midwest Generation
PROJECT & NO. 21053.070
LOCATION Powerton

LOGGED BY MPG
GROUND ELEVATION 467.7

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □ Water Content ○ LL △ (10 20 30 40 50); Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
447.7	20.0		Dark gray and black organic clay, very soft, moist OH				
				SS-9 21.0-22.5 18"R	WOH WOH 2		qu=0.25**tsf
445.2	22.5		Dark gray and black organic silt, very soft, moist OL				
				SS-10 23.5-25.0 18"R	WOH 1 1		qu=0.25**tsf
441.7	26.0		Dark gray and black organic clay, soft, dry OH	SS-11 26.0-27.5 18"R	WOH 1 2		qu=1.0**tsf
			Medium stiff	SS-12 28.5-30.0 18"R	0 2 3		Sand pack 28.0'-40.0' qu=1.5**tsf
438.2	29.5	▼					
437.2	30.5		Gray silty clay, some coarse to fine sand, trace fine gravel, wet CL				Set screen (slot 0.010") 30.0'-40.0'
436.2	31.5	▽		SS-13 31.0-32.5 18"R	2 4 5		qu=2.0**tsf
433.7	34.0		Stiff	SS-14 33.5-35.0 6"R	2 3 2		qu=2.0**tsf
			Brown coarse to fine gravel, trace coarse to medium sand, silt, medium dense, saturated GP				
				SS-15 36.0-37.5 8"R	4 6 6		qu=NT
				SS-16 38.5-40.0 8"R	5 8 8		qu=NT
427.7	40.0		End of Boring at 40.0'				

DRILLING CONTRACTOR Groff Testing
DRILLING METHOD 4.25" I.D. HSA
DRILLING EQUIPMENT CME 550 ATV
DRILLING STARTED 9/29/10 ENDED 9/29/10

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ 31.5
▼ 29.5
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-14-Po** SHEET **1** OF **2**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Powerton**

LOGGED BY **MPG**
GROUND ELEVATION **467.7**

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✱ (1 2 3 4 5)	NOTES & TEST RESULTS
467.7	0.0		Cinders, gravel, sand, silt, dry FILL				
				SS-1 1.0-2.5			
				SS-2 3.5-5.0			Bentonite seal 3.0'-18.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
457.7	10.0		Brown fine gravel, some silty clay and coarse sand, dry FILL				
				SS-5 11.0-12.5 18"R	4 4 4		
				SS-6 13.5-15.0 16"R	4 3 4		
			Black cinders	SS-7 16.0-17.5 16"R	2 3 3		
				SS-8 18.5-20.0 18"R	3 3 1		Sand pack 18.0'-30.0'
448.2	19.5	∇	Gray organic silt, some fine sand,				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **9/30/10** ENDED **9/30/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **19.5**
▼ **20.5**
▼

PATRICK ENGINEERING INC.	
BORING NUMBER	B-MW-14-Po SHEET 2 OF 2
CLIENT	Midwest Generation
PROJECT & NO.	21053.070
LOCATION	Powerton

LOGGED BY MPG

GROUND ELEVATION 467.7

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ 10 20 ○ 30 40 △ LL 50 / Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
447.7 447.2	20.0 20.5		▼ very loose, low plasticity, saturated OL				Set screen (slot 0.010") 20.0'-30.0'
				SS-9 21.0-22.5 18"R	1 0 0		qu=NT
				SS-10 23.5-25.0 18"R	1 1 2		qu=0.25**tsf
442.7	25.0		Gray and mottled black organic silt, trace fine sand, soft, low plasticity, moist OL				
				SS-11 26.0-27.5 18"R	0 0 1		qu=0.25**tsf
438.7	29.0		Gray and black organic clay, medium stiff, moist OH	SS-12 28.5-30.0 18"R	2 3 4		qu=1.25**tsf
437.7	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 9/30/10	ENDED 9/30/10

REMARKS

Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)

▽ 19.5

▼ 20.5

▼

PATRICK ENGINEERING INC.

BORING NUMBER	B-MW-15-Po	SHEET	1 OF 2
CLIENT	Midwest Generation		
PROJECT & NO.	21053.070		
LOCATION	Powerton		

LOGGED BY MPG
GROUND ELEVATION 468.3

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL Water Content LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✱ (1 2 3 4 5)	NOTES & TEST RESULTS
468.3	0.0		Black cinders, fine gravel, sand, silt, dry FILL				
				SS-1 1.0-2.5			
				SS-2 3.5-5.0			Bentonite seal 3.0'-17.0'. Stickup protective cover installed.
				SS-3 6.0-7.5			
				SS-4 8.5-10.0			
458.3	10.0		Black cinders, fine gravel, coarse sand, silt, dry FILL				
				SS-5 11.0-12.5 14"R	6 13 12		
				SS-6 13.5-15.0 0"R	50/1"		
				SS-7 16.0-17.5 14"R	7 7 5		Sand pack 17.0'-30.0'
				SS-8 18.5-20.0 18"R	2 1 1		
448.8	19.5	∇					
448.3	20.0						

DRILLING CONTRACTOR Groff Testing
DRILLING METHOD 4.25" I.D. HSA
DRILLING EQUIPMENT CME 550 ATV
DRILLING STARTED 9/30/10 ENDED 9/30/10

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ 20.0'
∇ 19.5
∇

PATRICK ENGINEERING INC.

BORING NUMBER B-MW-15-Po SHEET 2 OF 2
CLIENT Midwest Generation
PROJECT & NO. 21053.070
LOCATION Powerton

LOGGED BY MPG
GROUND ELEVATION 468.3

ELEV.	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □ Water Content ○ LL △ (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✱ (1 2 3 4 5)	NOTES & TEST RESULTS
448.3	20.0		Gray fine sand, trace medium sand, loose, saturated SM				Set screen (slot 0.010") 20.0'-30.0'
				SS-9 21.0-22.5 18"R	1 1 1		qu=NT
444.8	23.5		Gray silt, mottled black, some organics, soft, moist to wet OL	SS-10 23.5-25.0 18"R	1 2 2		qu=0.75**tsf
				SS-11 26.0-27.5 18"R	1 2 2		qu=1.0**tsf
440.3	28.0		Gray silty clay, some organics, soft, medium stiff, dry CL	SS-12 28.5-30.0 18"R	1 3 2		qu=1.0**tsf
438.3	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 9/30/10 ENDED 9/30/10

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ 20.0'
▼ 19.5
▼

KPRG
ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG and Associates, Inc.

Midwest Generation, LLC
Powerton Station
Pekin, Illinois

KPRG Project No. 18311.21

GEOLOGIC LOG OF MW-16

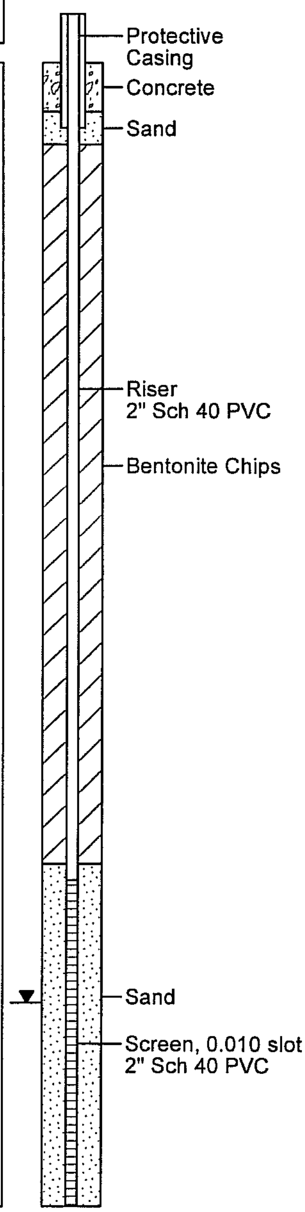
(Page 1 of 1)

Date Started	: 11/27/2012
Date Well Set	: 11/27/2012
Rock Coring Tools	: Not cored
Drilling Tools	: 4.25 ID HSA
Drill Rig	: Geoprobe
Driller Name/Co	: S. Keehma/Cabeno

Total Boring Depth	: 35 feet
Well Bottom Depth	: 35 feet
Surface Elev.	: 468.957 feet above MSL
TOC Elev.	: 471.564 feet above MSL
Groundwater Elev.	: 439.81
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	: 40 32' 22.9" N
Coordinate E	: 89 40' 41.1" W
Logged By	: M. Wilson

Depth in Feet	Surf. Elev. 468.957	DESCRIPTION	PID	% Recovery
0	469			
		FILL: Black to brown silty clay with sand and gravel (Hydrovac from 0-10')		
2	467			
4	465			
6	463			
8	461	Approximate extent of fill		
10	459	Tan medium to fine grained SAND with some gravel		
			0	60
12	457			
14	455		0	
16	453		0	70
18	451			
			0	
20	449	- Gravel layer approximately 2" thick		
			0	100
22	447			
24	445		0	
		- Thin layer of fine grained sand		
26	443		0	100
28	441			
			0	
30	439	- Wet		
			0	60
32	437			
34	435		0	
36	433	End of boring at 35'		
38	431			
40				

Well Diagram: MW-16



KPRG
ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG and Associates, Inc.

Midwest Generation, LLC
Powerton Station
Pekin, Illinois

Project No. 15315.7

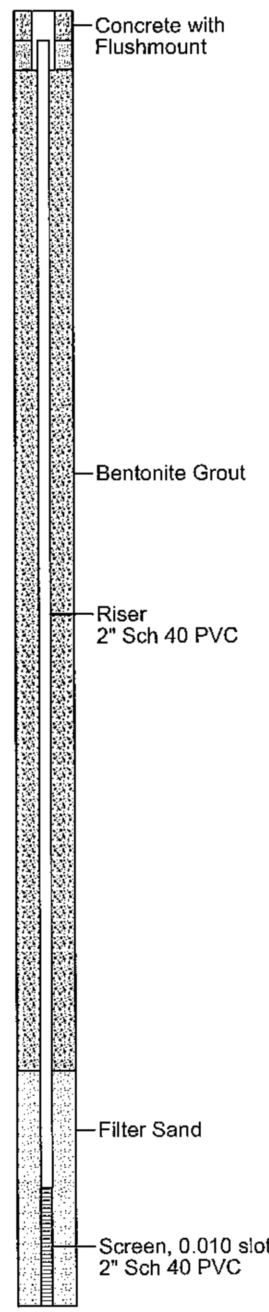
GEOLOGIC LOG OF MW-17

Date Started	: 09/21/15
Date Well Set	: 09/21/15
Drilling Tools	: 8 1/4 HSA
Reaming Tools	: None
Drill Rig	: Geoprobe
Driller Name/Co	: Nick / Cabeno Env. Serv.

Total Boring Depth	: 30.0 feet
Well Bottom Depth	: 30.0 feet
Surface Elev.	: xxx feet above MSL
TOC Elev.	: xxx feet above MSL
Groundwater Elev.	: xxx feet above MSL
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	:
Coordinate E	:
Logged By	: P. Allenstein

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery
0	575	Asphalt Roadway over sand, silt, gravel mix, brown, dry.		
1	574			
2	573	SILTY SAND, fine to coarse, black, slightly moist, occ silty layers.		
3	572			
4	571			
5	570			
6	569			
7	568			
8	567			
9	566			
10	565			
11	564			
12	563	- begin black with orange brown		
13	562			
14	561			
15	560			
16	559	- some gray silt laminates		
17	558			
18	557			
19	556	SILT, gray, laminated with SILTY SAND, moist		
20	555	- increase to very moist then wet		
21	554			
22		SILT, gray, laminated with light brown silt, trace organics, wet.		

Well Diagram:



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ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG and Associates, Inc.

Midwest Generation, LLC
Powerton Station
Pekin, Illinois

Project No. 15315.7

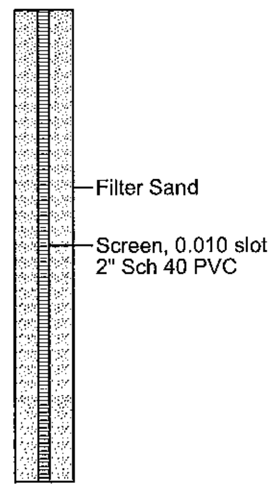
GEOLOGIC LOG OF MW-17

Date Started	: 09/21/15
Date Well Set	: 09/21/15
Drilling Tools	: 8 1/4 HSA
Reaming Tools	: None
Drill Rig	: Geoprobe
Driller Name/Co	: Nick / Cabeno Env. Serv.

Total Boring Depth	: 30.0 feet
Well Bottom Depth	: 30.0 feet
Surface Elev.	: xxx feet above MSL
TOC Elev.	: xxx feet above MSL
Groundwater Elev.	: xxx feet above MSL
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	:
Coordinate E	:
Logged By	: P. Allenstein

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery
22	553			
23	552			
24	551			
25	550			
26	549	SILTY SAND, black and dark gray, fine to meduim, wet.		
27	548	SILT and SAND, gray and black, wet.		
28	547			
29	546			
30	545			
31	544	End of Boring at 30 feet.		
32	543			
33	542			
34	541			
35	540			
36	539			
37	538			
38	537			
39	536			
40	535			
41	534			
42	533			
43	532			
44				

Well Diagram:



ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

Midwest Generation, LLC
Powerton Station
Pekin, Illinois

Project No. 15315.7

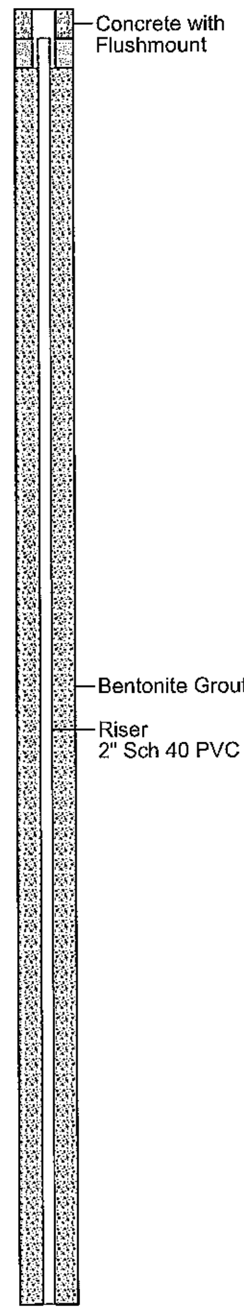
GEOLOGIC LOG OF MW-18

Date Started	: 09/21/15
Date Well Set	: 09/21/15
Drilling Tools	: 8 1/4 HSA
Reaming Tools	: None
Drill Rig	: Geoprobe
Driller Name/Co	: Nick / Cabeno Env. Serv.

Total Boring Depth	: 30.0 feet
Well Bottom Depth	: 30.0 feet
Surface Elev.	: xxx feet above MSL
TOC Elev.	: xxx feet above MSL
Groundwater Elev.	: xxx feet above MSL
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	:
Coordinate E	:
Logged By	: P. Allenstein

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery
0	575	SILTY CLAY, brown, trace gravel, slightly moist.		
1	574			
2	573			
3	572	SILTY SAND, fine to coarse, black, brown and dark gray, dry to slightly moist.		
4	571			
5	570			
6	569			
7	568	- clayey from 7-8, followed by occasional clayey layers		
8	567			
9	566			
10	565			
11	564			
12	563			
13	562			
14	561			
15	560			
16	559	- begin all black		
17	558			
18	557			
19	556	- very moist		
20	555			
21	554			
22				

Well Diagram:



ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG and Associates, Inc.

Midwest Generation, LLC
Powerton Station
Pekin, Illinois

Project No. 15315.7

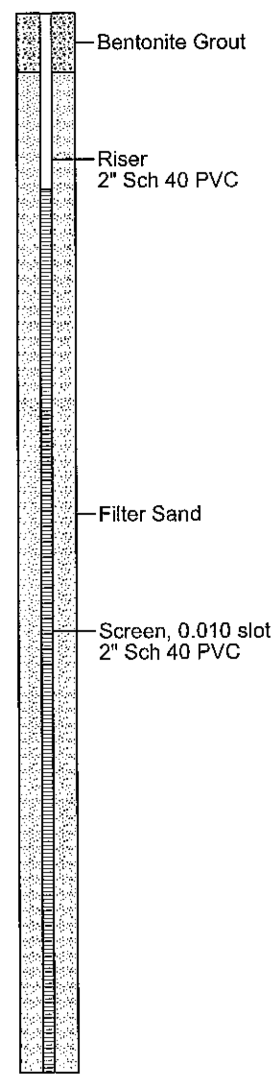
GEOLOGIC LOG OF MW-18

Date Started	: 09/21/15
Date Well Set	: 09/21/15
Drilling Tools	: 8 1/4 HSA
Reaming Tools	: None
Drill Rig	: Geoprobe
Driller Name/Co	: Nick / Cabeno Env. Serv.

Total Boring Depth	: 30.0 feet
Well Bottom Depth	: 30.0 feet
Surface Elev.	: xxx feet above MSL
TOC Elev.	: xxx feet above MSL
Groundwater Elev.	: xxx feet above MSL
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	:
Coordinate E	:
Logged By	: P. Allenstein

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery
22	553			
23	552			
24	551			
25	550			
26	549			
27	548			
28	547			
29	546	CLAY, gray, some black, moist.		
30	545			
31	544			
32	543	CLAY, dark gray, trace organics, moist.		
33	542			
34	541			
35	540			
36	539	CLAY, greenish gray, trace organics, moist.		
37	538			
38	537			
39	536	SILTY SAND, tan, some gravel, very moist.		
40	535	End of Boring at 40 feet.		
41	534			
42	533			
43	532			
44				

Well Diagram:



KPRG
ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG and Associates, Inc.

GEOLOGIC LOG OF MW-19

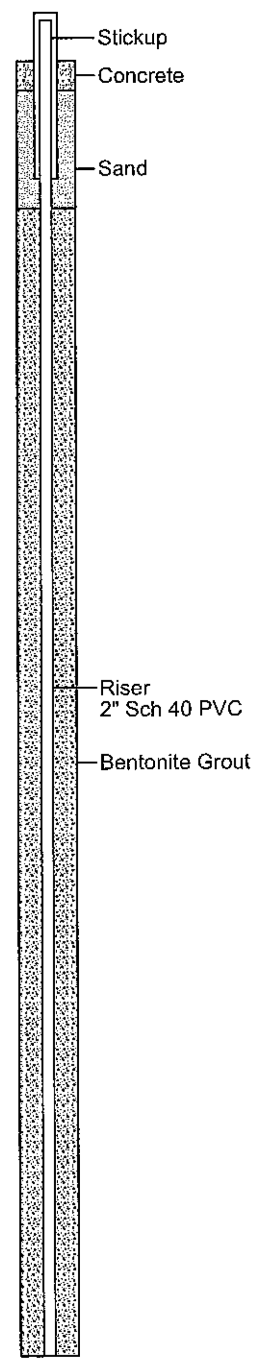
Midwest Generation, LLC
Powerton Station
Pekin, Illinois

Date Started	: 10/05/16
Date Well Set	: 10/05/16
Drilling Tools	: 8 1/4 HSA
Reaming Tools	: None
Drill Rig	: Geoprobe
Driller Name/Co	: Nick / Cabeno Env. Serv.

Total Boring Depth	: 41.0 feet
Well Bottom Depth	: 41.0 feet
Surface Elev.	: xxx feet above MSL
TOC Elev.	: xxx feet above MSL
Groundwater Elev.	: xxx feet above MSL
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	:
Coordinate E	:
Logged By	: P. Allenstein

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery
0	575			
1	574	SILTY SAND, black, fine to coarse, occasional clayey layers slightly moist.		
2	573			
3	572			
4	571			
5	570	- very moist to wet		
6	569			
7	568	- slightly moist		
8	567			
9	566			
10	565			
11	564			
12	563			
13	562			
14	561	- 6" white and brown gravel		
15	560			
16	559			
17	558			
18	557	- moist		
19	556			
20	555			
21	554			
22				

Well Diagram:



KPRG
ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG and Associates, Inc.

Midwest Generation, LLC
Powerton Station
Pekin, Illinois

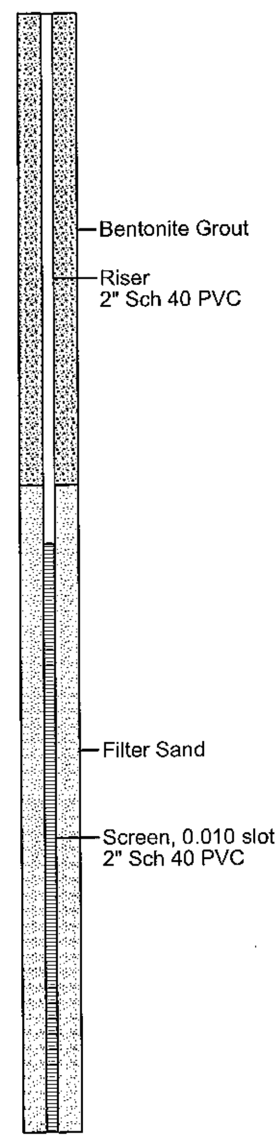
GEOLOGIC LOG OF MW-19

Date Started	: 10/05/16
Date Well Set	: 10/05/16
Drilling Tools	: 8 1/4 HSA
Reaming Tools	: None
Drill Rig	: Geoprobe
Driller Name/Co	: Nick / Cabeno Env. Serv.

Total Boring Depth	: 41.0 feet
Well Bottom Depth	: 41.0 feet
Surface Elev.	: xxx feet above MSL
TOC Elev.	: xxx feet above MSL
Groundwater Elev.	: xxx feet above MSL
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	:
Coordinate E	:
Logged By	: P. Allenstein

Depth in Feet	Surf. Elev. 575	DESCRIPTION	% RQD	% Recovery
22	553			
23	552			
24	551			
25	550			
26	549			
27	548			
28	547			
29	546	SAND, fine to medium, gray, trace gravel, moist.		
30	545	SAND, fine to medium, brown, very moist.		
31	544			
32	543			
33	542			
34	541			
35	540			
36	539			
37	538			
38	537			
39	536			
40	535			
41	534			
42	533	End of Boring at 41 feet.		
43	532			
44				

Well Diagram:



Attachment 9-3 – Historical CCA Groundwater Data

Attachment 9-3 Historical CCA Groundwater Data - Midwest Generation LLC, Powerton Station, Pekin, IL

Sample: MW-02

Sample: MW-02	Date	12/15/2010		3/25/2011		6/16/2011		9/19/2011		12/12/2011		3/19/2012		6/25/2012		9/18/2012		12/12/2012		2/27/2013		5/29/2013		7/29/2013		10/21/2013		3/5/2014		5/27/2014		8/25/2014		10/27/2014		2/25/2015		5/13/2015		8/17/2015		11/17/2015	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND	0.003	ND	0.0030	0.015	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	NP	0.0018	0.001	0.0015	0.001	0.0017	0.001	ND	0.001	ND	0.001	ND	0.001	0.0011	0.001	0.0012	0.0050	ND	0.001	0.0011	0.0010	0.0010	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	0.0015	0.0010	0.0016	0.0010	0.0017	0.0010	ND
Barium	2.0	NP	0.042	0.001	0.025	0.001	0.053	0.001	0.059	0.001	0.066	0.001	0.049	0.001	0.064	0.001	0.06	0.040	0.075	0.001	0.035	0.0025	0.053	0.0025	0.078	0.0025	0.088	0.0025	0.046	0.0025	0.069	0.0025	0.071	0.0025	0.067	0.0025	0.051	0.0025	0.055	0.0025	0.072	0.0025	0.066
Beryllium	0.004	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0010	ND ^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	NP	0.38	0.01	0.23	0.01	0.35	0.01	0.83	0.01	0.69	0.01	0.27	0.01	0.74	0.01	0.65	0.40	0.8	0.01	0.29	0.050	0.21	0.050	1.4	0.050	2.7	0.050	0.28	0.050	0.38	0.050	1.1	0.050	0.078	0.050	0.082	0.050	0.11	0.050	0.41	0.050	0.50
Cadmium	0.005	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	NP	45	10	43	10	44	10	46	10	40	10	53	10	51	10	45	10	48	10	52	2.0	53	2.0	48	10	90	10	88	10	91	2.0	58 ^	2.0	44	2.0	54	10	92	2.0	51	2.0	45
Chromium	0.1	NP	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.0030	0.0096	0.004	0.0042	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	NP	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.0030	ND	0.002	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.010	ND	0.003	ND	0.0020	0.0021	0.0020	ND	0.0020	ND	0.0020	ND^	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	0.024	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	NP	ND	0.25	0.30	0.25	0.35	0.25	ND	0.25	ND	0.25	ND	0.25	ND	0.25	ND	0.25	0.28	0.25	ND	0.10	0.32	0.10	0.19	0.10	0.17	0.10	0.19	0.10	0.18	0.10	0.19	0.10	0.22	0.10	0.17	0.10	0.22	0.10	0.22	0.10	0.18
Iron	5.0	NP	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	0.046	0.01	0.026	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0050	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.0013	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	NP	ND	0.001	0.0012	0.001	0.0022	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.0019	0.0020	0.0063	0.001	ND	0.0025	ND	0.0025	0.0060	0.0025	0.0060	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.015	0.0025	0.0027
Mercury	0.002	NP	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	NP	0.0086	0.005	0.0096	0.005	0.0053	0.005	0.01	0.005	0.0073	0.005	ND	0.005	0.0065	0.005	0.0066	0.010	ND	0.005	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	NP	7.5	0.20	4.5	0.20	4.7	0.20	4.3	0.20	6.9	0.20	5.1	0.20	4.4	0.20	2.9	0.20	2.4	0.2	5.7	0.10	0.44	0.10	0.59	0.10	1.1	0.10	2.4	0.10	4.0	0.10	0.28	0.10	4.3	0.10	5.9	0.10	1.2	0.10	ND	0.10	3.2
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.10	0.48	0.10	0.59	0.10	1.1	0.50	2.4	0.50	4.0	0.10	0.28	0.50	4.3	0.50	5.9	0.10	1.2	0.10	ND ^	0.20	3.2
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.020	0.041	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	NP	0.0017	0.001	0.0032	0.001	0.0014	0.001	0.0032	0.001	0.0037	0.001	ND	0.001	0.0039	0.001	0.0016	0.0050	ND	0.001	0.0032	0.0040	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	NP	52	10	42	10	53	10	70	10	69	10	55	10	73	10	69	10	95	10	53	20	96	25	140	50	190	10	53	20	63	20	76	20	49	10	57	10	41	10	53	20	77
Thallium	0.002	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solid	1,200	NP	480	17	420	17	470	17	460	17	490	17	440	17	500	17	510	26	520	26	440	10	340	10	560	10	770	10	430	10	440	10	460	10	440	10	510	10	490	10	540	10	480
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0080	ND	0.005	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	NP	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	0.013	0.006	ND	0.006	ND	0.020	ND	0.006	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.005	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.001
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.03	ND	0.03	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00055	0.0025	0.0042
pH	6.5 - 9.0	NA	7.91	NA	7.78	NA	7.20	NA	7.52	NA	6.41	NA	7.92	NA	7.35	NA	7.32	NA	7.38	NA	7.53	NA	7.39	NA	7.03	NA	7.20	NA	8.21	NA	7.19	NA	7.01	NA	7.37	NA	8.13	NA	7.86	NA	7.28	NA	7.12
Temperature	NA	NA	14.01	NA	3.26	NA	13.14	NA	14.75	NA	9.58	NA	9.56	NA	14.90	NA	17.12	NA	12.33	NA	13.30	NA	20.87	NA	17.02	NA	12.34	NA	6.67	NA	15.72 *	NA	20.87	NA	17.43	NA	2.61	NA	12.12	NA	24.86	NA	13.93
Conductivity	NA	NA	0.96	NA	0.74	NA	0.75	NA	0.64	NA	0.59	NA	0.56	NA	0.66	NA	0.68	NA	0.68	NA	0.54	NA	0.56	NA	0.74	NA	0.80	NA	0.40	NA	0.69	NA	0.76	NA	0.78	NA	0.49	NA	0.66	NA	0.86	NA	0.64
Dissolved Oxygen	NA	NA	NM	NA	7.73	NA	0.58	NA	0.28	NA	3.34	NA	3.91	NA	0.78	NA	0.53	NA	2.03	NA	10.89	NA	0.65	NA	0.47	NA	0.32	NA	7.92	NA	0.55	NA	0.46	NA	2.96	NA	11.55	NA	1.99	NA	1.52	NA	8.66
ORP	NA	NA	NM	NA	124.5	NA	226.3	NA	-196	NA	63	NA	272	NA	168	NA	157	NA	200	NA	185.2	NA	-34.5	NA	33.9	NA	-180.3	NA	-53	NA	72.5	NA	35.9	NA	60.1	NA	113.1	NA	87.3	NA	-37.7	NA	112.9

Sample: MW-02	Date	2/23/2016		5/17/2016		8/16/2016		11/15/2016		2/14/2017		5/1/2017		8/23/2017		11/7/2017		3/6/2018		5/15/2018		8/7/2018		10/30/2018		2/26/2019		4/30/2019		8/27/2019		11/12/2019		2/24/2020		5/19/2020		8/10/2020		12/9/2020		2/22/2021		5/11/2021	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	0.0036	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	0.0013	0.0010	0.0010	0.0010	ND	0.0010	0.0015	0.0010	0.0013	0.0010	0.0012	0.001	0.0038	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.0012	0.001	0.0017	0.001	ND	0.001	0.0011	0.001	ND	0.001	0.0012	0.001	ND	0.001	ND	0.001	ND	0.001	0.001
Barium	2.0	0.0025	0.058	0.0025	0.061	0.0025	0.050	0.0025	0.057	0.0025	0.046	0.0025	0.050	0.0025	0.062	0.0025	0.088	0.0025	0.058	0.0025	0.065	0.0025	0.066	0.0025	0.068	0.0025	0.038	0.0025	0.046	0.0025	0.066	0.0025	0.066	0.0025	0.061	0.0025	0.057	0.0025	0.078	0.0025	0.071	0.0025	0.054	0.0025	0.057
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND ^1+	0.001	ND ^+	0.001	ND ^+
Boron	2.0	0.050	0.24	0.050	0.30	0.050	0.32	0.050	0.15	0.050	0.16	0.050	0.21	0.25	1.3	0.05	2.8	0.25	0.39	0.05	0.18	0.25	1.5	0.05	0.092	0.05	0.064	0.05	0.13	0.05	0.49	0.05	0.43	0.05	0.3	0.05	0.33	0.25	1.1	0.05	0.56	0.05	0.25	0.05	0.19
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND ^	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	2.0	45	2.0	47	2.0	39	2.0	39	2.0	50	2.0	56	2	48	2	47	2	62	2	47	2	55	2	42	2	51	2	51	2	49	2	46	2	55	10	47	2	42	2	43	4	44	2	50
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	4.0	0.10	0.16	0.10	0.23	0.10	0.24	0.10	0.19	0.10	0.22	0.10	0.15	0.1	0.18	0.1	0.16	0.1	0.15	0.1	0.23	0.1	0.14	0.1	0.17	0.1	0.16	0.1	0.18	0.1	0.17	0.1	0.19	0.1	0.23	0.1	0.2	0.1	0.22	0.1	0.15	0.1	0.15	0.1	0.18 H
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND F1	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Mercury	0.002	0.00020	ND F2	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Nitrogen/Nitrate	10.0	0.10	2.9	0.10	4.1	0.10	2.7	0.10	4.5	0.10	4.1	0.10	0.78	0.1	1.6	0.1	1.8	0.1	4.1	0.1	3.6	0.1	1.7	0.1	3.4	0.1	3.7	0.1	1.2	0.1	0.71	0.1	2.4	0.1	2.1	0.1	4.1	0.1	6.3	0.1	9.5	0.1	7.9	0.1	3.4
Nitrogen/Nitrate, Nitr	NA	0.20	2.9	0.50	4.1	0.50	2.7	0.50	4.5	0.50	4.1	0.10	0.78	0.1	1.6	0.1	1.8	0.5	4.1	0.2	3.6	0.1	1.7	0.2	3.4	0.5	3.7	0.1	1.2	0.1	0.71	0.5	2.4	0.5	2.1	0.5	4.1	1	6.3	0.5	9.5	0.5	7.9	0.5	3.4
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^1+	0.02	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND F1	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND F2	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	20	73	10	54	10	39	10	53	10	50	25	60	20	57	25	83	20	45	20	57	20	66	10	33	1	24	5	30	5	38	5	43	5	39	5	37 H	25	68	15	65	15	51	10	39
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND F1	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solid	1,200	10	440	10	470	10	370	10	470	10	510	10	500	10	420	10	530	10	490	10	500	10	560	10	480	10	400	10	440	10	420	10	420	10	380	10	390	30	450	10	340	10	540	10	300
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	0.00077	0.0025	0.00068	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00066	0.0025	0.0015	0.0025	0.0007	0.0025	0.00062	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.28	NA	7.33	NA	7.29	NA	7.50	NA	6.18	NA	7.99	NA	7.40	NA	7.10	NA	7.10	NA	7.71	NA	7.09	NA	7.83	NA	7.82	NA	7.60	NA	7.13	NA	7.66	NA	7.43	NA	7.33	NA	6.96	NA	7.78	NA	7.65	NA	7.70
Temperature	NA	NA	5.47	NA	11.12	NA	10.65	NA	11.20	NA	5.17	NA	10.37	NA	15.30	NA	12.19	NA	5.33	NA	14.74	NA	19.91	NA	12.91	NA	1.60	NA	4.90	NA	15.20	NA	13.75	NA	6.80	NA	10.10	NA	17.90	NA	9.50	NA	2.40	NA	12.30
Conductivity	NA	NA	0.47	NA	0.55	NA	0.56	NA	0.53	NA	0.50	NA	0.56	NA	0.64	NA	0.57	NA	0.45	NA	0.51	NA	0.63	NA	0.57	NA	0.70	NA	0.48	NA	0.13	NA	0.71	NA	0.33	NA	0.64	NA	0.84	NA	0.84	NA	0.50	NA	0.76
Dissolved Oxygen	NA	NA	4.93	NA	2.58	NA	1.89	NA	6.05	NA	5.00	NA	3.26	NA	0.79	NA	6.57	NA	10.49	NA	5.03	NA	5.17	NA	8.30	NA	8.28	NA	4.19	NA	0.45	NA	0.61	NA	1.11	NA	0.55	NA	1.03	NA	5.30	NA	11.49	NA	0.68
ORP	NA	NA	36.9	NA	27.6	NA	-32.8	NA	13.2	NA	235.1	NA	-51.6	NA	45.5	NA	2.6	NA	19.4	NA	-6.7	NA	39.7	NA	16.6	NA	91.4	NA	116.0	NA	108.7	NA	-65.1	NA	44.5	NA	60.2	NA	135.3	NA	168.3	NA	140.7	NA	132.7

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater. All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit; NA - Not Applicable; ND - Not Detected; NM - Not Measured; NR - Not Required; NS - Not Sampled; H - Prepped/analyzed past hold time; V - Serial Dilution Exceeds Control Limits; F1- MS and/or MSD Recovery outside of limits.; F2- MS/MSD RPD exceeds control limits.; ^1+ - Initial Calibration Verification is outside acceptance limits, high biased; ^+ - Continuing Calibration Verification is outside acceptance limits, high biased; ^ - Denotes instrument related QC exceeds the control limits; * - Median Value (for temp); * - LCS or LCSD is outside acceptance limits

Temperature °C degrees Celcius; Conductivity ms/cm² millisiemens/centimeters; Dissolved Oxygen mg/L milligrams/liter; Oxygen Reduction Potential (ORP) mV millivolts

Sample: MW-03

Sample: MW-03	11/17/2015		2/23/2016		5/17/2016		8/16/2016		11/15/2016		2/14/2017		5/1/2017		8/23/2017		11/7/2017		3/6/2018		5/15/2018		8/7/2018		10/30/2018		2/26/2019		4/30/2019		8/26/2019		11/12/2019		2/24/2020		5/19/2020		8/10/2020		12/9/2020		2/22/2021		5/11/2021	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.003	0.003	0.003	ND	0.003	ND	0.0030	ND	0.003	ND	0.003	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.0010	ND	0.0010	0.0014	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND ^	0.0010	ND	0.001	0.0039	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.0011	0.001	ND	0.001	0.0012	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Barium	0.0025	0.061	0.0025	0.042	0.0025	0.051	0.0025	0.058	0.0025	0.054	0.0025	0.059	0.0025	0.057	0.0025	0.059	0.0025	0.067	0.0025	0.052	0.0025	0.056	0.0025	0.072	0.0025	0.054	0.0025	0.049	0.0025	0.058	0.0025	0.071	0.0025	0.075	0.0025	0.063	0.0025	0.053	0.0025	0.056	0.0025	0.081	0.0025	0.088	0.0025	0.076
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND ^1+	0.001	ND ^+	0.001	ND ^+
Boron	0.050	0.30	0.050	0.42	0.050	0.28	0.050	0.30	0.050	0.31	0.050	0.19	0.050	0.24	0.05	0.38	0.05	0.3	0.05	0.085	0.05	0.33	0.05	0.34	0.05	0.18	0.05	ND	0.05	0.27	0.05	0.28	0.05	0.3	0.05	0.3	0.05	0.15	0.05	0.49	0.05	0.76	0.05	0.6	0.05	0.18
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND ^	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	2.0	43	2.0	46	2.0	46	2.0	44	2.0	39	2.0	47	2.0	55	2	52	2	63	2	55	2	68	2	67	2	44	2	56	2	48	2	51	2	50	2	53	10	49	2	47	2	44	4	53	4	49
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	0.10	0.29	0.10	0.23	0.10	0.20	0.10	0.22	0.10	0.24	0.10	0.24	0.10	0.21	0.1	0.29	0.1	0.26	0.1	0.24	0.1	0.23	0.1	0.23	0.1	0.26	0.1	0.25	0.1	0.23	0.1	0.25	0.1	0.27	0.1	0.25	0.1	0.3	0.1	0.26	0.1	0.29	0.1	0.24	0.1	0.19 H
Iron	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	0.0031	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.014	0.0025	0.0036	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Nitrogen/Nitrate	0.10	0.19	0.10	0.95	0.10	0.70	0.10	0.98	0.10	3.7	0.10	4.6	0.10	1.2	0.1	ND	0.1	2.3	0.1	4	0.1	0.41	0.1	0.22	0.1	1	0.1	3.7	0.1	0.22	0.1	ND	0.1	0.46	0.1	ND	0.1	4.6	0.1	0.39	0.1	4.3	0.1	6.1	0.1	4.1
Nitrogen/Nitrate, Nitr	0.10	0.19	0.10	0.95	0.10	0.70	0.10	0.98	0.20	3.7	0.50	4.6	0.10	1.2	0.1	ND	0.2	2.3	0.5	4	0.1	0.41	0.1	0.22	0.1	1	0.5	3.7	0.1	0.22	0.1	ND	0.1	0.46	0.1	ND	0.5	4.6	0.1	0.39	0.5	4.3	0.5	6.1	0.5	4.1
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^1+	0.02	ND
Perchlorate	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	ND	0.0025	0.0025	0.0025	ND	0.0025	0.0044	0.0025	ND	0.0025	0.0036	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0032	0.0025	ND
Silver	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	20	50	20	77	20	78	20	74	10	46	10	50	20	54	20	42	20	56	10	64	25	55	20	53	5	29	25	27	5	39	5	15	5	32	5	71	5	34	5	43	25	59	25	54	5	40
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solid	10	380	10	400	10	450	10	530	10	450	10	460	10	510	10	410	10	460	10	400	10	510	10	530	10	410	10	400	10	420	10	420	10	390	10	410	10	340	30	350	10	410	10	520	10	370
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.00050	0.002	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	0.0011	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	0.0054	0.0025	ND	0.0025	0.00074	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0019	0.0025	ND	0.0025	0.01403	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.12	NA	7.41	NA	6.99	NA	7.23	NA	7.33	NA	7.49	NA	7.54	NA	7.44	NA	7.04	NA	7.05	NA	7.53	NA	6.60	NA	7.84	NA	7.49	NA	7.17	NA	7.17	NA	7.55	NA	7.10	NA	7.09	NA	7.00	NA	7.46	NA	7.34	NA	7.33
Temperature	NA	19.09	NA	6.10	NA	8.82	NA	15.65	NA	14.93	NA	11.71	NA	11.66	NA	19.50	NA	13.80	NA	5.20	NA	12.94	NA	18.21	NA	14.63	NA	2.80	NA	10.50	NA	25.0	NA	19.0	NA	10.0	NA	12.0	NA	21.5	NA	17.8	NA	13.9	NA	7.2
Conductivity	NA	0.60	NA	0.44	NA	0.49	NA	0.59	NA	0.53	NA	0.55	NA	0.55	NA	0.65	NA	0.54	NA	0.40	NA	0.49	NA	0.64	NA	0.51	NA	0.72	NA	0.44	NA	0.73	NA	0.72	NA	0.71	NA	0.19	NA	0.42	NA	0.25	NA	0.68	NA	0.73
Dissolved Oxygen	NA	1.01	NA	9.60	NA	3.67	NA	2.52	NA	3.56	NA	2.04	NA	5.97	NA	0.37	NA	4.39	NA	7.28	NA	5.43	NA	5.89	NA	4.20	NA	8.66	NA	4.53	NA	0.24	NA	0.43	NA	0.30	NA	3.61	NA	0.28	NA	1.15	NA	1.12	NA	5.90
ORP	NA	92.5	NA	36.1	NA	70.1	NA	2.8	NA	22.1	NA	118.3	NA	-1.0	NA	180.9	NA	-15.5	NA	15.7	NA	21.1	NA	60.7	NA	9.6	NA	116.4	NA	117.8	NA	30.3	NA	-50.3	NA	147.8	NA	53.2	NA	77.8	NA	148.9	NA	148.2	NA	143.3

Sample: MW-04

Parameter	Standards	12/15/2010		3/25/2011		6/16/2011		9/19/2011		12/12/2011		3/19/2012		6/25/2012		9/18/2012		12/12/2012		2/27/2013		5/29/2013	
		DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND	0.003	ND	0.0030	ND
Arsenic	0.010	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.0012	0.0050	ND	0.001	ND	0.0010	ND
Barium	2.0	NP	0.055	0.001	0.052	0.001	0.058	0.001	0.041	0.001	0.048	0.001	0.043	0.001	0.04	0.001	0.07	0.040	0.09	0.001	0.054	0.0025	0.030
Beryllium	0.004	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0010	ND ^
Boron	2.0	NP	0.77	0.01	0.83	0.01	0.33	0.01	0.84	0.01	0.79	0.01	0.78	0.01	0.83	0.01	0.76	0.40	0.74	0.01	0.97	0.050	0.23
Cadmium	0.005	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.00050	ND
Chloride	200.0	NP	150	10	77	10	43	25	86	1.0	8.1	10	58	10	75	25	110	25	130	10	90	2.0	54
Chromium	0.1	NP	0.0045	0.004	ND	0.004	ND	0.004	0.0044	0.004	ND	0.004	ND	0.004	ND	0.004	0.0045	0.0030	0.01	0.004	0.0052	0.0050	ND
Cobalt	1.0	NP	ND	0.002	0.0026	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.0030	ND	0.002	ND	0.0010	ND
Copper	0.65	NP	ND	0.003	ND	0.003	ND	0.003	0.0033	0.003	0.01	0.003	ND	0.003	ND	0.003	ND	0.010	ND	0.003	ND	0.0020	ND
Cyanide	0.2	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.010	ND
Fluoride	4.0	NP	0.3	0.25	0.39	0.25	0.43	0.25	0.31	0.25	ND	0.25	ND	0.25	ND	0.25	0.26	0.25	0.29	0.25	ND	0.10	0.39
Iron	5.0	NP	ND	0.010	0.017	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	0.14	0.01	0.059	0.10	ND
Lead	0.0075	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0050	ND	0.001	ND	0.00050	ND
Manganese	0.15	NP	0.77	0.001	0.68	0.001	0.41	0.001	0.69	0.001	0.35	0.001	0.089	0.001	0.26	0.001	0.50	0.0020	0.027	0.001	0.007	0.0025	ND
Mercury	0.002	NP	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND
Nickel	0.1	NP	0.012	0.005	0.012	0.005	0.0067	0.005	0.011	0.005	0.01	0.005	0.0055	0.005	0.0074	0.005	0.0095	0.010	ND	0.005	ND	0.0020	ND
Nitrogen/Nitrate	10.0	NP	0.34	0.02	0.73	0.20	2.7	0.02	0.06	0.02	0.07	0.02	0.65	0.02	1.1	0.02	0.46	0.02	1.0	0.02	1.8	0.10	ND
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.10	ND
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0040	ND
Selenium	0.05	NP	0.0022	0.001	0.0037	0.001	0.0022	0.001	0.0039	0.001	0.002	0.001	0.0085	0.001	0.0035	0.001	0.0032	0.0050	ND	0.001	0.013	0.0025	ND
Silver	0.05	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND	0.005	ND	0.00050	ND
Sulfate	400.0	NP	110	25	140	10	48	25	61	1.0	6.7	50	160	10	94	25	170	25	150	50	130	20	92
Thallium	0.002	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0020	ND
Total Dissolved Soli	1,200	NP	680	17	620	17	470	17	580	17	520	17	660	17	600	17	800	26	720	26	640	10	350
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0080	ND	0.005	ND	0.0050	ND
Zinc	5.0	NP	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.020	ND	0.006	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.005	ND	0.005	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.03	ND	0.03	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.27	NA	7.48	NA	7.26	NA	7.22	NA	6.37	NA	7.24	NA	7.04	NA	7.13	NA	7.14	NA	7.37	NA	7.30
Temperature	NA	NA	16.30	NA	13.33	NA	17.54	NA	19.07	NA	16.35	NA	12.99	NA	18.12	NA	16.51	NA	14.11	NA	13.20	NA	21.84
Conductivity	NA	NA	1.29	NA	1.06	NA	0.75	NA	0.91	NA	0.76	NA	0.76	NA	0.83	NA	1.05	NA	0.98	NA	0.92	NA	0.58
Dissolved Oxygen	NA	NA	NM	NA	3.93	NA	0.26	NA	0.18	NA	0.20	NA	1.43	NA	0.33	NA	0.46	NA	4.01	NA	5.93	NA	0.47
ORP	NA	NA	NM	NA	116.5	NA	202.6	NA	-228	NA	51	NA	212	NA	124	NA	119	NA	130	NA	170.3	NA	-90.1

Parameter	Standards	7/31/2013		10/21/2013		3/5/2014		5/27/2014		8/25/2014		10/27/2014		2/25/2015		5/13/2015		8/17/2015		11/17/2015		2/23/2016		5/17/2016		8/16/2016		11/15/2016	
		DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Barium	2.0	0.0025	0.048	0.0025	0.062	0.0025	0.039	0.0025	0.054	0.0025	0.055	0.0025	0.070	0.0025	0.025	0.0025	0.025	0.0025	0.027	0.0025	0.030	0.0025	0.028	0.0025	0.037	0.0025	0.035	0.0025	0.026
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.050	0.67	0.050	0.81	0.050	0.81	0.050	0.94	0.050	1.0	0.050	0.77	0.050	0.94	0.050	0.80	0.050	0.44	0.050	0.51	0.050	0.43	0.050	0.60	0.050	0.90	0.10	0.79
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	2.0	70	10	150	10	130	10	92	10	95	10	96	10	74	2.0	65	2.0	47	2.0	74	2.0	47	2.0	60	2.0	59	2.0	53
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	0.0024	0.0020	0.0025	0.0020	ND^	0.0020	ND	0.0020	0.0021	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0021	0.0020	ND	0.0020	ND	0.0020	0.0020	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.31	0.10	0.21	0.10	0.29	0.10	0.23	0.10	0.25	0.10	0.21	0.10	0.32	0.10	0.26	0.10	0.30	0.10	0.26	0.10	0.22	0.10	0.25	0.10	0.28	0.10	0.27
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.13	0.0025	0.27	0.0025	0.026	0.0025	0.029	0.0025	0.24	0.0025	0.075	0.0025	0.018	0.0025	ND	0.0025	0.015	0.0025	0.14	0.0025	ND	0.0025	0.0041	0.0025	0.025	0.0025	0.22
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0023	0.0020	0.0039	0.0020	ND	0.0020	ND	0.0020	0.0024	0.0020	0.0020	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0021	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	0.50	0.10	ND	0.10	ND	0.10	ND	0.10	0.14	0.10	0.30	0.10	ND	0.10	ND	0.10	0.85	0.10	0.45	0.10	ND	0.10	1.3	0.10	ND
Nitrogen/Nitrate, Nitr	NA	0.10	ND	0.10	0.50	0.10	ND	0.10	ND	0.10	ND	0.10	0.14	0.10	0.30	0.10	ND	0.10	ND ^	0.10	0.85	0.10	0.45	0.10	ND	0.10	1.3	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0033	0.0025	ND	0.0025	ND	0.0025	ND ^
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	50	190	100	260	50	200	100	320	50	260	100	390	25	100	20	120	10	47	25	75	20	74	20	65	20	61	10	30
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	670	10	980	10	780	10	980	10	880	10	1100	10	580	10	540	10	470	10	550	10	420	10	480	10	590	10	510
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.0017	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0056	0.0025	0.00069	0.0025	0.0013	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.02	NA	7.00	NA	8.00	NA	7.04	NA	7.06	NA	7.20	NA	7.63	NA	7.30	NA	7.37	NA	6.72	NA	7.28	NA	7.09	NA	7.07	NA	7.12
Temperature	NA	NA	26.31	NA	16.83	NA	11.96	NA	17.48 *	NA	24.18	NA	20.48	NA	8.95	NA	13.52	NA	24.79	NA	16.54	NA	6.06	NA	14.14	NA	21.42	NA	17.30
Conductivity	NA	NA	1.08	NA	1.15	NA	0.81	NA	1.20	NA	1.36	NA	1.62	NA	0.72	NA	0.73	NA	0.79	NA	0.77	NA	0.48	NA	0.67	NA	0.77	NA	0.68
Dissolved Oxygen	NA	NA	0.24	NA	0.53	NA	1.63	NA	2.01	NA	1.23	NA	0.83	NA	1.97	NA	3.05	NA	1.31	NA	6.90	NA	9.71	NA	0.94	NA	2.20	NA	2.26
ORP	NA	NA	4.1	NA	-169.7	NA	-57	NA	13.7	NA	53.5	NA	22.9	NA	22.5	NA	72.4	NA	-32.1	NA	88.4	NA	43.8	NA	43.3	NA	-95.2	NA	-43.9

Parameter	Standards	2/14/2017		5/1/2017		8/28/2017		11/7/2017		3/6/2018		5/15/2018		8/7/2018		10/30/2018		2/26/2019		4/30/2019		8/26/2019		11/12/2019		2/24/2020		4/28/2020		8/10/2020		12/9/2020		2/22/2021		5/11/2021	
		DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Barium	2.0	0.0025	0.022	0.0025	0.029	0.0025	0.026	0.0025	0.046	0.0025	0.057	0.0025	0.033	0.0025	0.03	0.0025	0.048	0.0025	0.025	0.0025	0.024	0.0025	0.034	0.0025	0.028	0.0025	0.024	0.0025	0.024	0.0025	0.03	0.0025	0.033	0.0025	0.032	0.0025	0.024
Beryllium	0.004	0.0010	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^1+	0.001	ND ^+	0.001	ND ^+
Boron	2.0	0.050	0.48	0.050	0.55	0.05	0.69	0.05	0.51	0.05	0.099	0.05	0.63	0.05	0.74	0.05	0.53	0.05	0.35	0.05	0.37	0.05	0.58	0.05	0.25	0.05	0.32	0.05	0.52	0.05	0.69	0.05	0.5	0.05	0.47	0.05	0.56
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	2.0	56	2.0	58	10	77	10	93	10	81	2	68	2	69	10	86	2	55	2	47	2	58	2	53	2	51	2	50	2	56	10	88	6	62	4	44
Chromium	0.1	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	0.0023	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.01	ND H	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	4.0	0.10	0.25	0.10	0.19	0.1	0.29	0.1	0.21	0.1	0.26	0.1	0.27	0.1	0.33	0.1	0.24	0.1	0.26	0.1	0.25	0.1	0.24	0.1	0.27	0.1	0.22	0.1	0.25	0.1	0.25	0.1	0.32	0.1	0.31	0.1	0.30 H
Iron	5.0	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.19	0.0025	ND	0.0025	0.46	0.0025	0.025	0.0025	ND	0.0025	ND	0.0025	0.054	0.0025	0.013	0.0025	0.033	0.0025	ND	0.0025	0.086	0.0025	0.1	0.0025	0.041	0.0025	0.0098	0.0025	0.024	0.0025	0.22	0.0025	0.059	0.0025	0.0036
Mercury	0.002	0.00020	ND	0.00020	ND	0.0002	0.0002	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.002	0.0029	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	0.0022	0.002	ND	0.002	ND
Nitrogen/Nitrate	10.0	0.10	0.64	0.10	0.38	0.1	ND	0.1	1.5	0.1	4.2	0.1	ND	0.1	ND	0.1	0.44	0.1	0.18	0.1	ND	0.1	ND	0.1	ND	0.1	0.1	0.1	ND	0.1	ND	0.1	0.23	0.1	0.36	0.1	ND
Nitrogen/Nitrate, Nitr	NA	0.10	0.64	0.10	0.38	0.1	ND	0.1	1.5	0.5	4.2	0.1	ND	0.1	ND	0.1	0.44	0.1	0.18	0.1	ND	0.1	ND	0.1	ND	0.1	0.1	0.1	ND	0.1	ND	0.1	0.23	0.1	0.36	0.1	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^1+	0.02	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	0.0049	0.0025	0.0026	0.0025	ND	0.0025	0.0071	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	20	68	25	67	25	80	50	120	10	50	25	100	20	50	50	100	50	59	5	36	5	15	5	66	5	71	5	54 ^	5	23	15	97	15	86	15	80
Thallium	0.002	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	510	10	540	10	640	10	700	10	410	10	650	10	460	10	710	10	450	10	380	10	520	10	440	10	390	10	380	30	420	10	530	10	560	10	430
Vanadium	0.049	0.0050	ND	0.0050	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^	0.02	0.035	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00722	0.0025	0.0015	0.0025	0.00097	0.0025	0.004	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.21	NA	7.34	NA	7.13	NA	6.80	NA	7.19	NA	7.63	NA	6.72	NA	7.55	NA	7.18	NA	7.08	NA	7.08	NA	7.78	NA	7.05	NA	7.03	NA	6.92	NA	7.10	NA	7.23	NA	7.22
Temperature	NA	NA	12.11	NA	12.10	NA	20.80	NA	13.71	NA	7.31	NA	15.20	NA	21.89	NA	17.42	NA	8.90	NA	11.70	NA	25.10	NA	18.93	NA	6.70	NA	12.50	NA	23.60	NA	16.60	NA	13.20	NA	13.50
Conductivity	NA	NA	0.64	NA	0.61	NA	0.80	NA	0.71	NA	0.43	NA	0.56	NA	0.75	NA	0.85	NA	0.83	NA	0.44	NA	0.91	NA	0.72	NA	0.65	NA	0.23	NA	0.77	NA	0.19	NA	0.73	NA	0.72
Dissolved Oxygen	NA	NA	2.91	NA	5.49	NA	0.42	NA	5.10	NA	2.30	NA	8.73	NA	2.47	NA	1.28	NA	1.00	NA	2.32	NA	3.98	NA	6.90	NA	2.92	NA	2.51	NA	5.96	NA	1.92	NA	4.10	NA	3.07
ORP	NA	NA	57.7	NA	-4.5	NA	196.4	NA	-5.5	NA	-10.1	NA	5.0	NA	51.2	NA	-7.4	NA	107.7	NA	117.8	NA	15.9	NA	-56.0	NA	138.9	NA	62.1	NA	111.5	NA	60.5	NA	143.4	NA	136.2

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
H - Prepped/analyzed past hold time
V - Serial Dilution Exceeds Control Limits

F1- MS and/or MSD Recovery outside of limits.
F2- MS/MSD RPD exceeds control limits.
^1+ - Initial Calibration Verification is outside acceptance limits, high biased
^+ - Continuing Calibration Verification is outside acceptance limits, high biased

^ - Denotes instrument related QC exceeds the control limits
* - Median Value (for temp)
* - LCS or LCSD is outside acceptance limits

Temperature °C degrees Celcius
Conductivity ms/cm[c] millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

Sample: MW-05

Parameter	Standards	12/15/2010		3/25/2011		6/16/2011		9/19/2011		12/12/2011		3/19/2012		6/25/2012		9/18/2012		12/12/2012		2/27/2013		5/29/2013	
		DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND	0.003	ND	0.0030	ND
Arsenic	0.010	NP	0.0011	0.001	ND	0.001	ND	0.001	ND	0.001	0.001	0.001	ND	0.001	ND	0.001	ND	0.0050	ND	0.001	ND	0.0010	ND
Barium	2.0	NP	0.053	0.001	0.048	0.001	0.046	0.001	0.071	0.001	0.065	0.001	0.054	0.001	0.058	0.001	0.066	0.040	0.077	0.001	0.061	0.0025	0.089
Beryllium	0.004	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0010	ND ^
Boron	2.0	NP	0.95	0.01	0.93	0.01	0.79	0.01	0.79	0.01	0.77	0.01	0.82	0.01	0.74	0.01	0.65	0.40	0.66	0.01	0.66	0.050	0.70
Cadmium	0.005	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.00050	ND
Chloride	200.0	NP	150	25	120	10	89	25	160	25	140	10	82	50	100	50	150	25	170	50	110	10	92
Chromium	0.1	NP	0.0044	0.004	0.0042	0.004	ND	0.004	0.0066	0.004	ND	0.004	ND	0.004	ND	0.004	0.0058	0.0030	0.0049	0.004	0.0053	0.0050	ND
Cobalt	1.0	NP	0.0025	0.002	0.0023	0.002	ND	0.002	0.0027	0.002	0.0022	0.002	ND	0.002	ND	0.002	0.002	0.0030	ND	0.002	ND	0.0010	0.0022
Copper	0.65	NP	ND	0.003	ND	0.003	ND	0.003	0.0036	0.003	0.0061	0.003	ND	0.003	0.0031	0.003	ND	0.010	ND	0.003	ND	0.0020	ND
Cyanide	0.2	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.010	ND
Fluoride	4.0	NP	0.27	0.25	0.36	0.25	0.43	0.25	0.25	0.25	ND	0.25	ND	0.25	ND	0.25	0.32	0.25	0.32	0.25	ND	0.10	0.23
Iron	5.0	NP	0.13	0.010	0.050	0.010	0.046	0.010	0.082	0.010	0.036	0.010	ND	0.010	ND	0.010	ND	0.010	0.43	0.01	0.052	0.10	0.20
Lead	0.0075	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0050	ND	0.001	ND	0.00050	ND
Manganese	0.15	NP	0.51	0.001	0.49	0.001	0.48	0.001	0.64	0.001	0.50	0.001	0.26	0.001	0.41	0.001	1.00	0.040	0.59	0.001	0.21	0.0025	0.67
Mercury	0.002	NP	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND
Nickel	0.1	NP	0.014	0.005	0.013	0.005	0.0077	0.005	0.014	0.005	0.014	0.005	0.008	0.005	0.0095	0.005	0.013	0.010	ND	0.005	0.009	0.0020	0.0055
Nitrogen/Nitrate	10.0	NP	ND	0.02	ND	0.02	0.08	0.02	ND	0.02	ND	0.02	1.6	0.02	0.04	0.02	0.04	0.02	0.04	0.02	0.19	0.10	ND
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.10	ND
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0040	ND
Selenium	0.05	NP	0.0019	0.001	0.003	0.001	ND	0.001	0.0045	0.001	0.0023	0.001	0.0028	0.001	0.0033	0.001	0.0031	0.0050	ND	0.001	0.0029	0.0025	ND
Silver	0.05	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND	0.005	ND	0.00050	ND
Sulfate	400.0	NP	160	25	170	25	110	25	250	25	170	25	120	50	130	50	200	25	200	50	180	100	310
Thallium	0.002	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0020	ND
Total Dissolved Soli	1,200	NP	740	17	680	17	640	17	890	17	820	17	590	17	700	17	890	26	840	26	790	10	990
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0080	ND	0.005	ND	0.0050	ND
Zinc	5.0	NP	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.020	ND	0.006	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.005	ND	0.005	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.03	ND	0.03	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.24	NA	7.36	NA	7.29	NA	7.05	NA	6.34	NA	7.14	NA	7.00	NA	6.94	NA	6.94	NA	8.01	NA	6.87
Temperature	NA	NA	14.80	NA	14.35	NA	15.83	NA	15.80	NA	15.64	NA	17.03	NA	16.99	NA	16.03	NA	14.38	NA	14.50	NA	16.36
Conductivity	NA	NA	1.33	NA	1.16	NA	1.00	NA	1.21	NA	1.10	NA	0.85	NA	0.94	NA	1.19	NA	1.17	NA	1.17	NA	1.14
Dissolved Oxygen	NA	NA	NM	NA	3.95	NA	0.07	NA	0.06	NA	0.06	NA	0.05	NA	0.07	NA	0.01	NA	0.46	NA	0.40	NA	0.28
ORP	NA	NA	NM	NA	110.1	NA	70.5	NA	-274	NA	-26	NA	237	NA	128	NA	152	NA	30	NA	99.2	NA	-50.9

Parameter	Standards	7/31/2013		10/21/2013		3/5/2014		5/27/2014		8/25/2014		10/27/2014		2/25/2015		5/13/2015		8/17/2015		11/17/2015		2/23/2016		5/17/2016	
		DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Barium	2.0	0.0025	0.092	0.0025	0.088	0.0025	0.059	0.0025	0.052	0.0025	0.069	0.0025	ND	0.0025	0.041	0.0025	0.055	0.0025	0.073	0.0025	0.060	0.0025	0.043	0.0025	0.051
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.050	0.64	0.050	0.83	0.050	0.70	0.050	0.76	0.050	0.71	0.050	ND	0.050	1.1	0.050	0.72	0.050	1.3	0.050	0.74	0.050	0.59	0.050	0.63
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.00050	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	150	10	170	10	120	10	80	10	140	10	120	10	79	10	120	2.0	60	10	110	2.0	54	10	88
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	0.0015	0.0010	0.0015	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	0.0027	0.0020	ND^	0.0020	ND	0.0020	0.0023	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.24	0.10	0.24	0.10	0.35	0.10	0.29	0.10	0.32	0.10	0.28	0.10	0.38	0.10	0.37	0.10	0.26	0.10	0.27	0.10	0.27	0.10	0.35
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.29	0.0025	0.62	0.0025	0.077	0.0025	0.043	0.0025	0.016	0.0025	ND	0.0025	0.058	0.0025	0.0078	0.0025	0.13	0.0025	0.084	0.0025	0.044	0.0025	0.039
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0059	0.0020	0.0068	0.0020	0.0038	0.0020	0.0036	0.0020	0.0041	0.0020	ND	0.0020	0.0025	0.0020	0.0023	0.0020	0.0051	0.0020	0.0027	0.0020	0.0032	0.0020	0.0027
Nitrogen/Nitrate	10.0	0.10	ND	0.10	0.34	0.10	0.74	0.10	2.2	0.10	0.11	0.10	0.20	0.10	0.74	0.10	ND	0.10	ND	0.10	ND	0.10	0.27	0.10	ND
Nitrogen/Nitrate, Nitr	NA	0.10	ND	0.10	0.34	0.10	0.77	0.50	2.2	0.10	0.11	0.10	0.20	0.10	0.74	0.10	ND	0.10	ND ^	0.10	ND	0.10	0.27	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	0.033	0.020	0.026	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0028	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	290	100	260	50	180	50	150	50	200	50	310	20	110	50	150	50	250	50	180	25	130	25	140
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	1000	10	1100	10	840	10	640	10	870	10	910	10	570	10	730	10	860	10	810	10	550	10	690
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.00068	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00278	0.0025	ND	0.0025	0.0011
pH	6.5 - 9.0	NA	6.82	NA	6.89	NA	7.69	NA	7.01	NA	6.86	NA	7.30	NA	7.52	NA	7.26	NA	7.35	NA	6.65	NA	7.18	NA	7.08
Temperature	NA	NA	17.75	NA	14.79	NA	12.62	NA	20.54	NA	21.14	NA	21.18	NA	5.51	NA	17.46	NA	25.42	NA	15.07	NA	11.30	NA	13.85
Conductivity	NA	NA	1.25	NA	1.33	NA	0.28	NA	1.01	NA	1.28	NA	1.38	NA	0.69	NA	1.06	NA	1.32	NA	1.06	NA	0.75	NA	0.83
Dissolved Oxygen	NA	NA	0.36	NA	0.32	NA	1.17	NA	0.53	NA	1.01	NA	2.20	NA	2.50	NA	1.54	NA	2.24	NA	1.32	NA	1.99	NA	2.58
ORP	NA	NA	55.5	NA	-197	NA	-51	NA	-59.6	NA	64.8	NA	6.8	NA	9.8	NA	23.5	NA	-27.7	NA	-4.8	NA	-103.8	NA	-65.0

Parameter	Standards	8/16/2016		11/15/2016		2/14/2017		5/1/2017		8/28/2017		11/7/2017		3/6/2018		5/15/2018		8/7/2018		10/30/2018		2/26/2019		4/30/2019		8/26/2019		11/12/2019		2/24/2020		4/28/2020		8/10/2020		12/9/2020		2/22/2021		5/11/2021	
		DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	ND	0.0010	ND	0.0010	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Barium	2.0	0.0025	0.055	0.0025	0.051	0.0025	0.052	0.0025	0.055	0.0025	0.063	0.0025	0.057	0.0025	0.072	0.0025	0.057	0.0025	0.051	0.0025	0.07	0.0025	0.054	0.0025	0.041	0.0025	0.053	0.0025	0.049	0.0025	0.055	0.0025	0.05	0.0025	0.059	0.0025	0.048	0.0025	0.045	0.0025	0.039
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^1+	0.001	ND ^+	0.001	ND ^+
Boron	2.0	0.050	0.66	0.10	0.83	0.050	0.59	0.050	0.68	0.05	0.57	0.05	0.45	0.05	0.34	0.05	0.56	0.05	0.45	0.05	0.5	0.05	0.56	0.05	0.6	0.05	0.47	0.05	0.56	0.05	0.52	0.05	0.48	0.05	0.68	0.05	0.46	0.05	0.53	0.05	0.48
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	0.00053	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	100	2.0	66	10	98	10	92	10	120	10	110	10	110	10	90	10	120	10	120	10	87	2	74	10	78	2	72	2	80	2	56	2	70	10	80	6	70	4	53
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	0.0022	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	0.0039	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND H	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	0.0069	0.005	ND
Fluoride	4.0	0.10	0.30	0.10	0.25	0.10	0.27	0.10	0.27	0.1	0.33	0.1	0.32	0.1	0.21	0.1	0.29	0.1	0.33	0.1	0.29	0.1	0.34	0.1	0.37	0.1	0.29	0.1	0.35	0.1	0.39	0.1	0.37	0.1	0.26	0.1	0.31	0.1	0.33	0.1	0.34 H
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND ^	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.015	0.0025	0.0040	0.0025	0.0068	0.0025	0.024	0.0025	0.032	0.0025	ND	0.0025	0.77	0.0025	0.015	0.0025	0.12	0.0025	ND	0.0025	0.0076	0.0025	0.039	0.0025	0.037	0.0025	0.053	0.0025	0.028	0.0025	0.03	0.0025	0.042	0.0025	0.04	0.0025	0.0084	0.0025	0.018
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.0002	0.00021	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	0.00047	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	0.0020	0.0020	ND	0.0020	ND	0.0020	0.0022	0.002	0.0027	0.002	ND	0.002	0.0039	0.002	ND	0.002	0.003	0.002	ND	0.002	ND	0.002	ND	0.002	0.0025	0.002	0.0022	0.002	0.0026	0.002	0.0022	0.002	0.0023	0.002	0.0022	0.002	ND	0.002	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	0.12	0.10	ND	0.10	ND	0.1	ND	0.1	0.22	0.1	3.7	0.1	ND	0.1	0.13	0.1	0.28	0.1	0.48	0.1	0.24	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.33	0.1	0.92
Nitrogen/Nitrate, Nitr	NA	0.10	ND	0.10	0.12	0.10	ND	0.10	ND	0.1	ND	0.1	0.22	0.2	3.7	0.1	ND	0.1	0.13	0.1	0.28	0.1	0.48	0.1	0.24	0.1	ND	0.1	ND	0.1	0.1	0.1	ND	0.1	ND	0.1	ND	0.1	0.33	0.1	0.92
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^1+	0.02	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	ND ^	0.0025	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0031	0.0025	ND	0.0025	ND	0.0025	0.0032	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	50	160	25	94	50	130	50	180	50	230	50	140	20	64	50	230	50	160	50	130	130	140	5	130	5	140	5	120	5	140	5	130 ^	25	92	15	110	25	110	15	100
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	800	10	630	10	720	10	720	10	880	10	690	10	570	10	1000	10	790	10	890	10	660	10	590	10	660	10	590	10	660	10	600	30	650	10	580	10	650	10	540
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	0.00056	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	0.0006	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0021	0.0025	0.00092	0.0025	0.00073	0.0025	0.00896	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	6.85	NA	6.96	NA	7.25	NA	7.60	NA	7.05	NA	6.87	NA	7.10	NA	7.70	NA	6.56	NA	7.57	NA	6.99	NA	6.96	NA	7.01	NA	7.85	NA	6.90	NA	6.87	NA	6.79	NA	6.91	NA	7.14	NA	7.20
Temperature	NA	NA	19.41	NA	15.32	NA	13.93	NA	12.43	NA	16.90	NA	13.03	NA	10.12	NA	16.71	NA	17.48	NA	15.77	NA	14.50	NA	14.40	NA	17.70	NA	15.40	NA	14.20	NA	13.50	NA	16.70	NA	15.00	NA	15.60	NA	14.60
Conductivity	NA	NA	1.02	NA	0.77	NA	0.87	NA	0.82	NA	1.06	NA	0.82	NA	0.63	NA	0.83	NA	1.04	NA	1.01	NA	1.13	NA	0.62	NA	0.15	NA	0.96	NA	0.34	NA	0.26	NA	1.12	NA	0.19	NA	0.86	NA	0.89
Dissolved Oxygen	NA	NA	2.88	NA	1.33	NA	1.93	NA	3.43	NA	0.49	NA	4.09	NA	1.68	NA	4.33	NA	2.17	NA	8.36	NA	0.10	NA	0.21	NA	0.35	NA	0.51	NA	0.21	NA	0.23	NA	0.20	NA	0.21	NA	1.12	NA	0.21
ORP	NA	NA	-99.8	NA	-34.7	NA	-18.4	NA	-142.5	NA	232.2	NA	-9.6	NA	-43.3	NA	-9.7	NA	41.1	NA	17.8	NA	109.7	NA	116.4	NA	139.4	NA	-58.1	NA	40.3	NA	17.0	NA	-0.9	NA	56.3	NA	146.2	NA	116.7

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
H - Prepped/analyzed past hold time
V - Serial Dilution Exceeds Control Limits

F1- MS and/or MSD Recovery outside of limits.
F2- MS/MSD RPD exceeds control limits.
^1+ - Initial Calibration Verification is outside acceptance limits, high biased
^+ - Continuing Calibration Verification is outside acceptance limits, high biased

^ - Denotes instrument related QC exceeds the control limits
* - Median Value (for temp)
* - LCS or LCSD is outside acceptance limits

Temperature °C degrees Celcius
Conductivity ms/cm[c] millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

Sample: MW-06

Parameter	Standards	12/15/2010		3/25/2011		6/16/2011		9/19/2011		12/12/2011		3/19/2012		6/25/2012		9/18/2012		12/12/2012		2/27/2013		5/29/2013	
		DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND	0.003	ND	0.0030	ND
Arsenic	0.010	NP	0.0042	0.001	0.0024	0.001	0.0029	0.001	0.0031	0.001	0.0036	0.001	0.002	0.001	0.0021	0.001	0.0022	0.0050	ND	0.001	0.0017	0.0010	0.0027
Barium	2.0	NP	0.11	0.001	0.092	0.001	0.1	0.001	0.1	0.001	0.12	0.001	0.097	0.001	0.12	0.001	0.11	0.040	0.12	0.001	0.088	0.0025	0.12
Beryllium	0.004	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0010	ND ^
Boron	2.0	NP	0.5	0.01	0.35	0.01	0.43	0.01	0.61	0.01	0.63	0.01	0.39	0.01	0.46	0.01	0.57	0.40	0.45	0.01	0.39	0.050	1.0
Cadmium	0.005	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.00050	ND
Chloride	200.0	NP	180	50	200	50	160	50	210	50	150	50	150	50	200	50	190	50	240	50	200	10	99
Chromium	0.1	NP	0.006	0.004	0.0083	0.004	0.0045	0.004	0.0085	0.004	0.0056	0.004	ND	0.004	0.0054	0.004	0.0072	0.0030	0.0077	0.004	ND	0.0050	ND
Cobalt	1.0	NP	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.0030	ND	0.002	ND	0.0010	ND
Copper	0.65	NP	ND	0.003	ND	0.003	0.0032	0.003	0.0042	0.003	ND	0.003	0.16	0.003	ND	0.003	ND	0.010	ND	0.003	ND	0.0020	ND
Cyanide	0.2	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.010	ND
Fluoride	4.0	NP	0.65	0.25	0.61	0.25	0.63	0.25	0.64	0.25	0.50	0.25	0.47	0.25	0.37	0.25	0.48	0.25	0.42	0.25	ND	0.10	0.36
Iron	5.0	NP	1.6	0.010	1.6	0.010	1.7	0.010	1.8	0.010	1.9	0.010	1.7	0.010	1.9	0.010	1.9	0.010	1.6	0.01	1.1	0.10	1.8
Lead	0.0075	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0050	ND	0.001	ND	0.00050	ND
Manganese	0.15	NP	0.68	0.001	0.68	0.001	0.63	0.001	0.66	0.001	0.63	0.001	0.61	0.001	0.71	0.001	0.64	0.040	0.61	0.001	0.50	0.0025	1.3
Mercury	0.002	NP	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND	0.0002	ND	0.00020	ND
Nickel	0.1	NP	0.0091	0.005	0.014	0.005	0.0078	0.005	0.0099	0.005	0.0089	0.005	ND	0.005	0.0095	0.005	0.011	0.010	ND	0.005	0.0062	0.0020	ND
Nitrogen/Nitrate	10.0	NP	0.037	0.02	ND	0.02	ND	0.02	0.04	0.02	0.06	0.02	ND	0.02	ND	0.02	0.04	0.02	0.06	0.02	0.02	0.10	ND
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.10	ND
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0040	ND
Selenium	0.05	NP	0.0034	0.001	ND	0.001	ND	0.001	0.0025	0.001	0.0033	0.001	ND	0.001	0.0013	0.001	0.0023	0.0050	ND	0.001	0.001	0.0025	0.0030
Silver	0.05	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND	0.005	ND	0.00050	ND
Sulfate	400.0	NP	210	50	250	50	280	50	260	50	170	50	250	50	450	50	340	50	440	50	320	130	560
Thallium	0.002	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0020	ND
Total Dissolved Soli	1,200	NP	950	17	990	17	1100	17	970	17	1000	17	1100	17	1300	17	1200	26	1200	26	1100	10	1400
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0080	ND	0.005	ND	0.0050	ND
Zinc	5.0	NP	0.0064	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	0.049	0.006	ND	0.006	ND	0.020	ND	0.006	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.005	ND	0.005	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.03	ND	0.03	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.67	NA	7.97	NA	7.62	NA	7.61	NA	7.35	NA	7.68	NA	7.59	NA	7.73	NA	7.68	NA	9.30	NA	7.23
Temperature	NA	NA	24.53	NA	16.38	NA	18.99	NA	22.40	NA	22.76	NA	20.99	NA	19.83	NA	20.30	NA	20.07	NA	14.40	NA	16.14
Conductivity	NA	NA	1.65	NA	1.63	NA	1.68	NA	1.56	NA	1.61	NA	1.54	NA	1.65	NA	1.69	NA	1.75	NA	1.49	NA	1.47
Dissolved Oxygen	NA	NA	NM	NA	0.24	NA	0.08	NA	0.10	NA	0.08	NA	0.03	NA	0.23	NA	0.02	NA	0.41	NA	0.18	NA	0.45
ORP	NA	NA	NM	NA	-137.5	NA	-161.9	NA	-236	NA	-196	NA	-176	NA	-169	NA	-183	NA	-160	NA	-85.8	NA	-97.1

Parameter	Standards	7/31/2013		10/23/2013		3/6/2014		5/29/2014		8/27/2014		10/29/2014		2/23/2015		5/11/2015		8/18/2015		11/17/2015		2/23/2016		5/17/2016	
		DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND F1	0.0030	ND
Arsenic	0.010	0.0010	0.0037	0.0010	0.0039	0.0010	0.0010	0.0010	0.20	0.0010	0.0024	0.0010	0.0016	0.0010	0.0011	0.0010	ND	0.0010	0.0025	0.0010	0.0016	0.0010	0.0019 F1	0.0010	ND
Barium	2.0	0.0025	0.12	0.0025	0.11	0.0025	0.10	0.0025	0.54	0.0025	0.11	0.0025	0.10	0.0025	0.099	0.0025	0.094	0.0025	0.12	0.0025	0.11	0.0025	0.082 F1	0.0025	0.098
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.050	0.62	0.050	0.51	0.050	0.34	0.050	0.35	0.050	0.52	0.050	0.34	0.050	0.34	0.050	0.35	0.050	0.75	0.050	0.51	0.050	0.40 F1	0.050	0.34
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND F1	0.00050	ND
Chloride	200.0	10	200	10	210	10	230	10	230	10	230 ^	10	240	10	110	10	230	10	170	10	210	10	200	10	200 F1
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND F1	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	0.0068	0.0010	ND	0.0010	ND	0.0010	0.0013	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND F1	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND^	0.0020	ND	0.0020	ND ^	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND F1	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.56	0.10	0.64	0.10	0.42	0.10	0.53	0.10	0.74	0.10	0.79	0.10	0.48	0.10	0.52	0.10	0.56	0.10	0.64	0.10	0.58	0.10	0.48
Iron	5.0	0.10	2.2	0.10	1.8	0.10	1.5	0.10	22	0.10	1.0	0.10	0.81	0.10	1.0	0.10	0.29	0.10	1.8	0.10	1.4	0.10	1.6 F1	0.10	0.15
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.00082	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND F1	0.00050	ND
Manganese	0.15	0.0025	0.70	0.0025	0.58	0.0025	0.68	0.013	8.0	0.0025	0.71	0.0025	0.57	0.0025	0.86	0.0025	0.90	0.0025	1.2	0.0025	0.98	0.0025	0.87 F1	0.0025	0.85
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	0.0020	0.0020	ND	0.0020	0.0061	0.0020	ND	0.0020	ND	0.0020	0.0024	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0020	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	0.16	0.10	ND	0.10	ND	0.10	ND	0.10	0.11	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitr	NA	0.10	ND	0.10	0.16	0.10	ND	0.10	ND	0.10	ND	0.10	0.11	0.10	ND	0.10	ND	0.10	ND ^	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	0.0065	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND F1	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND F1	0.00050	ND
Sulfate	400.0	100	440	100	310	100	410	100	530	100	300	100	380	100	360	100	350	100	400	100	490	100	390	250	500
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND F1	0.0020	ND
Total Dissolved Soli	1,200	10	1200	10	1100	10	1100	10	1400	10	1300	10	1100	10	1100	10	1300	10	1400	10	1100	10	1100	10	1400
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND F1	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0013	0.0025	0.00061	0.0025	0.00053
pH	6.5 - 9.0	NA	7.37	NA	7.55	NA	8.21	NA	7.45	NA	7.73	NA	7.60	NA	8.05	NA	7.76	NA	7.94	NA	7.46	NA	7.68	NA	7.47
Temperature	NA	NA	24.20	NA	23.30	NA	10.06	NA	19.41 *	NA	26.15	NA	19.31	NA	7.20	NA	17.91	NA	21.94	NA	18.66	NA	13.60	NA	15.26
Conductivity	NA	NA	1.71	NA	1.74	NA	1.01	NA	1.84	NA	1.91	NA	2.36	NA	1.17	NA	1.67	NA	1.99	NA	1.58	NA	1.31	NA	1.56
Dissolved Oxygen	NA	NA	0.14	NA	0.26	NA	1.24	NA	0.80	NA	0.39	NA	0.32	NA	0.96	NA	1.57	NA	1.60	NA	1.20	NA	0.64	NA	0.83
ORP	NA	NA	-180.4	NA	-233.2	NA	-168.8	NA	-25.3	NA	-143.4	NA	-126.7	NA	-147.7	NA	-73.6	NA	-142.7	NA	-90.4	NA	-96.8	NA	-58.8

Parameter	Standards	8/16/2016		11/16/2016		2/16/2017		5/2/2017		8/24/2017		11/8/2017		3/6/2018		5/18/2018		8/10/2018		10/29/2018		2/25/2019		5/1/2019		8/27/2019		11/12/2019		2/25/2020		4/27/2020		8/11/2020		12/9/2020		2/23/2021		5/10/2021	
		DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.003	0.0033	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	ND	0.0010	0.0022	0.0010	ND	0.0010	ND	0.001	0.0016	0.001	0.0015	0.001	ND	0.001	ND	0.001	0.0014	0.001	ND	0.001	ND	0.001	0.0017	0.001	0.0023	0.001	0.0022	0.001	ND	0.001	ND ^	0.001	0.0016	0.001	0.0017	0.001	0.0011	0.001	ND
Barium	2.0	0.0025	0.090	0.0025	0.090	0.0025	0.079	0.0025	0.077	0.0025	0.097	0.0025	0.098	0.0025	0.071	0.0025	0.072	0.0025	0.1	0.0025	0.083	0.0025	0.071	0.0025	0.073	0.0025	0.081	0.0025	0.07	0.0025	0.055	0.0025	0.063	0.0025	0.062	0.0025	0.052	0.0025	0.049	0.0025	0.047
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^1+	0.001	ND ^+	0.001	ND ^+
Boron	2.0	0.050	0.41	0.050	0.36	0.050	0.29	0.050	0.36	0.05	0.36	0.05	0.3	0.05	0.3	0.05	0.39	0.05	0.36	0.05	0.31	0.05	0.24	0.05	0.33	0.05	0.35	0.05	0.26	0.05	0.22	0.05	0.31	0.05	0.49	0.05	0.23	0.05	0.25	0.05	0.32
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	210	10	180 F1	10	190	10	180	10	180	10	180	10	180	10	170	10	190	10	170	10	170	10	180	10	160	10	150	10	150	10	140	10	140	10	140	10	130	10	130
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND F1 F2	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	4.0	0.10	0.60	0.10	0.50	0.10	0.26	0.10	0.31	0.1	0.62	0.1	0.6	0.1	0.36	0.1	0.37	0.1	0.55	0.1	0.6	0.1	0.43	0.1	0.42	0.1	0.49	0.1	0.51	0.1	0.46	0.1	0.42	0.1	0.47	0.1	0.57	0.1	0.41	0.1	0.44 H F1
Iron	5.0	0.10	ND	0.10	1.1	0.10	1.4	0.10	ND	0.1	1.2	0.1	1.5	0.1	0.94	0.1	ND	0.1	1	0.1	0.47	0.1	1.2	0.1	1.8	0.1	1.1	0.1	0.87	0.1	1.4	0.1	1.1	0.1	0.65	0.1	1.2	0.1	1	0.1	0.45
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.57	0.0025	0.79	0.0025	1.0	0.0025	0.086	0.0025	0.73	0.0025	0.95	0.0025	1.1	0.0025	0.48	0.0025	1	0.0025	0.75	0.0025	0.78	0.0025	1.1	0.0025	0.77	0.0025	0.73	0.0025	0.7	0.0025	0.7	0.0025	0.57	0.0025	0.57	0.0025	0.66	0.0025	0.47
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	0.19	0.1	ND	0.1	ND	0.1	0.11	0.1	0.22	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.13 H
Nitrogen/Nitrate, Nitr	NA	0.10	ND	0.10	ND	0.10	ND	0.10	0.19	0.1	ND	0.1	ND	0.1	0.11	0.1	0.22	0.1	ND	0.1	ND	0.1	ND	0.1	ND ^	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.13
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	0.037	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND ^	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	ND ^	0.0025	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0036	0.0025	ND	0.0025	ND	0.0025	0.0063	0.0025	ND	0.0025	0.012	0.0025	0.0025	0.0025	ND	0.0025	0.0069	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	100	380	100	470	100	390	100	420	100	340	100	410	100	350	100	460	100	320	100	410	20	350	20	390	20	360 F1	20	280	20	280	50	400	100	280	50	220	50	240	50	400
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	1200	10	1100	10	1000	10	1200	10	1100	10	1100	10	1000	10	1300	10	1100	10	1100	10	1000	10	1100	10	970	10	920	10	830	10	1200	30	790	10	640	10	790	10	680
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	0.00099	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00067	0.0025	0.0014	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.31	NA	7.66	NA	7.66	NA	7.58	NA	7.38	NA	7.24	NA	7.42	NA	6.97	NA	6.96	NA	7.75	NA	7.55	NA	7.36	NA	7.52	NA	8.03	NA	7.76	NA	7.52	NA	7.50	NA	7.65	NA	7.90	NA	7.74
Temperature	NA	NA	28.74	NA	19.81	NA	12.94	NA	14.71	NA	22.90	NA	18.78	NA	8.80	NA	15.39	NA	24.22	NA	21.39	NA	12.10	NA	12.40	NA	22.80	NA	18.25	NA	10.50	NA	11.90	NA	18.90	NA	16.00	NA	10.70	NA	12.40
Conductivity	NA	NA	1.94	NA	1.43	NA	1.24	NA	1.26	NA	1.53	NA	1.43	NA	0.99	NA	1.18	NA	1.49	NA	1.37	NA	1.60	NA	1.02	NA	1.50	NA	1.35	NA	1.21	NA	0.34	NA	0.66	NA	1.21	NA	0.94	NA	1.49
Dissolved Oxygen	NA	NA	1.32	NA	1.42	NA	1.06	NA	2.84	NA	0.21	NA	1.56	NA	2.82	NA	8.16	NA	7.57	NA	7.50	NA	0.75	NA	0.19	NA	0.23	NA	0.22	NA	0.22	NA	0.24	NA	0.36	NA	0.11	NA	0.34	NA	0.20
ORP	NA	NA	-166.3	NA	-154.6	NA	-102.5	NA	-79.2	NA	-102.3	NA	-141.4	NA	-83.1	NA	-33.8	NA	-42.8	NA	-63.3	NA	-125.9	NA	-49.2	NA	-159.0	NA	-132.2	NA	-193.2	NA	-173.0	NA	-102.4	NA	-217.5	NA	-171.7	NA	37.5

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
H - Prepped/analyzed past hold time
V - Serial Dilution Exceeds Control Limits

F1- MS and/or MSD Recovery outside of limits.
F2- MS/MSD RPD exceeds control limits.
^1+ - Initial Calibration Verification is outside acceptance limits, high biased
^+ - Continuing Calibration Verification is outside acceptance limits, high biased

^ - Denotes instrument related QC exceeds the control limits
* - Median Value (for temp)
* - LCS or LCSD is outside acceptance limits

Temperature °C degrees Celcius
Conductivity ms/cm[c] millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

Sample: MW-07

Parameter	Standards	12/6/2010 DL	Result	3/25/2011 DL	Result	6/16/2011 DL	Result	9/19/2011 DL	Result	12/12/2011 DL	Result	3/19/2012 DL	Result	6/25/2012 DL	Result	9/18/2012 DL	Result	12/12/2012 DL	Result
Antimony	0.006	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND
Arsenic	0.010	NP	0.026	0.001	0.085	0.001	0.12	0.001	0.18	0.001	0.23	0.001	0.23	0.001	0.15	0.001	0.18	0.0050	0.26
Barium	2.0	NP	0.55	0.001	0.52	0.001	0.57	0.001	0.57	0.001	0.59	0.001	0.57	0.001	0.44	0.001	0.46	0.040	0.47
Beryllium	0.004	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND
Boron	2.0	NP	0.61	0.01	0.44	0.012	0.43	0.01	0.38	0.01	0.34	0.01	0.35	0.01	0.41	0.01	0.36	0.40	0.41
Cadmium	0.005	NP	0.0026	0.001	ND	0.001	0.0015	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND
Chloride	200.0	NP	170	50	200	25	140	25	130	10	81	25	99	25	130	25	130	25	150
Chromium	0.1	NP	0.0088	0.004	0.0075	0.004	0.0061	0.004	0.011	0.004	ND	0.004	ND	0.004	0.0043	0.004	0.0051	0.0030	0.028
Cobalt	1.0	NP	0.017	0.002	0.0056	0.002	0.007	0.002	0.0055	0.002	0.006	0.002	0.0067	0.002	0.011	0.002	0.009	0.0030	0.0056
Copper	0.65	NP	0.14	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.010	ND
Cyanide	0.2	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	0.0055	0.0050	ND	0.0050	ND
Fluoride	4.0	NP	0.47	0.25	0.42	0.25	0.58	0.25	0.94	0.25	0.47	0.25	0.54	0.25	0.38	0.25	0.35	0.25	0.35
Iron	5.0	NP	8.0	0.010	7.5	0.010	10	0.010	22	0.010	26	0.010	31	0.010	10	0.010	21	0.010	18
Lead	0.0075	NP	0.039	0.001	ND	0.001	0.0014	0.001	ND	0.001	ND	0.001	ND	0.001	0.0013	0.001	ND	0.0050	ND
Manganese	0.15	NP	3.5	0.001	5.9	0.001	6.4	0.001	12	0.001	12	0.001	11	0.001	9.3	0.001	8	0.040	6.7
Mercury	0.002	NP	ND	0.0002	ND	0.0002	0.00025	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND
Nickel	0.1	NP	0.045	0.005	0.021	0.005	0.022	0.005	0.026	0.005	0.022	0.005	0.018	0.005	0.026	0.005	0.028	0.010	ND
Nitrogen/Nitrate	10.0	NP	0.043	0.02	0.08	0.02	ND	0.20	0.31	0.02	0.03	0.02	ND	0.02	0.02	0.02	ND	0.02	0.03
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Selenium	0.05	NP	0.0043	0.001	0.0026	0.001	0.0025	0.001	0.0073	0.001	0.0054	0.001	0.0013	0.001	0.006	0.001	0.0047	0.0050	ND
Silver	0.05	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND
Sulfate	400.0	NP	120	10	49	10	25	1.0	9.1	1.0	3.3	1.0	3.0	10	18	10	25	10	43
Thallium	0.002	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total Dissolved Solids	1,200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Vanadium	0.049	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Zinc	5.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Benzene	0.005	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BETX	11.705	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
pH	6.5 - 9.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Temperature	NA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Conductivity	NA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dissolved Oxygen	NA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ORP	NA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Parameter	2/27/2013 DL	Result	5/31/2013 DL	Result	7/31/2013 DL	Result	10/23/2013 DL	Result	3/5/2014 DL	Result	5/29/2014 DL	Result	8/27/2014 DL	Result	10/29/2014 DL	Result	2/23/2015 DL	Result	5/11/2015 DL	Result
Antimony	0.003	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.001	0.17	0.0010	0.12	0.0010	0.22	0.0010	0.20	0.0010	0.15	0.0010	ND	0.0010	0.19	0.0010	0.31	0.0010	0.18	0.0010	0.18
Barium	0.001	0.44	0.0025	0.42	0.0025	0.46	0.0025	0.49	0.0025	0.56	0.0025	0.13	0.0025	0.52	0.0025	0.55	0.0025	0.61	0.0025	0.50
Beryllium	0.001	ND	0.0010	ND ^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	0.01	0.47	0.050	0.52	0.050	0.41	0.050	0.46	0.050	0.37	0.25	1.0	0.050	0.33	0.050	0.27	0.050	0.39	0.050	0.34
Cadmium	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	50	160	10	180	10	150	10	160	10	170	10	150	10	160 ^	10	150	10	130	10	170
Chromium	0.004	0.017	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	0.002	0.0075	0.0010	0.0059	0.0010	0.0045	0.0010	0.0071	0.0010	0.0085	0.0010	ND	0.0010	0.0070	0.0010	0.0046	0.0010	0.012	0.0010	0.0070
Copper	0.003	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND^	0.0020	ND	0.0020	ND ^	0.0020	ND	0.0020	0.0091	0.0020	ND
Cyanide	0.005	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	0.25	ND	0.10	0.47	0.10	0.46	0.10	0.43	0.10	0.41	0.10	0.41	0.10	0.43	0.10	0.46	0.10	0.42	0.10	0.42
Iron	0.01	27	0.10	15	0.10	30	0.10	20	0.10	17	0.10	0.15	0.10	14	0.10	35	0.10	23	0.10	9.5
Lead	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.0011	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.0066	0.00050	ND
Manganese	0.001	9.5	0.025	5.7	0.0025	11	0.0025	5.9	0.0025	5.8 E	0.0025	0.33	0.013	6.6	0.013	13	0.013	7.0	0.050	5.9
Mercury	0.0002	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.005	0.014	0.0020	0.0063	0.0020	0.0055	0.0020	0.0081	0.0020	0.0099	0.0020	ND	0.0020	0.0072	0.0020	0.0045	0.0020	0.020	0.0020	0.0077
Nitrogen/Nitrate	0.02	0.06	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitr	NR	NR	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NR	NR	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	NR	NR	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.001	0.0031	0.0025	0.0028	0.0025	ND	0.0025	0.0056	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	10	36	25	120	10	42	20	80	20	95	10	52	20	71	5.0	16	10	50	10	55
Thallium	0.001	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solids	26	1200	10	1000	10	1300	10	1200	10	1200	10	1200	10	1300	10	1300	10	1100	10	1100
Vanadium	0.005	0.0051	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	0.0084	0.0050	ND
Zinc	0.006	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	0.027	0.020	ND
Benzene	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	0.03	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	6.87	NA	6.69	NA	6.68	NA	6.82	NA	7.20	NA	6.67	NA	7.00	NA	6.94	NA	6.90	NA	6.88
Temperature	NA	16.30	NA	17.12	NA	17.95	NA	16.36	NA	14.02	NA	17.66 *	NA	22.30	NA	14.31	NA	8.40	NA	17.66
Conductivity	NA	1.87	NA	1.42	NA	1.77	NA	1.66	NA	1.36	NA	1.78	NA	1.87	NA	2.62	NA	1.37	NA	1.67
Dissolved Oxygen	NA	2.31	NA	0.50	NA	0.29	NA	0.44	NA	1.01	NA	0.65	NA	0.47	NA	1.50	NA	2.66	NA	1.19
ORP	NA	-116.9	NA	-145.5	NA	-140.7	NA	-134.7	NA	-116.9	NA	-94.6	NA	-118.1	NA	-109.2	NA	-93.7	NA	-109.8

Parameter	8/18/2015 DL	Result	11/16/2015 DL	Result	2/24/2016 DL	Result	5/18/2016 DL	Result	8/19/2016 DL	Result	11/16/2016 DL	Result	2/16/2017 DL	Result	5/2/2017 DL	Result	8/24/2017 DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.003	0.0032
Arsenic	0.0010	0.23	0.0010	0.13	0.0010	0.21	0.0010	0.13	0.0010	0.14	0.0010	0.18	0.0010	0.19	0.0010	0.12	0.001	0.15
Barium	0.0025	0.49	0.0025	0.43	0.0025	0.50	0.0025	0.46	0.0025	0.44	0.0025	0.51	0.0025	0.50	0.0025	0.41	0.0025	0.44
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND ^	0.0010	ND	0.001	ND
Boron	0.050	0.38	0.050	0.36	0.050	0.39	0.050	0.36	0.050	0.36	0.050	0.35	0.050	0.30	0.050	0.50	0.05	0.35
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND
Chloride	10	140	10	160	10	150	10	180	10	160	10	150	10	170	10	170	10	160
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND
Cobalt	0.0010	0.0026	0.0010	0.0062	0.0010	0.0038	0.0010	0.0062	0.0010	0.0064	0.0010	0.0058	0.0010	0.0054	0.0010	0.0044	0.001	0.0052
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND
Fluoride	0.10	0.44	0.10	0.43	0.10	0.47	0.10	0.41	0.10	0.43	0.10	0.39	0.10	0.37	0.10	0.38	0.1	0.43
Iron	0.10	38	0.10	12	0.10	33	0.10	9.2	0.10	14	0.10	22	0.10	20	0.10	13	0.1	15
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND
Manganese	0.13	15	0.025	6.2	0.025	13	0.025	3.0	0.013	7.1	0.025	7.8	0.050	8.6	0.013	5.5	0.013	6.9
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.0002	ND
Nickel	0.0020	0.0024	0.0020	0.0064	0.0020	0.0052	0.0020	0.0069	0.0020	0.0066	0.0020	0.0055	0.0020	0.0054	0.0020	0.0050	0.002	0.0055
Nitrogen/Nitrate	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND
Nitrogen/Nitrate, Nitr	0.10	ND ^	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND
Perchlorate	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND
Selenium	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND ^	0.0025	ND ^	0.0025	ND	0.0025	ND
Silver	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND
Sulfate	10	59	20	68	10	41	20	69	10	54	10	27	10	49	25	95	20	58
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND
Total Dissolved Solids	10	1300	10	1100	10	1300	10	1000	10	1400	10	1200	10	1200	10	1100	10	1100
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND
Benzene	0.00050	ND	0.00050	0.00078	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	0.00238	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.03	NA	6.60	NA	6.80	NA	6.77	NA	6.62	NA	6.64	NA	6.83	NA	7.08	NA	6.75
Temperature	NA	22.21	NA	13.34	NA	10.72	NA	16.18	NA	21.90	NA	18.24	NA	16.29	NA	15.35	NA	17.40
Conductivity	NA	2.18	NA	1.47	NA	1.55	NA	1.47	NA	1.75	NA	1.61	NA	1.66	NA	1.43	NA	1.72
Dissolved Oxygen	NA	0.75	NA	1.47	NA	1.61	NA	2.26	NA	2.66	NA	2.07	NA	1.26	NA	3.06	NA	0.58
ORP	NA	-149.0	NA	-40.8	NA	-87.7	NA	-78.3	NA	-68.0	NA	-78.6	NA	-72.3	NA	-92.4	NA	-88.1

Parameter	11/8/2017 DL	Result	3/6/2018 DL	Result	5/18/2018 DL	Result	8/10/2018 DL	Result	10/29/2018 DL	Result	2/25/2019 DL	Result	5/1/2019 DL	Result	8/27/2019 DL	Result
Antimony	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.001	0.17	0.001	0.073	0.001	0.16 V	0.001	0.17 V	0.001	0.2	0.001	0.14	0.001	0.21	0.001	0.17
Barium	0.0025	0.49	0.0025	0.33	0.0025	0.5	0.0025	0.48	0.0025	0.5	0.0025	0.51	0.0025	0.45	0.0025	0.48
Beryllium	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	0.05	0.29	0.05	0.56	0.1	0.37	0.05	0.33	0.05	0.31	0.05	0.33	0.1	0.58	0.05	0.38
Cadmium	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	10	160	10	170	10	150	10	170	10	160	10	170	10	170	10	170
Chromium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.001	0.0056	0.001	0.0038	0.001	0.0061	0.001	0.006	0.001	0.0056	0.001	0.0058	0.001	0.0044	0.001	0.005
Copper	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	0.1	0.41	0.1	0.46	0.1	0.41	0.1	0.39	0.1	0.42	0.1	0.41	0.1	0.45	0.1	0.37
Iron	0.1	16	0.1	5.5	0.1	15	0.1	15	0.1	19	0.1	11	0.1	13	0.1	19
Lead	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	0.0012	0.0005	ND	0.0005	ND
Manganese	0.013	8.5	0.0025	3.9	0.005	6.6	0.013	7.7	0.013	8.6	0.0025	4.9	0.005	5.9	0.013	7.5
Mercury	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.002	0.0058	0.002	0.0047	0.002	0.006	0.002	0.0059	0.002	0.0053	0.002	0.0073	0.002	0.0055	0.002	0.0053
Nitrogen/Nitrate	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nitr	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND ^	0.1	ND
Nitrogen/Nitrite	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.004	ND	0.004	ND	0.004	ND ^	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	ND	0.0025	0.0026	0.0025	0.0029	0.0025	ND	0.0025	ND	0.0025	0.0041	0.0025	0.0077	0.0025	ND
Silver	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	5	32	50	120	20	62	10	26	10	34	2	49	5	48	5	18
Thallium	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solids	10	1200	10	1100	10	1300	10	1200	10	1300	10	1100	10	1100	10	1100
Vanadium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	0.0015	0.0025	0.002	0.0025	0.00077	0.0025	0.0011	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	6.63	NA	7.01	NA	6.74	NA	6.83	NA	7.13	NA	6.61	NA	6.58	NA	6.68
Temperature	NA	15.76	NA	9.19	NA	17.83	NA	21.77	NA	17.67	NA	16.20	NA	16.50	NA	18.80
Conductivity	NA	1.59	NA	1.13	NA	1.52	NA	1.70	NA	1.67	NA	1.96	NA	1.26	NA	2.05
Dissolved Oxygen	NA	4.41	NA	5.01	NA	7.09	NA	7.47	NA	3.48	NA	0.00	NA	0.25	NA	0.67
ORP	NA	-69.3	NA	-33.4	NA	-61.4	NA	-45.4	NA	-41.0	NA	-103.7	NA	-127.6	NA	-102.7

Parameter	11/12/2019 DL	Result	2/25/2020 DL	Result	4/27/2020 DL	Result	8/11/2020 DL	Result	12/9/2020 DL	Result	2/23/2021 DL	Result	5/10/2021 DL	Result
Antimony	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.001	0.16	0.001	0.11	0.001	0.2	0.001	0.15	0.001	0.13	0.001	0.12	0.001	0.14
Barium	0.0025	0.44	0.0025	0.47	0.0025	0.49	0.0025	0.52	0.0025	0.49	0.0025	0.46	0.0025	0.47
Beryllium	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^1+	0.001	ND ^+	0.001	ND ^+
Boron	0.05	0.58	0.05	0.53	0.05	0.44	0.05	0.59	0.05	0.46	0.05	0.47	0.05	0.34
Cadmium	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	10	150	10	170	10	170	10	170	10	170	10	150	10	130
Chromium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.001	0.0043	0.001	0.0052	0.001	0.0052	0.001	0.0044	0.001	0.0056	0.001	0.0051	0.001	0.0054
Copper	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND F1	0.005	0.0053
Fluoride	0.1	0.44	0.1	0.44	0.1	0.44	0.1	0.31	0.1	0.5	0.1	0.48	0.1	0.46 H
Iron	0.1	10	0.1	14	0.1	11	0.1	20	0.1	15	0.1	12	0.1	11
Lead	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	0.00054	0.0005	ND
Manganese	0.013	5.3	0.013	11	0.013	5.1	0.013	7.3	0.013	5.2	0.0025	4.9	0.013	5.5
Mercury	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.002	0.0054	0.002	0.0068	0.002	0.0064	0.002	0.005	0.002	0.0064	0.002	0.0061	0.002	0.0055
Nitrogen/Nitrate	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND H
Nitrogen/Nitrate, Nitr	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrite	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	0.0094	0.0025	ND	0.0025	0.011	0.0025	0.0063	0.0025	ND	0.0025	0.0035	0.0025	ND
Silver	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	5	87	5	64	5	30	25	57	15	52	10	82	10	59
Thallium	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solids	10	1100	10	1100	10	1100	60	1100	10	1000	10	1000	10	970
Vanadium	0.005	ND	0.005	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.32	NA	6.64	NA	6.58	NA	6.55	NA	6.51	NA	6.76	NA	6.76
Temperature	NA	15.85	NA	15.50	NA	15.90	NA	16.20	NA	15.20	NA	14.80	NA	15.50
Conductivity	NA	1.77	NA	0.42	NA	1.69	NA	0.82	NA	0.23	NA	1.64	NA	1.91
Dissolved Oxygen	NA	0.55	NA	0.20	NA	0.31	NA	5.14	NA	0.29	NA	0.41	NA	0.23
ORP	NA	-113.0	NA	-162.0	NA	-153.6	NA	127.3	NA	-119.8	NA	-126.9	NA	-97.5

^ - Denotes instrument related QC exceeds the control limits
* - Median Value (for temp)
* - LCS or LCSD is outside acceptance limits

Temperature °C degrees Celcius
Conductivity ms/cm^c millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

Attachment 9-3 Historical CCA Groundwater Data - Midwest Generation LLC, Powerton Station, Pekin, IL

Sample: MW-10	Date	12/15/2010		3/25/2011		6/16/2011		9/19/2011		12/12/2011		3/19/2012		6/25/2012		9/18/2012		12/12/2012		2/27/2013		5/29/2013		7/31/2013		10/23/2013		3/6/2014		5/30/2014		8/28/2014		10/30/2014		2/23/2015		5/14/2015		8/18/2015		11/18/2015		2/24/2016		5/18/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND	0.003	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	NP	ND	0.001	ND	0.001	0.0015	0.001	ND	0.001	ND	0.001	ND	0.001	0.0015	0.001	0.0014	0.0050	ND	0.001	0.001	0.0010	0.0012	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	0.0011	0.0010	ND	0.0010	ND	0.0010	0.0012	0.0010	ND
Barium	2.0	NP	0.24	0.001	0.28	0.001	0.36	0.001	0.25	0.001	0.26	0.001	0.26	0.001	0.27	0.001	0.23	0.040	0.24	0.001	0.22	0.0025	0.30	0.0025	0.18	0.0025	0.23	0.0025	0.31	0.0025	0.25	0.0025	0.28	0.0025	0.13	0.0025	0.17	0.0025	0.23	0.0025	0.14	0.0025	0.17	0.0025	0.18	0.0025	0.25
Beryllium	0.004	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0010	ND ^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	NP	0.48	0.01	0.48	0.012	0.52	0.01	0.42	0.01	0.57	0.01	0.54	0.01	0.54	0.01	0.42	0.40	0.46	0.01	0.64	0.050	0.98	0.050	1.9	0.050	0.61	0.050	2.1	0.25	3.2	0.050	1.9	0.050	0.84	0.050	0.83	0.050	0.64	0.050	0.42	0.050	0.30	0.050	0.40	0.050	0.38
Cadmium	0.005	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	NP	40	10	43	10	43	10	49	10	42	10	45	10	46	10	45	10	45	10	37	2.0	41	2.0	40	2.0	54	2.0	40	2.0	37	2.0	57	2.0	62	2.0	22	2.0	52	2.0	55	2.0	53	2.0	48	2.0	44
Chromium	0.1	NP	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.0030	0.0048	0.004	0.0064	0.0050	0.0061	0.0050	ND	0.0050	ND	0.0050	ND^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	NP	0.0026	0.002	0.0027	0.002	0.0039	0.002	0.0025	0.002	0.0026	0.002	0.0024	0.002	0.0029	0.002	0.0029	0.0030	ND	0.002	0.0021	0.0010	0.012	0.0010	0.0019	0.0010	0.0025	0.0010	0.0037	0.0010	0.0012	0.0010	0.0034	0.0010	0.0015	0.0010	0.0019	0.0010	0.0019	0.0010	0.0013	0.0010	0.0017	0.0010	0.0020	0.0010	0.0020
Copper	0.65	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	0.0041	0.003	ND	0.003	ND	0.003	ND	0.010	ND	0.003	ND	0.0020	0.028	0.0020	ND	0.0020	ND	0.0020	0.0020^	0.0020	ND	0.0020	ND ^	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	0.024	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	NP	ND	0.25	0.30	0.25	0.36	0.25	ND	0.25	ND	0.25	ND	0.25	ND	0.25	ND	0.25	0.28	0.25	ND	0.10	0.18	0.10	0.18	0.10	0.17	0.10	0.20	0.10	0.18	0.10	0.20	0.10	0.18	0.10	0.17	0.10	0.21	0.10	0.17	0.10	0.17	0.10	0.17	0.10	0.18
Iron	5.0	NP	ND	0.010	ND	0.010	0.044	0.010	ND	0.010	ND	0.010	ND	0.010	0.015	0.010	0.012	0.010	0.016	0.01	ND	0.10	2.7	0.10	ND	0.10	0.18	0.10	0.19	0.10	0.11	0.10	0.34	0.10	0.18	0.10	0.22	0.10	0.34	0.10	ND	0.10	0.13	0.10	0.20	0.10	ND
Lead	0.0075	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0050	ND	0.001	ND	0.00050	0.012	0.00050	ND	0.00050	ND	0.00050	0.00080	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	NP	2.1	0.001	2.8	0.001	3.8	0.001	2.3	0.001	2.3	0.001	2.3	0.001	2.6	0.001	2.5	0.040	2.2	0.001	1.9	0.0025	3.2	0.0025	1.5	0.0025	2.0	0.0025	3.1	0.0025	1.6	0.0025	2.1	0.0025	1.1	0.0025	1.3	0.0025	1.7	0.0025	0.94	0.0025	1.4	0.0025	1.6	0.0025	2.3
Mercury	0.002	NP	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND	0.0002	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	NP	0.015	0.005	0.016	0.005	0.015	0.005	0.01	0.005	0.013	0.005	0.0091	0.005	0.0093	0.005	0.014	0.010	ND	0.005	0.0079	0.0020	0.023	0.0020	0.0037	0.0020	0.0051	0.0020	0.0073	0.0020	0.0038	0.0020	0.0046	0.0020	0.0028	0.0020	0.0045	0.0020	0.0049	0.0020	0.0024	0.0020	0.0030	0.0020	0.0046	0.0020	0.0045
Nitrogen/Nitrate	10.0	NP	3.0	0.20	4.0	0.20	2.1	0.20	4.5	0.20	4.9	0.20	6.0	0.20	2.9	0.20	5.2	0.20	4.8	0.2	3.3	0.10	1.9	0.10	1.5	0.10	1.2	0.10	2.0	0.10	2.1	0.10	0.41	0.10	0.67	0.10	0.90	0.10	1.2	0.10	2.8	0.10	1.3	0.10	3.1	0.10	2.2
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.20	1.9	0.10	1.6	0.10	1.2	0.50	2.0	0.50	2.1	0.10	0.43	0.10	0.71	0.10	0.94	0.10	1.2	0.20	2.9	0.10	1.3	0.20	3.2	0.50	2.2
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.020	ND	0.020	0.056	0.020	0.034	0.020	ND	0.020	0.028	0.020	0.022	0.020	0.039	0.020	0.038	0.020	0.032	0.020	0.077	0.020	ND	0.020	0.056	0.020	0.025
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	NP	0.0042	0.001	0.0064	0.001	0.0043	0.001	0.0057	0.001	0.0065	0.001	0.0056	0.001	0.0056	0.001	0.0058	0.0050	0.0074	0.001	0.0083	0.0025	0.0043	0.0025	0.0087	0.0025	0.0080	0.0025	ND	0.0025	0.0073	0.0025	0.0057	0.0025	0.0048	0.0025	0.0028	0.0025	0.0050	0.0025	0.0054	0.0025	0.0033	0.0025	0.0043	0.0025	0.0048
Silver	0.05	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	NP	62	10	64	10	67	10	64	10	72	10	76	10	63	10	58	10	59	10	69	25	92	25	150	25	90	50	160	50	140	25	110	25	95	10	46	10	50	20	64	20	110	20	88	20	67
Thallium	0.002	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	1,200	NP	530	17	520	17	650	17	470	17	540	17	530	17	550	17	580	26	420	26	440	10	580	10	550	10	620	10	670	10	630	10	590	10	550	10	530	10	530	10	550	10	500	10	540	10	580
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0080	ND	0.005	ND	0.0050	0.012	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	NP	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.020	ND	0.006	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.005	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.03	ND	0.03	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00055	0.0025	0.00066	0.0025	0.0011	0.0025	ND	0.0025	0.0027
pH	6.5 - 9.0	NA	7.04	NA	7.01	NA	6.88	NA	7.04	NA	6.03	NA	7.03	NA	6.95	NA	6.96	NA	7.03	NA	8.39	NA	6.87	NA	6.85	NA	7.02	NA	7.90	NA	7.09	NA	6.74	NA	7.16	NA	7.36	NA	7.13	NA	7.46	NA	6.74	NA	6.71	NA	6.72
Temperature	NA	NA	11.72	NA	11.98	NA	14.25	NA	11.76	NA	11.05	NA	14.51	NA	13.49	NA	12.84	NA	11.87	NA	11.60	NA	14.99	NA	13.28	NA	11.61	NA	10.63	NA	18.61 *	NA	15.79	NA	11.11	NA	5.22	NA	13.91	NA	23.06	NA	13.70	NA	7.22	NA	13.24
Conductivity	NA	NA	0.99	NA	0.92	NA	1.04	NA	0.62	NA	0.65	NA	0.71	NA	0.67	NA	0.67	NA	0.60	NA	0.70	NA	0.69	NA	0.71	NA	0.70	NA	0.63	NA	0.93	NA	0.83	NA	1.04	NA	0.56	NA	0.70	NA	0.86	NA	0.67	NA	0.59	NA	0.70
Dissolved Oxygen	NA	NA	NM	NA	0.29	NA	0.08	NA	0.02	NA	0.04	NA	0.02	NA	0.04	NA	0.10	NA	2.07	NA	0.49	NA	0.39	NA	0.19	NA	0.50	NA	1.00	NA	3.29	NA	0.77	NA	0.64	NA	3.45	NA	0.88	NA	2.21	NA	2.01	NA	0.99	NA	1.62
ORP	NA	NA	NM	NA	106.4	NA	132.3	NA	-297	NA	23	NA	118	NA	67	NA	107	NA	60	NA	33.2	NA	63.9	NA	20.8	NA	-138.7	NA	-65.7	NA	-39.0	NA	-0.5	NA	-86.1	NA	20.3	NA	-4.0	NA	-56.8	NA	70.3	NA	4.2	NA	30.6

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured
NR - Not Required
NS - Not Sampled
H - Prepped/analyzed past hold time
V - Serial Dilution Exceeds Control Limits
F1- MS and/or MSD Recovery outside of limits.
F2- MS/MSD RPD exceeds control limits.
^1+ - Initial Calibration Verification is outside acceptance limits, high biased
^+ - Continuing Calibration Verification is outside acceptance limits, high biased
^ - Denotes instrument related QC exceeds the control limits
* - Median Value (for temp)
* - LCS or LCSD is outside acceptance limits

Temperature	°C	degrees Celsius
Conductivity	ms/cm²	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

Sample: MW-11	Date	12/16/2010		2/15/2011		6/16/2011		9/19/2011		12/12/2011		3/19/2012		6/25/2012		9/18/2012		12/12/2012		2/27/2013		5/30/2013		7/30/2013		10/22/2013		3/4/2014		5/29/2014		8/26/2014		10/28/2014		2/24/2015		5/12/2015		8/19/2015		11/19/2015		2/26/2016		5/20/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NP	ND	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND	0.003	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	NP	0.0021	NP	0.0025	0.001	0.0019	0.001	0.0016	0.001	0.0019	0.001	0.0021	0.001	0.0032	0.001	0.0038	0.0050	0.03	0.001	0.045	0.0010	0.028	0.0010	0.038	0.0010	0.038	0.0010	0.057	0.0010	0.036	0.0010	0.068	0.0010	0.045	0.0010	0.022	0.0010	0.052	0.0010	0.027	0.0010	0.015	0.0010	0.0097	0.0010	0.011
Barium	2.0	NP	0.17	NP	0.11	0.001	0.18	0.001	0.11	0.001	0.11	0.001	0.13	0.001	0.17	0.001	0.22	0.20	ND	0.001	0.2	0.0025	0.15	0.0025	0.19	0.0025	0.18	0.0025	0.22	0.0025	0.16	0.0025	0.21	0.0025	0.19	0.0025	0.16	0.0025	0.16	0.0025	0.15	0.0025	0.15	0.0025	0.17	0.0025	0.21
Beryllium	0.004	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0010	ND ^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	NP	1.6	NP	1.8	0.012	1.6	0.01	1.5	0.01	1.8	0.01	2.3	0.01	1.9	0.01	2.6	2.0	ND	0.01	1.4	0.050	1.3	0.050	1.5	0.050	1.2	0.050	1.1	0.25	1.4	0.050	0.97	0.050	0.89	0.050	1.7	0.050	1.3	0.050	2.0	0.050	1.5	0.25	1.8	0.050	1.2
Cadmium	0.005	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	NP	70	NP	66	50	120	25	53	50	87	10	54	25	150	10	52	50	83	10	84	10	79	10	110	10	79	2.0	67	2.0	70	10	120	10	91	2.0	66	2.0	65	2.0	60	2.0	60	10	120	10	130
Chromium	0.1	NP	ND	NP	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	0.0051	0.004	ND	0.0030	0.015	0.004	0.0099	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	NP	0.0028	NP	0.0041	0.002	0.0024	0.002	ND	0.002	ND	0.002	0.0024	0.002	0.0039	0.002	0.0049	0.0030	0.0041	0.002	0.0028	0.0010	0.0020	0.0010	0.0023	0.0010	0.0025	0.0010	ND	0.0010	0.0017	0.0010	0.0017	0.0010	0.0017	0.0010	0.0023	0.0010	0.0017	0.0010	0.0021	0.0010	0.0021	0.0010	0.0020	0.0010	0.0020
Copper	0.65	NP	0.0032	NP	0.0032	0.003	0.0043	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	0.0049	0.010	ND	0.003	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND ^	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	NP	ND	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	NP	0.53	NP	0.56	0.25	0.67	0.25	0.58	0.25	0.44	0.25	0.42	0.25	0.32	0.25	0.56	0.25	0.64	0.25	0.43	0.10	0.79	0.10	0.80	0.10	0.75	0.10	0.64	0.10	0.64	0.10	0.71	0.10	0.71	0.10	0.66	0.10	0.79	0.10	0.61	0.10	0.56	0.10	0.53	0.10	0.50
Iron	5.0	NP	0.44	NP	0.01	0.010	0.029	0.010	0.018	0.010	ND	0.010	ND	0.010	0.056	0.010	2.0	0.010	0.7	0.01	2.4	0.10	3.1	0.10	3.9	0.10	3.3	0.10	5.8	0.10	3.8	0.10	5.5	0.10	5.0	0.10	2.0	0.10	4.2	0.10	2.2	0.10	1.5	0.10	1.2	0.10	1.1
Lead	0.0075	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.0023	0.0050	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	NP	3.2	NP	3.6	0.001	2.9	0.001	2.2	0.001	2.5	0.001	2.9	0.001	3.7	0.001	4.7	0.20	12	0.001	11	0.025	7.5	0.0025	8.0	0.0025	7.3	0.013	7.9	0.013	8.0	0.013	8.4	0.013	6.6	0.025	5.5	0.050	7.8	0.025	5.9	0.0025	4.1	0.0025	3.6	0.0025	3.9
Mercury	0.002	NP	ND	NP	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND	0.0002	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	NP	0.019	NP	0.016	0.005	0.013	0.005	0.011	0.005	0.013	0.005	0.011	0.005	0.013	0.005	0.017	0.010	ND	0.005	0.0088	0.0020	0.0026	0.0020	0.0033	0.0020	0.0036	0.0020	0.0024	0.0020	ND	0.0020	ND	0.0020	0.0023	0.0020	0.0042	0.0020	ND	0.0020	0.0028	0.0020	0.0031	0.0020	0.0045	0.0020	0.0038
Nitrogen/Nitrate	10.0	NP	0.41	NP	0.17	0.02	0.04	0.02	0.74	0.02	1.5	0.02	0.39	0.02	ND	0.20	4.6	0.02	0.39	0.02	0.33	0.10	1.1	0.10	ND	0.10	0.18	0.10	0.34	0.10	0.27	0.10	ND	0.10	ND	0.10	ND	0.10	0.52	0.10	0.20	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.10	1.1	0.10	ND	0.10	0.18	0.10	0.34	0.10	0.27	0.10	ND	0.10	ND^	0.10	ND	0.10	0.52	0.10	0.20	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	NP	0.0026	NP	0.0015	0.001	0.0018	0.001	0.004	0.001	0.0031	0.001	0.0039	0.001	0.0039	0.001	0.004	0.0050	ND	0.001	0.0014	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	NP	ND	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	NP	170	NP	160	50	210	25	140	50	160	50	130	100	320	25	170	50	200	50	150	50	240	50	280	50	180	50	210	50	170	50	200	50	200	25	120	20	130	50	150	50	210	50	260	50	280
Thallium	0.002	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	1,200	NP	740	NP	710	17	930	17	620	17	730	17	740	17	1000	17	760	26	970	26	840	10	850	10	980	10	770	10	760	10	660	10	860	10	790	10	700	10	710	10	750	10	630	10	890	10	950
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0080	ND	0.005	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	NP	0.012	NP	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	0.0073	0.020	ND	0.006	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.005	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.0013	0.00050	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.03	ND	0.03	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00086	0.0025	0.0041	0.0025	0.00058	0.0025	0.0019
pH	6.5 - 9.0	NA	7.88	NA	7.13	NA	7.02	NA	7.31	NA	6.48	NA	7.32	NA	7.15	NA	7.30	NA	7.28	NA	8.27	NA	6.99	NA	7.08	NA	7.23	NA	8.00	NA	7.10	NA	7.12	NA	7.37	NA	7.55	NA	7.33	NA	7.25	NA	7.06	NA	7.25	NA	7.10
Temperature	NA	NA	12.61	NA	13.66	NA	17.58	NA	14.67	NA	13.85	NA	16.31	NA	15.74	NA	17.90	NA	13.95	NA	14.20	NA	17.00	NA	16.66	NA	13.33	NA	9.77	NA	19.35	NA	22.73	NA	16.12	NA	10.59	NA	16.31	NA	20.65	NA	13.73	NA	11.18	NA	15.78
Conductivity	NA	NA	1.27	NA	1.14	NA	1.44	NA	0.85	NA	0.89	NA	0.98	NA	1.26	NA	0.96	NA	1.22	NA	1.30	NA	1.19	NA	1.22	NA	1.10	NA	0.92	NA	1.19	NA	1.38	NA	1.34	NA	0.91	NA	1.17	NA	1.21	NA	0.95	NA	0.96	NA	1.13
Dissolved Oxygen	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	3.73	NA	5.16	NA	2.54	NA	3.55	NA	0.28	NA	0.20	NA	0.76	NA	2.38	NA	0.32	NA	0.98	NA	0.71	NA	2.74	NA	1.62	NA	0.57	NA	0.85	NA	1.10	NA	2.65
ORP	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	0.47	NA	43	NA	-60	NA	-113.2	NA	-147.5	NA	-144.2	NA	-141.3	NA	-108.3	NA	-126.2	NA	-138.8	NA	-126.3	NA	-110.5	NA	-146.8	NA	-115.3	NA	-40.7	NA	-100.5	NA	-123.5

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.

Sample: MW-12	Date	12/15/2010		2/15/2011		6/16/2011		9/19/2011		12/12/2011		3/19/2012		6/25/2012		9/18/2012		12/12/2012		2/27/2013		5/30/2013		7/29/2013		10/22/2013		3/4/2014		5/29/2014		8/26/2014		10/28/2014		2/24/2015		5/12/2015		8/19/2015		11/19/2015		2/26/2016		5/20/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NP	ND	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND	0.003	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	NP	0.0088	NP	0.013	0.001	0.0064	0.001	0.0087	0.001	0.0089	0.001	0.0042	0.001	0.014	0.001	0.011	0.0050	0.022	0.001	0.0066	0.0010	0.0031	0.0010	0.016	0.0010	0.018	0.0010	0.0025	0.0010	0.0017	0.0010	0.0021	0.0010	0.0019	0.0010	ND	0.0010	0.0034	0.0010	0.0025	0.0010	0.0033	0.0010	0.0020	0.0010	0.0045 F1
Barium	2.0	NP	0.089	NP	0.11	0.001	0.091	0.001	0.085	0.001	0.09	0.001	0.071	0.001	0.12	0.001	0.11	0.040	0.1	0.001	0.1	0.0025	0.091	0.0025	0.092	0.0025	0.087	0.0025	0.086	0.0025	0.073	0.0025	0.066	0.0025	0.063	0.0025	0.070	0.0025	0.071	0.0025	0.083	0.0025	0.091	0.0025	0.060	0.0025	0.094
Beryllium	0.004	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0010	ND ^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	NP	1.6	NP	1.4	0.012	1.3	0.01	1.2	0.01	1.3	0.01	0.92	0.01	1.2	0.01	1.1	0.40	0.85	0.01	1.1	0.050	3.7	0.050	1.1	0.050	1.1	0.050	0.41	0.050	0.69	0.050	0.73	0.050	0.59	0.050	0.58	0.050	0.59	0.050	1.5	0.050	0.94	0.050	0.57	0.050	0.50
Cadmium	0.005	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	NP	170	NP	180	50	180	50	190	50	210	50	170	50	190	50	170	50	210	50	190	10	200	10	190	10	180	10	220	10	220	10	210	10	200	10	210	10	230	10	220	10	220	10	210	10	200 F1
Chromium	0.1	NP	ND	NP	0.0056	0.004	0.0044	0.004	0.0071	0.004	0.0047	0.004	ND	0.004	0.0043	0.004	0.0045	0.0030	0.0079	0.004	0.0052	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	NP	ND	NP	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.0030	ND	0.002	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	NP	ND	NP	ND	0.003	0.0032	0.003	0.0036	0.003	0.0031	0.003	ND	0.003	ND	0.003	ND	0.010	ND	0.003	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND^	0.0020	ND	0.0020	ND ^	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	NP	ND	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	NP	0.71	NP	0.61	0.25	0.64	0.25	0.74	0.25	0.61	0.25	0.46	0.25	0.36	0.25	0.42	0.25	0.43	0.25	ND	0.10	0.62	0.10	0.56	0.10	0.51	0.10	0.56	0.10	0.42	0.10	0.54	0.10	0.54	0.10	0.58	0.10	0.52	0.10	0.59	0.10	0.58	0.10	0.41	0.10	0.48
Iron	5.0	NP	5.5	NP	6.3	0.010	5.6	0.010	4.0	0.010	3.1	0.010	4.8	0.010	8.2	0.010	8.9	0.010	6.4	0.01	5.8	0.10	8.9	0.10	4.5	0.10	0.23	0.10	2.4	0.10	0.39	0.10	0.17	0.10	0.33	0.10	1.7	0.10	0.48	0.10	2.2	0.10	0.61	0.10	0.88	0.10	1.2
Lead	0.0075	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0050	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	NP	0.32	NP	0.58	0.001	0.26	0.001	0.37	0.001	0.25	0.001	0.13	0.001	0.71	0.001	0.64	0.040	1.7	0.001	0.38	0.0025	0.24	0.0025	1.3	0.0025	1.5	0.0025	0.23	0.0025	0.65	0.0025	1.2	0.0025	1.2	0.0025	0.17	0.0025	0.63	0.0025	0.16	0.0025	1.2	0.0025	0.065	0.0025	0.51
Mercury	0.002	NP	ND	NP	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND	0.0002	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	NP	0.0096	NP	0.01	0.005	0.0072	0.005	0.0075	0.005	0.0091	0.005	0.0075	0.005	0.0082	0.005	0.012	0.010	ND	0.005	0.0065	0.0020	ND	0.0020	0.0029	0.0020	0.0028	0.0020	0.0020	0.0020	0.0026	0.0020	0.0033	0.0020	0.0031	0.0020	0.0031	0.0020	0.0022	0.0020	0.0020	0.0020	0.0023	0.0020	0.0020	0.0020	ND
Nitrogen/Nitrate	10.0	NP	ND	NP	ND	0.02	0.14	0.02	ND	0.02	ND	0.02	0.04	0.20	ND	0.02	0.03	0.02	ND	0.02	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND^	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	0.048	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	0.024	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	NP	0.0026	NP	0.0027	0.001	ND	0.001	0.0023	0.001	0.0034	0.001	0.0043	0.001	0.0038	0.001	0.0016	0.0050	ND	0.001	0.002	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND F1
Silver	0.05	NP	ND	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	NP	290	NP	270	50	350	50	360	50	300	50	310	50	430	50	370	50	300	50	350	100	410	100	420	100	270	100	530	100	560	100	310	100	420	100	450	100	530	100	390	100	750	100	580	100	570
Thallium	0.002	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	1,200	NP	980	NP	1000	17	1100	17	970	17	970	17	1000	17	1200	17	1200	26	1100	26	1000	10	1200	10	1200	10	1000	10	1400	10	1300 H	10	1100	10	1000	10	1300	10	1400	10	1300	10	1400	10	1300	10	1300
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0080	ND	0.005	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	NP	ND	NP	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.020	ND	0.006	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.005	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.0013	0.00050	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.03	ND	0.03	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0061	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.65	NA	7.51	NA	6.98	NA	7.66	NA	7.38	NA	7.22	NA	7.40	NA	7.50	NA	7.37	NA	8.36	NA	7.17	NA	7.29	NA	7.73	NA	7.99	NA	7.14	NA	7.37	NA	7.33	NA	7.61	NA	7.49	NA	7.43	NA	7.12	NA	7.96	NA	7.28
Temperature	NA	NA	16.90	NA	16.77	NA	18.77	NA	17.75	NA	17.78	NA	19.62	NA	19.07	NA	18.88	NA	17.51	NA	16.30	NA	21.42	NA	17.93	NA	14.78	NA	11.22	NA	19.48	NA	22.71	NA	16.37	NA	6.11	NA	18.19	NA	19.48	NA	14.85	NA	9.04	NA	15.14
Conductivity	NA	NA	1.69	NA	1.66	NA	1.63	NA	1.34	NA	1.38	NA	1.54	NA	1.63	NA	1.61	NA	1.48	NA	1.60	NA	1.63	NA	1.47	NA	1.20	NA	1.30	NA	1.73	NA	1.69	NA	1.55	NA	1.24	NA	1.76	NA	1.74	NA	1.59	NA	1.29	NA	1.55
Dissolved Oxygen	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	0.06	NA	0.11	NA	1.70	NA	0.35	NA	1.04	NA	0.25	NA	0.20	NA	1.43	NA	1.59	NA	0.36	NA	0.36	NA	1.29	NA	1.87	NA	1.13	NA	1.49	NA	1.31	NA	2.73
ORP	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	-168	NA	-157	NA	-130	NA	-141.2	NA	-146.5	NA	-85.9	NA	-205.6	NA	-91.9	NA	-23.6	NA	-49.2	NA	6.0	NA	-80.6	NA	-55.7	NA	-109.9	NA	36.6	NA	-134	NA	-91.4

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.

Attachment 9-3 Historical CCA Groundwater Data - Midwest Generation LLC, Powerton Station, Pekin, IL

Sample: MW-13	Date	12/15/2010		2/15/2011		4/25/2011		6/16/2011		8/9/2011		10/13/2011		12/12/2011		4/10/2012		12/14/2012		2/28/2013		5/30/2013		7/30/2013		10/22/2013		3/4/2014		5/28/2014		8/27/2014		10/29/2014		2/26/2015		5/13/2015		8/19/2015		11/19/2015		2/24/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
pH	6.5 - 9.0	NA	7.68	NA	7.53	NA	7.26	NA	6.75	NA	7.13	NA	7.31	NA	7.19	NA	8.49	NA	7.92	NA	8.26	NA	7.65	NA	7.61	NA	7.81	NA	8.67	NA	7.73	NA	7.82	NA	7.72	NA	8.20	NA	7.99	NA	8.03	NA	7.57	NA	7.67
Temperature	NA	NA	12.59	NA	13.82	NA	14.40	NA	16.84	NA	15.92	NA	14.87	NA	13.78	NA	14.90	NA	14.88	NA	14.00	NA	18.10	NA	16.26	NA	12.38	NA	12.91	NA	23.09	NA	20.49	NA	13.90	NA	9.51	NA	16.67	NA	19.27	NA	12.62	NA	9.43
Conductivity	NA	NA	3.33	NA	2.15	NA	1.92	NA	1.79	NA	1.63	NA	1.59	NA	2.33	NA	2.89	NA	2.15	NA	2.05	NA	2.12	NA	2.13	NA	1.83	NA	1.72	NA	2.63	NA	2.50	NA	3.41	NA	2.11	NA	2.78	NA	2.91	NA	2.36	NA	2.21
Dissolved Oxygen	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	3.54	NA	1.69	NA	1.16	NA	0.27	NA	0.94	NA	0.99	NA	0.93	NA	0.34	NA	0.84	NA	1.60	NA	1.10	NA	1.20	NA	0.96	NA	1.56
ORP	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	-20	NA	134	NA	-177.9	NA	-171.2	NA	-189.1	NA	-190.9	NA	-44.7	NA	-128.5	NA	-140.4	NA	-161.4	NA	-175.5	NA	-153.2	NA	-76.2	NA	-137.5

Sample: MW-13	5/19/2016		8/18/2016		11/17/2016		2/17/2017		5/4/2017		8/24/2017		11/9/2017		3/7/2018		5/16/2018		8/9/2018		10/31/2018		2/28/2019		5/2/2019		8/28/2019		11/14/2019		2/26/2020		4/30/2020		8/11/2020		12/10/2020		2/24/2021		5/13/2021	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
pH	NA	7.60	NA	7.53	NA	7.65	NA	7.87	NA	7.82	NA	7.78	NA	7.49	NA	7.37	NA	8.33	NA	7.60	NA	8.29	NA	7.74	NA	7.71	NA	7.71	NA	8.11	NA	7.75	NA	7.66	NA	7.43	NA	7.62	NA	7.79	NA	7.86
Temperature	NA	17.47	NA	25.95	NA	20.32	NA	15.28	NA	11.67	NA	15.30	NA	12.33	NA	9.41	NA	20.13	NA	18.37	NA	14.94	NA	12.50	NA	13.60	NA	13.90	NA	12.68	NA	13.20	NA	14.10	NA	14.80	NA	14.30	NA	14.00	NA	14.80
Conductivity	NA	2.81	NA	3.48	NA	3.12	NA	3.05	NA	2.68	NA	2.98	NA	2.53	NA	1.41	NA	2.78	NA	2.80	NA	2.68	NA	3.69	NA	2.25	NA	0.23	NA	3.24	NA	0.53	NA	0.36	NA	3.47	NA	3.27	NA	2.75	NA	3.25
Dissolved Oxygen	NA	1.02	NA	1.79	NA	1.13	NA	1.76	NA	4.03	NA	0.82	NA	4.63	NA	2.70	NA	1.05	NA	5.16	NA	5.01	NA	0.04	NA	0.18	NA	0.30	NA	8.63	NA	0.18	NA	0.19	NA	7.18	NA	1.91	NA	0.44	NA	0.24
ORP	NA	-147.5	NA	-195.8	NA	-81.0	NA	-93.1	NA	-151.5	NA	-141.2	NA	-123.3	NA	-120.4	NA	-147.5	NA	-167.4	NA	-132.7	NA	-153.9	NA	-176.9	NA	-171.5	NA	-123.8	NA	-232.8	NA	-226.3	NA	-180.5	NA	-218.5	NA	-182.0	NA	-160.2

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured
NR - Not Required
NS - Not Sampled
H - Prepped/analyzed past hold time
V - Serial Dilution Exceeds Control Limits
F1- MS and/or MSD Recovery outside of limits.
F2- MS/MSD RPD exceeds control limits.
^1+ - Initial Calibration Verification is outside acceptance limits, high biased
^+ - Continuing Calibration Verification is outside acceptance limits, high biased
^ - Denotes instrument related QC exceeds the control limits
* - Median Value (for temp)
* - LCS or LCSD is outside acceptance limits

Temperature °C degrees Celcius
Conductivity ms/cm^c millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

Sample: MW-14	Date	12/15/2010		2/15/2011		4/25/2011		6/16/2011		8/9/2011		10/13/2011		12/12/2011		4/10/2012		12/14/2012		2/27/2013		5/30/2013		7/30/2013		10/23/2013		3/4/2014		5/28/2014		8/28/2014		10/29/2014		2/26/2015		5/13/2015		8/19/2015		11/18/2015		2/24/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NP	ND	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND	0.003	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	NP	0.024	NP	0.019	0.001	0.0084	0.001	0.005	0.001	0.0062	0.001	0.015	0.001	0.0033	0.001	0.0039	0.0050	0.0053	0.001	0.0066	0.0010	0.0023	0.0010	0.0016	0.0010	ND	0.0010	0.0016	0.0010	0.0011	0.0010	0.0052	0.0010	0.0063	0.0010	0.0011	0.0010	0.0017	0.0010	0.0020	0.0010	0.0023	0.0010	0.0024
Barium	2.0	NP	0.034	NP	0.034	0.001	0.036	0.001	0.04	0.001	0.041	0.001	0.04	0.001	0.045	0.001	0.045	0.0020	0.038	0.001	0.032	0.0025	0.053	0.0025	0.042	0.0025	0.050	0.0025	0.044	0.0025	0.033	0.0025	0.057	0.0025	0.045	0.0025	0.050	0.0025	0.042	0.0025	0.069	0.0025	0.053	0.0025	0.050
Beryllium	0.004	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0010	ND ^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	NP	2	NP	1.9	0.01	1.9	0.01	1.9	0.01	1.8	0.01	1.9	0.01	1.9	0.01	1.8	2.0	ND	0.01	1.9	0.050	1.7	0.050	1.7	0.050	2.0	0.050	1.6	0.25	1.8	0.050	1.9	0.50	2.2	0.25	2.2	0.25	1.7	0.050	1.9	0.050	2.5	0.050	2.3
Cadmium	0.005	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.00050	0.00060	0.00050	0.00086	0.00050	0.00062	0.00050	0.00053	0.00050	ND	0.00050	0.00052	0.00050	ND	0.00050	ND	0.00050	0.00056	0.00050	0.00070	0.00050	0.00051	0.00050	ND
Chloride	200.0	NP	160	NP	160	25	160	50	160	25	240	100	200	100	200	50	190	50	190	25	92	10	160	10	190	10	190	10	220	10	140	10	190	10	180	10	180	10	180	10	150	10	160	10	130
Chromium	0.1	NP	ND	NP	0.0046	0.004	0.0078	0.004	0.0049	0.004	0.0076	0.004	0.0096	0.004	0.0065	0.004	0.0057	0.0030	0.018	0.004	0.0095	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.010	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	NP	ND	NP	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.0030	ND	0.002	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	NP	0.0037	NP	0.0035	0.003	0.0074	0.003	0.0071	0.003	0.0064	0.003	0.0055	0.003	0.025	0.003	0.0067	0.010	ND	0.003	0.003	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND^	0.0020	ND	0.0020	ND ^	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	NP	ND	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	NP	1.7	NP	1.6	0.25	1.1	0.25	1.3	0.25	1.4	0.25	0.88	0.25	1.1	0.25	1.0	0.25	1.2	0.25	0.29	0.10	1.1	0.10	1.1	0.10	0.95	0.10	0.96	0.10	0.95	0.10	0.91	0.10	0.94	0.10	0.76	0.10	0.98	0.10	1.1	0.10	1.1	0.10	1.1
Iron	5.0	NP	2.2	NP	0.94	0.010	0.36	0.010	0.30	0.010	0.71	0.010	2.0	0.010	0.12	0.010	0.77	0.010	0.012	0.01	0.02	0.10	ND	0.10	ND	0.10	0.39	0.10	1.2	0.10	0.60	0.10	4.6	0.10	5.3	0.10	0.17	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.0035	0.0050	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.00078	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	NP	0.68	NP	0.81	0.001	0.29	0.001	0.36	0.001	0.57	0.001	0.84	0.001	0.067	0.001	0.63	0.0020	0.11	0.001	0.12	0.0025	0.72	0.0025	0.32	0.0025	1.2	0.0025	1.3	0.0025	0.34	0.0025	1.8	0.0025	1.3	0.0025	0.15	0.0025	0.073	0.0025	0.32	0.0025	1.2	0.0025	0.070
Mercury	0.002	NP	ND	NP	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND	0.0002	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	NP	0.015	NP	0.015	0.005	0.02	0.005	0.016	0.005	0.016	0.005	0.011	0.005	0.015	0.005	0.018	0.010	ND	0.005	0.0094	0.0020	0.0027	0.0020	0.0073	0.0020	0.0042	0.0020	0.0032	0.0020	0.0031	0.0020	0.0033	0.0020	0.0030	0.0020	0.0045	0.0020	0.0036	0.0020	0.0043	0.0020	0.0030	0.0020	0.0035
Nitrogen/Nitrate	10.0	NP	0.036	NP	ND	0.02	1.0	0.02	0.27	0.02	0.05	0.02	ND	0.02	0.33	0.02	0.31	0.02	0.32	0.2	3.5	0.10	ND	0.10	ND	0.10	0.16	0.10	ND	0.10	0.22	0.10	ND	0.10	ND	0.10	0.24	0.10	2.4	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.10	ND	0.10	ND	0.10	0.18	0.10	ND	0.10	0.22	0.10	ND	0.10	ND	0.10	0.24	0.20	2.4	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.020	ND	0.020	ND	0.020	0.022	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	NP	0.0024	NP	0.0015	0.001	0.065	0.001	0.0035	0.001	0.003	0.001	0.0017	0.001	0.0037	0.001	0.022	0.0050	0.0055	0.001	0.15	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.020	0.0025	0.014	0.0025	ND	0.0025	ND	0.0025	0.023	0.0025	0.042	0.0025	ND	0.0025	ND	0.0025	0.0035
Silver	0.05	NP	ND	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	NP	960	NP	820	250	770	250	810	250	940	100	850	100	880	250	990	500	810	100	390	250	800	250	900	250	840	100	680	100	720	250	1100	250	1300	250	850	250	1200	250	1000	500	1200	250	730
Thallium	0.002	NP	0.0019	NP	0.0018	0.001	0.0035	0.001	0.0039	0.001	0.0027	0.001	0.0016	0.001	0.0016	0.001	0.0034	0.0010	0.0025	0.001	0.0043	0.0020	0.0025	0.0020	0.0043	0.0020	0.0022	0.0020	0.0023	0.0020	0.0026	0.0020	0.0023	0.0020	ND	0.0020	ND	0.0020	0.0044	0.0020	0.0065	0.0020	0.0033	0.0020	0.0043
Total Dissolved Solids	1,200	NP	1800	NP	1700	17	1800	17	1900	17	2000	17	1800	17	1800	17	2200	26	1700	26	1300	10	2000	10	2100	10	2100	10	1900	10	1700	10	2400	10	2200	10	2200	13	2700	10	2400	10	2300	10	1800
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0080	0.010	0.005	0.007	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	NP	ND	NP	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	0.0084	0.020	ND	0.006	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.005	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.0021	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.03	ND	0.03	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00069	0.0025	0.0061	0.0025	ND
pH	6.5 - 9.0	NA	7.55	NA	7.75	NA	7.27	NA	7.15	NA	7.08	NA	7.40	NA	6.05	NA	8.35	NA	7.13	NA	8.21	NA	7.03	NA	6.93	NA	7.11	NA	7.72	NA	6.99	NA	7.17	NA	7.31	NA	7.28	NA	7.04	NA	7.30	NA	7.03	NA	7.05
Temperature	NA	NA	17.28	NA	14.52	NA	16.04	NA	17.94	NA	18.65	NA	16.54	NA	14.74	NA	15.10	NA	15.06	NA	14.50	NA	17.22	NA	16.52	NA	13.59	NA	12.83	NA	17.53	NA	20.10	NA	14.66	NA	6.67	NA	16.35	NA	21.01	NA	17.89	NA	10.84
Conductivity	NA	NA	2.61	NA	2.42	NA	2.44	NA	2.60	NA	2.74	NA	2.07	NA	2.00	NA	2.92	NA	2.06	NA	1.72	NA	1.98	NA	2.17	NA	2.10	NA	1.74	NA	2.00	NA	2.83	NA	3.49	NA	1.89	NA	2.98	NA	2.90	NA	2.62	NA	1.81
Dissolved Oxygen	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	2.00	NA	3.88	NA	0.72	NA	0.31	NA	0.51	NA	1.55	NA	0.42	NA	0.37	NA	0.66	NA	4.11	NA	1.03	NA	1.15	NA	0.59	NA	2.50
ORP	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	80	NA	127	NA	5.9	NA	2.8	NA	-146.8	NA	-77.3	NA	-26.4	NA	-41.2	NA	-105.4	NA	52.4	NA	9.8	NA	-30.6	NA	67.6	NA	-8.6

Sample: MW-14	5/19/2016		8/18/2016		11/17/2016		2/17/2017		5/4/2017		8/29/2017		11/9/2017		3/7/2018		5/17/2018		8/9/2018		10/31/2018		2/28/2019		5/2/2019		8/2//2019		11/14/2019		2/26/2020		4/30/2020		8/11/2020		12/10/2020		2/24/2021		5/12/2021	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0060	ND	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.0010	0.0027	0.0010	0.0013	0.0010	ND	0.0020	ND ^	0.0010	0.0012	0.001	0.0081	0.001	ND	0.001	ND	0.001	ND	0.001	0.0011	0.001	0.0013	0.001	0.0013	0.001	0.0019	0.001	0.0014	0.001	0.002	0.001	ND	0.001	ND ^	0.001	0.001	0.001	ND	0.001	ND	0.001	ND
Barium	0.0025	0.050	0.0025	0.055	0.0025	0.065	0.013	0.070	0.0025	0.054	0.0025	0.16	0.0025	0.036	0.0025	0.041	0.0025	0.041	0.0025	0.052	0.0025	0.047	0.0025	0.056	0.0025	0.053	0.0025	0.06	0.0025	0.049	0.0025	0.043	0.0025	0.04	0.0025	0.039	0.0025	0.039	0.0025	0.036	0.0025	0.033
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0020	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^1+	0.001	ND ^+	0.001	ND ^+
Boron	0.050	2.2	0.050	1.5	0.25	1.8	0.10	2.3	0.25	2.5	0.25	2.2	0.05	1.9	0.5	2.4	0.25	1.5	0.25	1.6	0.05	1.6	0.05	1.5	0.25	2	0.25	1.8	0.25	2	0.25	2	0.05	2.2	0.5	2.4	0.25	1.1	0.25	2.2	0.25	2.1
Cadmium	0.00050	ND	0.00050	ND	0.00050	0.00082	0.0010	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	0.00083	0.0005	0.00071	0.0005	0.001	0.0005	0.00073	0.0005	0.00064	0.0005	0.00062	0.0005	0.00076	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	10	140	10	160	10	170	10	190	10	180	10	180	10	180	10	140	10	130	10	140	2	120	10	130	10	130	10	180	10	160	10	150	10	130	10	120	10	140	10	110	10	96
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.0010	ND	0.0010	ND	0.0010	ND	0.0020	ND	0.0010	0.0012	0.001	0.0023	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0040	ND ^	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	0.10	1.0	0.10	0.96	0.10	0.96	0.10	0.86	0.10	0.81	0.1	1	0.1	0.96	0.1	1.1	0.1	0.96	0.1	0.95	0.1	1.1	0.1	0.91	0.1	0.91	0.1	0.85	0.1	0.92	0.1	0.97	0.1	1	0.1	0.81	0.1	1.1	0.1	1.1	0.1	1
Iron	0.10	ND	0.10	ND	0.10	0.18	0.10	2.0	0.10	3.0	0.1	0.73	0.1	0.2	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.18	0.1	1.7	0.1	ND	0.1	0.42	0.1	0.83	0.1	0.35	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.0010	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	0.25	0.0025	0.26	0.0025	0.81	0.0025	1.8	0.0025	1.7	0.0025	4.7	0.0025	0.27	0.0025	0.42	0.0025	0.1	0.0025	0.11	0.0025	0.64	0.0025	0.89	0.0025	0.84	0.0025	0.26	0.0025	0.63	0.0025	0.75	0.0025	0.53	0.0025	0.59	0.0025	0.034	0.0025	ND	0.0025	0.86
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.0002	0.00023	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.0020	ND	0.0020	0.0029	0.0020	0.0038	0.0040	ND	0.0020	0.0055	0.002	0.0035	0.002	0.0021	0.002	0.002	0.002	ND	0.002	0.0025	0.002	0.0021	0.002	0.003	0.002	0.0031	0.002	0.0044	0.002	0.0034	0.002	0.0034	0.002	0.0031	0.002	0.0025	0.002	ND	0.002	ND	0.002	ND
Nitrogen/Nitrate	0.10	0.11	0.10	0.35	0.10	ND	0.10	ND	0.10	0.11	0.1	ND	0.1	0.14	0.1	0.65	0.1	1.1	0.1	0.51	0.1	ND	0.1	0.51	0.1	1.2	0.1	ND	0.1	0.11	0.1	ND	0.1	1.5	0.1	ND	0.1	0.16	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nitr	0.10	0.11	0.10	0.35	0.10	ND	0.10	ND	0.10	0.11	0.1	ND	0.1	0.14	0.1	0.65	0.1	1.1	0.1	0.51	0.1	ND	0.1	0.51	0.1	1.2	0.1	ND	0.1	0.11	0.1	ND ^	0.1	1.5	0.1	ND	0.1	0.16	0.1	ND	0.1	ND
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND ^	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	0.0076	0.0025	0.023	0.0025	ND ^	0.0050	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.012	0.0025	0.021	0.0025	0.011	0.0025	ND	0.0025	0.016	0.0025	0.019	0.0025	0.0036	0.0025	0.012	0.0025	0.007	0.0025	0.048	0.0025	0.0027	0.0025	ND	0.0025	ND	0.0025	0.0031
Silver	0.00050	ND	0.00050	ND	0.00050	ND	0.0010	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	250	650	250	1000	250	1200	500	1500	500	1700	500	1300	500	1300	130	520	250	840	250	590	250	550	40	970	40	1100	40	990	50	990	50	980	50	790 ^	100	720	250	760	250	700	100	660
Thallium	0.0020	0.0028	0.0020	0.0041	0.0020	0.0048	0.0040	ND	0.0020	0.0028	0.002	ND	0.002	0.0024	0.002	0.003	0.002	0.0042	0.002	0.0036	0.002	0.0033	0.002	0.0046	0.002	0.0036	0.002	0.0072	0.002	0.0038	0.002	0.0035	0.002	0.0036	0.002	0.0042	0.002	0.0021	0.002	ND	0.002	0.0021
Total Dissolved Solids	10	1800	10	2300	10	2900	10	3200	10	3600	10	2900	10	2700	10	1400	10	2100	10	2000	10	1900	10	2200	10	2400	10	2300	10	2300	10	2200	10	2100	150	1700	10	1800	10	1800	10	1600
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	0.0054	0.005	ND	0.005	0.0059	0.005	0.0058	0.005	ND	0.005	ND ^	0.005	0.0051	0.005	ND	0.005	ND	0.005	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.040	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00052	0.0025	ND	0.0025	0.006	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.03	NA	6.78	NA	6.80	NA	7.17	NA	7.23	NA	7.02	NA	6.81	NA	6.83	NA	6.78	NA	7.18	NA	7.48	NA	6.88	NA	6.86	NA	6.92	NA	7.33	NA	6.97	NA	6.82	NA	6.80	NA	6.73	NA	7.20	NA	7.13
Temperature	NA	16.54	NA	22.91	NA	17.82	NA	15.94	NA	12.98	NA	17.10	NA	13.13	NA	8.07	NA	16.95	NA	20.77	NA	13.09	NA	13.60	NA	14.40	NA	15.70	NA	14.88	NA	14.80	NA	14.60	NA	16.00	NA	15.70	NA	15.20	NA	15.20
Conductivity	NA	2.02	NA	2.53	NA	2.86	NA	3.22	NA	2.85	NA	2.72	NA	2.57	NA	2.23	NA	1.85	NA	2.15	NA	1.79	NA	3.58	NA	2.53	NA	0.26	NA	3.01	NA	2.54	NA	2.36	NA	0.78	NA	2.53	NA	2.07	NA	2.35
Dissolved Oxygen	NA	2.16	NA	3.44	NA	1.49	NA	3.18	NA	4.79	NA	1.00	NA	3.81	NA	3.32	NA	4.00	NA	4.66	NA	4.70	NA	0.37	NA	0.39	NA	0.29	NA	0.48	NA	0.24	NA	0.27	NA	8.57	NA	1.73	NA	1.05	NA	0.15
ORP	NA	-13.5	NA	-128.8	NA	5.1	NA	-4.9	NA	-64.1	NA	37.4	NA	-32.9	NA	-7.1	NA	86.0	NA	-25.6	NA	-3.7	NA	-18.4	NA	-72.3	NA	18.1	NA	-66.0	NA	-93.1	NA	-58.6	NA	60.6	NA	63.0	NA	-12.9	NA	70.3

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.
DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured
NR - Not Required
NS - Not Sampled
H - Prepped/analyzed past hold time
V - Serial Dilution Exceeds Control Limits
F1- MS and/or MSD Recovery outside of limits.
F2- MS/MSD RPD exceeds control limits.
^1+ - Initial Calibration Verification is outside acceptance limits, high biased
^+ - Continuing Calibration Verification is outside acceptance limits, high biased
^ - Denotes instrument related QC exceeds the control limits
* - Median Value (for temp)
* - LCS or LCSD is outside acceptance limits
Temperature °C degrees Celcius
Conductivity ms/cm^c millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

Sample: MW-15	Date	12/15/2010		2/15/2011		4/25/2011		6/16/2011		8/9/2011		10/13/2011		12/12/2011		4/10/2012		12/14/2012		2/28/2013		5/30/2013		7/30/2013		10/23/2013		3/6/2014		5/28/2014		8/27/2014		10/28/2014		2/26/2015		5/14/2015		8/19/2015		11/18/2015		2/25/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NP	ND	NP	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0050	ND	0.003	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	NP	0.0099	NP	0.0092	0.001	0.0064	0.001	0.0052	0.001	0.0053	0.001	0.011	0.001	0.0097	0.001	0.0061	0.0050	0.011	0.001	0.0078	0.0010	0.0037	0.0010	0.0046	0.0010	0.0066	0.0010	0.0072	0.0010	0.0019	0.0010	0.0029	0.0010	0.0059	0.0010	0.0017	0.0010	0.0024	0.0010	0.0020	0.0010	0.0032	0.0010	0.0019
Barium	2.0	NP	0.058	NP	0.052	0.001	0.061	0.001	0.11	0.001	0.057	0.001	0.06	0.001	0.063	0.001	0.075	0.0020	0.11	0.001	0.096	0.0025	0.11	0.0025	0.080	0.0025	0.12	0.0025	0.098	0.0025	0.068	0.0025	0.14	0.0025	0.14	0.0025	0.10	0.0025	0.12	0.0025	0.070	0.0025	0.083	0.0025	0.059
Beryllium	0.004	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0010	ND ^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	NP	1.6	NP	1.4	0.01	1.5	0.01	1.6	0.01	1.3	0.02	1.2	0.01	1.2	0.01	1.4	2.0	ND	0.01	1.7	0.050	1.5	0.050	1.6	0.050	1.2	0.050	1.1	0.25	1.2	0.050	0.95	0.050	0.74	0.25	1.1	0.25	1.4	0.050	1.9	0.050	1.5	0.25	2.4
Cadmium	0.005	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	NP	180	NP	190	25	190	50	170	25	210	100	180	100	200	50	200	50	220	50	200	10	210	10	220	10	210	10	240	10	220	10	240	10	230	10	240	10	230	10	110	10	200	10	110
Chromium	0.1	NP	0.0042	NP	0.0061	0.004	0.0092	0.004	0.0054	0.004	0.0091	0.004	0.0062	0.004	0.0062	0.004	0.0071	0.0030	0.012	0.004	0.0062	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	NP	ND	NP	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.0030	ND	0.002	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	NP	ND	NP	ND	0.003	0.0039	0.003	0.005	0.003	0.0041	0.003	0.0037	0.003	0.0031	0.003	0.0039	0.010	ND	0.003	0.0036	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND^	0.0020	ND	0.0020	ND ^	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	NP	ND	NP	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	NP	0.69	NP	0.75	0.25	0.60	0.25	0.73	0.25	0.76	0.25	0.77	0.25	0.75	0.25	0.79	0.25	0.95	0.25	0.29	0.10	0.65	0.10	0.78	0.10	0.71	0.10	0.78	0.10	0.65	0.10	0.67	0.10	0.71	0.10	0.64	0.10	0.47	0.10	0.57	0.10	0.52	0.10	0.63
Iron	5.0	NP	3.3	NP	2.4	0.010	2.1	0.010	0.70	0.010	2.1	0.010	2.6	0.010	2.1	0.010	1.1	0.010	1.9	0.01	1.5	0.10	0.83	0.10	1.3	0.10	1.1	0.10	2.0	0.10	0.37	0.10	0.78	0.10	2.1	0.10	0.28	0.10	0.44	0.10	0.17	0.10	1.8	0.10	0.11
Lead	0.0075	NP	ND	NP	ND	0.001	0.0012	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0050	ND	0.001	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	NP	0.56	NP	0.42	0.001	0.36	0.001	0.6	0.001	0.37	0.001	0.48	0.001	0.39	0.001	0.25	0.0020	0.51	0.001	0.35	0.0025	0.27	0.0025	0.30	0.0025	0.43	0.0025	0.59	0.0025	0.30	0.0025	0.95	0.0025	0.87	0.0025	0.40	0.0025	0.42	0.0025	0.18	0.0025	1.3	0.0025	0.095
Mercury	0.002	NP	ND	NP	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.00020	ND	0.0002	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	NP	0.013	NP	0.011	0.005	0.012	0.005	0.015	0.005	0.01	0.005	0.011	0.005	0.011	0.005	0.01	0.010	ND	0.005	0.0079	0.0020	0.0072	0.0020	0.0063	0.0020	0.0052	0.0020	0.0034	0.0020	0.0047	0.0020	0.0038	0.0020	0.0037	0.0020	0.0090	0.0020	0.010	0.0020	0.0057	0.0020	0.0082	0.0020	0.0076
Nitrogen/Nitrate	10.0	NP	0.03	NP	0.086	0.02	0.04	0.02	0.07	0.02	0.05	0.02	ND	0.02	0.07	0.02	0.12	0.02	0.12	0.02	0.02	0.10	ND	0.10	ND	0.10	0.22	0.10	ND	0.10	0.40	0.10	ND	0.10	ND	0.10	0.18	0.10	0.10	0.10	0.34	0.10	ND	0.10	2.0
Nitrogen/Nitrate, Nitr	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.10	ND	0.10	ND	0.10	0.22	0.10	ND	0.10	0.40	0.10	ND	0.10	ND^	0.10	0.18	0.10	0.10	0.10	0.34	0.10	ND	0.10	2.0
Nitrogen/Nitrite	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	0.046	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND F1	0.0040	ND	0.0040	ND
Selenium	0.05	NP	0.0042	NP	0.0079	0.001	0.017	0.001	0.004	0.001	0.002	0.001	0.004	0.001	0.0047	0.001	0.025	0.0050	ND	0.001	0.0024	0.0025	0.0065	0.0025	ND	0.0025	0.013	0.0025	ND	0.0025	0.033	0.0025	ND	0.0025	0.0030	0.0025	0.068	0.0025	0.051	0.0025	0.013	0.0025	0.0080	0.0025	0.042
Silver	0.05	NP	ND	NP	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.010	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	NP	300	NP	220	100	270	100	650	50	250	100	180	100	140	50	200	50	320	50	280	250	570	100	460	100	420	100	260	100	390	130	620	100	660	100	460	250	930	250	640	250	1500	250	670
Thallium	0.002	NP	ND	NP	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.0010	ND	0.001	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solids	1,200	NP	1000	NP	1000	17	1100	17	1600	17	1000	17	890	17	840	17	1000	26	1100	26	1100	10	1700	10	1400	10	1400	10	1300	10	1300	10	1800	10	1600	10	1400	10	2500	10	1900	10	2400	10	1600
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0080	ND	0.005	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	NP	ND	NP	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.006	ND	0.020	ND	0.006	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.005	ND	0.005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.03	ND	0.03	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00073	0.0025	ND	0.0025	0.00054
pH	6.5 - 9.0	NA	7.43	NA	7.23	NA	7.06	NA	6.79	NA	6.89	NA	7.37	NA	6.84	NA	8.23	NA	7.30	NA	8.09	NA	6.71	NA	6.93	NA	7.18	NA	7.75	NA	6.89	NA	7.45	NA	7.36	NA	7.53	NA	7.05	NA	7.07	NA	6.55	NA	6.84
Temperature	NA	NA	15.96	NA	15.59	NA	16.50	NA	17.95	NA	18.41	NA	13.38	NA	16.50	NA	15.20	NA	16.25	NA	13.30	NA	18.64	NA	16.91	NA	15.59	NA	14.71	NA	20.04	NA	26.66	NA	17.05	NA	7.93	NA	15.57	NA	19.19	NA	15.04	NA	11.00
Conductivity	NA	NA	1.78	NA	1.66	NA	1.70	NA	2.23	NA	1.66	NA	1.25	NA	1.20	NA	1.51	NA	1.58	NA	1.00	NA	1.97	NA	1.62	NA	1.58	NA	1.29	NA	1.80	NA	2.32	NA	2.26	NA	1.41	NA	2.67	NA	2.45	NA	2.55	NA	1.73
Dissolved Oxygen	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	0.09	NA	0.37	NA	0.40	NA	0.16	NA	0.28	NA	1.15	NA	0.65	NA	0.57	NA	0.45	NA	1.36	NA	0.83	NA	1.51	NA	0.70	NA	1.36
ORP	NA	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	NM	NA	-90	NA	-87	NA	-9.3	NA	-48.3	NA	-180.6	NA	-141.6	NA	-8.6	NA	-30.9	NA	-84.6	NA	-34.4	NA	-25.7	NA	-29.2	NA	31.9	NA	22.8

Sample: MW-15	5/19/2016		8/18/2016		11/17/2016		2/17/2017		5/4/2017		8/29/2017		11/10/2017		3/7/2018		5/17/2018		8/9/2018		10/31/2018		2/28/2019		5/2/2019		8/28/2019		11/14/2019		2/26/2020		4/29/2020		8/11/2020		12/8/2020		2/24/2021		5/12/2021	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0060	ND	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.0010	0.0019	0.0010	0.0018	0.0010	0.0011	0.0050	ND	0.0010	0.0031	0.001	0.0012	0.001	0.0032	0.001	ND	0.001	0.0016	0.001	ND	0.001	ND	0.001	0.0018	0.001	0.0025	0.001	ND	0.001	0.0017	0.001	0.0012	0.001	0.0026	0.001	ND	0.001	0.0025	0.001	0.001	0.001	0.0013
Barium	0.0025	0.078	0.0025	0.045	0.0025	0.053	0.013	0.048	0.0025	0.042	0.0025	0.043	0.0025	0.043	0.0025	0.049	0.0025	0.05	0.0025	0.044	0.0025	0.045	0.0025	0.058	0.0025	0.052	0.0025	0.055	0.0025	0.05	0.0025	0.057	0.0025	0.064	0.0025	0.084	0.0025	0.074	0.0025	0.057	0.0025	0.066
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0020	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^1+	0.001	ND ^+	0.001	ND
Boron	0.050	1.9	0.050	1.8	0.25	2.0	0.10	1.6	0.25	1.4	0.05	1.6	0.05	1.2 V	0.5	1.8	0.5	2.4	0.5	2.3	0.05	1.8	0.05	1.4	0.25	1.8	0.25	1.8	0.25	1.7	0.25	1.4	0.05	1.2	0.5	2.6	0.25	1.3	0.25	1.2	0.25	1.3
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.0010	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	10	230	10	170	10	180	10	190 F1	10	170	10	190	10	180	10	180	10	160	10	200	10	170	10	190	10	210	10	170	10	160	10	160	10	190	10	210	10	200	10	160	10	180
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.0010	ND	0.0010	ND	0.0010	ND	0.0020	ND	0.0010	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0040	ND ^	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	0.0052 *	0.005	ND	0.005	ND
Fluoride	0.10	0.52	0.10	0.56	0.10	0.53	0.10	0.49	0.10	0.55	0.1	0.52	0.1	0.62	0.1	0.52	0.1	0.52	0.1	0.5	0.1	0.54	0.1	0.55	0.1	0.53	0.1	0.5	0.1	0.51	0.1	0.5	0.1	0.55	0.1	0.41	0.1	0.56	0.1	0.52	0.1	0.49
Iron	0.10	0.64	0.10	0.81	0.10	0.22	0.10	0.66	0.10	1.4	0.1	ND	0.1	1.1	0.1	0.11	0.1	0.36	0.1	ND	0.1	ND	0.1	0.83	0.1	0.49	0.1	0.11	0.1	0.39	0.1	0.5	0.1	0.65	0.1	ND	0.1	2.7	0.1	0.43	0.1	0.65
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.0010	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	0.59	0.0025	0.52	0.0025	0.19	0.0025	0.43	0.0025	0.67	0.0025	0.03	0.0025	0.71	0.0025	0.51	0.0025	0.084	0.0025	0.11	0.0025	0.16	0.0025	0.69	0.0025	0.43	0.0025	0.17	0.0025	0.32	0.0025	0.63	0.0025	0.65	0.0025	0.063	0.0025	1.1	0.0025	0.45	0.0025	0.5
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.0002	0.00022	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.0020	0.0089	0.0020	0.0055	0.0020	0.0063	0.0040	0.0050	0.0020	0.0051	0.002	0.0061	0.002	0.0039	0.002	0.0038	0.002	0.0068	0.002	0.0062	0.002	0.0048	0.002	0.0035	0.002	0.0048	0.002	0.0057	0.002	0.0043	0.002	0.0046	0.002	0.0044	0.002	0.0084	0.002	0.0049	0.002	0.0026	0.002	0.004
Nitrogen/Nitrate	0.10	ND	0.10	ND	0.10	0.17	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	0.66	0.1	2.9	0.1	2.7	0.1	0.36	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	1.6	0.1	0.12	0.1	0.13	0.1	ND
Nitrogen/Nitrate, Nitr	0.10	ND	0.10	ND	0.10	0.17	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	0.66	0.5	2.9	0.2	2.7	0.1	0.36	0.1	ND	0.1	ND ^	0.1	ND	0.1	ND	0.1	ND ^	0.1	ND	0.1	1.6	0.1	0.12	0.1	0.13	0.1	ND
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND ^	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	0.015	0.0025	ND	0.0025	0.017	0.013	ND	0.0025	ND F1	0.0025	0.013	0.0025	0.0093	0.0025	0.049	0.0025	0.096	0.0025	0.07	0.0025	0.014	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0046	0.0025	0.0031	0.0025	ND ^	0.0025	0.046	0.0025	0.0077	0.0025	0.025	0.0025	0.0058
Silver	0.00050	ND	0.00050	ND	0.00050	ND	0.0010	ND	0.00050	ND	0.0005	ND	0.0005	ND ^	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	500	1100	100	620	130	570	130	610	100	480	100	680	100	450	100	460	250	540	100	490	100	200	20	330	20	450	40	420	20	340	20	360	50	360	100	700	100	550	50	440	50	470
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0040	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solids	10	2800	10	1900	10	1900	10	1700	10	1500	10	1900	10	1500	10	1500	10	1900	10	1600	10	1300	10	1300	10	1500	10	1400	10	1200	10	1200	10	1300	150	1800	10	1500	10	1300	10	1500
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.040	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00068	0.0025	0.0012	0.0025	ND	0.0025	0.0066	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	6.83	NA	6.96	NA	6.91	NA	7.24	NA	7.35	NA	6.87	NA	7.09	NA	6.89	NA	6.75	NA	7.06	NA	7.54	NA	7.03	NA	6.89	NA	6.95	NA	7.24	NA	6.73	NA	6.90	NA	6.53	NA	7.04	NA	7.00	NA	6.97
Temperature	NA	18.10	NA	23.69	NA	18.29	NA	17.81	NA	14.56	NA	16.90	NA	11.37	NA	8.36	NA	19.90	NA	20.75	NA	14.49	NA	14.20	NA	15.50	NA	16.30	NA	14.53	NA	15.00	NA	15.30	NA	16.00	NA	15.10	NA	15.60	NA	16.70
Conductivity	NA	2.89	NA	2.52	NA	2.05	NA	2.09	NA	1.74	NA	1.96	NA	1.57	NA	1.38	NA	1.91	NA	1.98	NA	1.50	NA	1.98	NA	1.33	NA	0.23	NA	1.76	NA	1.67	NA	1.72	NA	2.62	NA	0.31	NA	1.67	NA	2.06
Dissolved Oxygen	NA	2.53	NA	1.76	NA	3.28	NA	2.30	NA	3.87	NA	0.69	NA	2.34	NA	1.90	NA	3.49	NA	7.90	NA	8.52	NA	0.16	NA	0.29	NA	0.53	NA	1.06	NA	0.42	NA	0.22	NA	1.12	NA	0.64	NA	1.12	NA	1.41
ORP	NA	-0.2	NA	-60.6	NA	-27.3	NA	20.3	NA	-74.4	NA	123.3	NA	-87.8	NA	-51.4	NA	9.5	NA	-49.3	NA	4.5	NA	-58.7	NA	-65.7	NA	1.6	NA	-39.1	NA	-48.8	NA	-81.5	NA	111.7	NA	-84.7	NA	-27.4	NA	-9.5

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.
DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured
NR - Not Required
NS - Not Sampled
H - Prepped/analyzed past hold time
V - Serial Dilution Exceeds Control Limits
F1- MS and/or MSD Recovery outside of limits.
F2- MS/MSD RPD exceeds control limits.
^1+ - Initial Calibration Verification is outside acceptance limits, high biased
^+ - Continuing Calibration Verification is outside acceptance limits, high biased
^ - Denotes instrument related QC exceeds the control limits
* - Median Value (for temp)
* - LCS or LCSD is outside acceptance limits
Temperature °C degrees Celcius
Conductivity ms/cm^c millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

Attachment 9-3 Historical CCA Groundwater Data - Midwest Generation LLC, Powerton Station, Pekin, IL

Sample: MW-16	Date	12/15/2010		2/15/2011		4/25/2011		6/16/2011		8/9/2011		10/13/2011		12/12/2011		4/10/2012		12/12/2012		2/27/2013	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0050	ND	0.003	ND
Arsenic	0.010	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0050	ND	0.001	ND
Barium	2.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.020	0.039	0.001	0.042
Beryllium	0.004	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0010	ND	0.001	ND
Boron	2.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.20	ND	0.01	0.13
Cadmium	0.005	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0010	ND	0.001	ND
Chloride	200.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	10	26	10	18
Chromium	0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0030	0.0047	0.004	0.0052
Cobalt	1.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0030	ND	0.002	ND
Copper	0.65	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.010	ND	0.003	ND
Cyanide	0.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0050	ND	0.005	ND
Fluoride	4.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25	ND	0.25	ND
Iron	5.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.010	0.012	0.01	0.019
Lead	0.0075	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0050	ND	0.001	ND
Manganese	0.15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0020	0.022	0.001	0.0053
Mercury	0.002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.00020	ND	0.0002	ND
Nickel	0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.010	ND	0.005	ND
Nitrogen/Nitrate	10.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50	18	0.5	23
Nitrogen/Nitrate, Nit	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NR	NR	NR	NR
Nitrogen/Nitrite	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NR	NR	NR	NR
Perchlorate	0.0049	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NR	NR	NR	NR
Selenium	0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0050	ND	0.001	0.0015
Silver	0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.010	ND	0.005	ND
Sulfate	400.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	10	37	10	31
Thallium	0.002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0010	ND	0.001	ND
Total Dissolved Soli	1,200	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	26	520	26	420
Vanadium	0.049	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0080	ND	0.005	ND
Zinc	5.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.020	ND	0.006	ND
Benzene	0.005	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.005	ND	0.005	ND
BETX	11.705	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.03	ND	0.03	ND
pH	6.5 - 9.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA	7.38	NA	8.31
Temperature	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA	12.84	NA	13.10
Conductivity	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA	0.61	NA	1.17
Dissolved Oxygen	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA	9.54	NA	8.53
ORP	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA	110	NA	-38

Sample: MW-16	5/29/2013		7/29/2013		10/22/2013		3/3/2014		5/30/2014		8/26/2014		10/30/2014		2/24/2015		5/12/2015		8/18/2015		11/16/2015	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Barium	0.0025	0.038	0.0025	0.035	0.0025	0.037	0.0025	0.060	0.0025	0.036	0.0025	0.035	0.0025	0.034	0.0025	0.038	0.0025	0.037	0.0025	0.039	0.0025	0.038
Beryllium	0.0010	ND ^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	0.050	0.20	0.050	0.26	0.050	0.35	0.050	0.17	0.050	0.17	0.050	0.15	0.050	0.14	0.050	0.17	0.050	0.15	0.050	0.25	0.050	1.0
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	2.0	19	2.0	21	2.0	35	10	230	2.0	20	2.0	25	2.0	24	2.0	24	2.0	29	2.0	29	2.0	33
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND ^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND ^	0.0020	ND	0.0020	ND ^	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	0.10	ND	0.10	0.11	0.10	0.11	0.10	ND	0.10	0.11	0.10	0.11	0.10	0.10	0.10	0.10	0.10	0.11	0.10	0.10	0.10	0.11
Iron	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0035	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0025	0.0025	ND	0.0025	ND	0.0025	ND
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	0.10	20	0.10	13	0.10	19	0.10	16	0.10	21	0.10	22	0.10	28	0.10	28	0.10	24	0.10	19	0.10	17
Nitrogen/Nitrate, Nit	2.5	20	2.5	13	1.0	19	2.0	16	2.5	21	2.0	22	2.5	28	2.0	28	2.0	24	2.0	19	1.0	17
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	20	50	20	55	20	55	10	34	10	40	10	35	10	54	10	27	10	33	20	64	25	57
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	10	460	10	440	10	540	10	800	10	390	10	440	10	510	10	490	10	530	10	540	10	460
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND ^	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0011
pH	NA	7.10	NA	7.18	NA	7.27	NA	7.85	NA	7.20	NA	7.41	NA	7.30	NA	7.56	NA	7.35	NA	7.19	NA	6.78
Temperature	NA	15.29	NA	16.61	NA	12.74	NA	9.98	NA	17.83 *	NA	22.10	NA	13.09	NA	8.21	NA	12.56	NA	19.75	NA	13.05
Conductivity	NA	0.60	NA	0.59	NA	0.63	NA	0.89	NA	0.88	NA	0.75	NA	0.94	NA	0.57	NA	0.67	NA	0.80	NA	0.62
Dissolved Oxygen	NA	6.78	NA	4.91	NA	6.24	NA	6.50	NA	6.99	NA	6.84	NA	2.05	NA	8.44	NA	7.97	NA	7.43	NA	7.61
ORP	NA	70.2	NA	24.7	NA	-83.4	NA	315.3	NA	74.8	NA	36.7	NA	-2.7	NA	95.6	NA	105.0	NA	-9.1	NA	188.1

Sample: MW-16	2/24/2016		5/16/2016		8/19/2016		11/16/2016		2/15/2017		5/2/2017		8/23/2017		11/9/2017		3/8/2018		5/17/2018		8/8/2018	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.003	0.0031	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND ^	0.0010	ND	0.001	0.004	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Barium	0.0025	0.043	0.0025	0.043	0.0025	0.039	0.0025	0.041	0.0025	0.040	0.0025	0.039	0.0025	0.039	0.0025	0.045	0.0025	0.041	0.0025	0.041	0.0025	0.038
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND ^	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	0.050	0.63	0.050	0.23	0.050	0.19	0.050	0.18	0.050	0.17	0.050	0.14	0.05	0.14	0.05	0.19	0.05	0.13	0.05	0.14	0.05	0.15
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	2.0	45	2.0	33	2.0	33	2.0	26	2.0	29	2.0	33	2	22	2	29	2	28	2	23	2	23
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	0.10	0.11	0.10	0.10	0.10	0.10	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Iron	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0059	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.028	0.0025	ND	0.0025	ND	0.0025	ND
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Nitrogen/Nitrate	0.10	16	0.10	22	0.10	25	0.10	27	0.10	23	0.10	27	0.1	22	0.1	24	0.1	26	0.1	25	0.1	24
Nitrogen/Nitrate, Nit	1.0	16	2.0	22	2.0	25	2.0	27	2.5	23	2.5	27	2	22	2	24	2	26	2	25	2	24
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND ^	0.004	ND
Selenium	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND ^	0.0025	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	10	50	10	40	10	43	10	38	10	33	10	43	10	34	20	38	20	41	20	30	10	29
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	10	510	10	530	10	620	10	540	10	520	10	560	10	460	10	530	10	530	10	540	10	470
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	0.00056
BETX	0.0025	ND	0.0025	0.0018	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0014	0.0025	0.0009	0.0025	0.00866
pH	NA	7.23	NA	7.13	NA	7.09	NA	6.93	NA	6.72	NA	7.14	NA	7.44	NA	6.95	NA	6.93	NA	6.76	NA	7.19
Temperature	NA	9.13	NA	14.63	NA	22.11	NA	16.10	NA	9.78	NA	13.99	NA	16.10	NA	13.06	NA	6.81	NA	17.97	NA	18.67
Conductivity	NA	0.59	NA	0.68	NA	0.80	NA	0.67	NA	0.61	NA	0.65	NA	0.67	NA	0.66	NA	0.53	NA	0.67	NA	0.67
Dissolved Oxygen	NA	7.95	NA	8.26	NA	7.50	NA	6.51	NA	8.00	NA	8.04	NA	7.63	NA	8.10	NA	7.53	NA	8.80	NA	8.26
ORP	NA	43.3	NA	57.0	NA	67.0	NA	17.0	NA	214.2	NA	39.1	NA	170.0	NA	-34.3	NA	-16.9	NA	12.8	NA	5.4

Sample: MW-16	10/31/2018		2/27/2019		5/2/2019		8/27/2019		11/14/2019		2/25/2020		4/27/2020		8/11/2020		12/10/2020		2/23/2021		5/10/2021	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND F1	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Barium	0.0025	0.041	0.0025	0.045	0.0025	0.039	0.0025	0.039	0.0025	0.046	0.0025	0.042	0.0025	0.04	0.0025	0.04	0.0025	0.041	0.0025	0.038	0.0025	0.041
Beryllium	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^1+	0.001	ND ^+	0.001	ND ^+
Boron	0.05	0.18	0.05	0.17	0.05	0.2	0.05	0.16	0.05	0.22	0.05	0.16	0.05	0.15	0.05	0.14	0.05	0.12	0.05	0.12	0.05	0.091
Cadmium	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	2	24	2	25	2	22	2	31	2	26	2	26	2	18	2	21	2	23	2	24	2	25
Chromium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND F1 F2	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.11	0.1	0.1	0.1	0.12	0.1	ND	0.1	0.11	0.1	0.1	0.1	0.10 H
Iron	0.1	ND	0.1	0.23	0.1	ND	0.1	ND	0.1	0.13	0.1	ND ^	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	ND	0.0025	0.014	0.0025	ND	0.0025	0.027	0.0025	0.019	0.0025	0.0051	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0058	0.0025	ND
Mercury	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Nitrogen/Nitrate	0.1	22	0.1	23	0.1	20	0.1	12	0.1	19	0.1	22	0.1	23	0.1	18	0.1	29	0.1	22	0.1	22 H
Nitrogen/Nitrate, Nit	2	22	2.5	23	2.5	20	2.5	12	2.5	19 ^	2.5	22	2	23	1	18	5	29	2	22	2.5	22
Nitrogen/Nitrite	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND F1	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND F1	0.0025	ND	0.0025	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	10	25	25	36	5	33	5	35	5	32	5	29	5	29	5	25	5	27	5	25	5	30
Thallium	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	10	590	10	520	10	550	10	470	10	480	10	440	10	500	30	400	10	390	10	500	10	210
Vanadium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND ^	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	0.0021	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.85	NA	7.00	NA	6.94	NA	7.03	NA	7.29	NA	7.02	NA	6.94	NA	6.94	NA	7.44	NA	7.21	NA	7.20
Temperature	NA	14.83	NA	12.30	NA	12.40	NA	14.20	NA	12.45	NA	12.30	NA	12.70	NA	13.60	NA	13.30	NA	12.70	NA	12.70
Conductivity	NA	0.63	NA	0.89	NA	0.53	NA	0.79	NA	0.82	NA	0.29	NA	0.72	NA	0.81	NA	0.84	NA	0.64	NA	0.80
Dissolved Oxygen	NA	8.59	NA	8.16	NA	6.89	NA	8.33	NA	8.72	NA	7.14	NA	7.20	NA	7.04	NA	5.21	NA	8.19	NA	8.64
ORP	NA	2.4	NA	81.3	NA	75.8	NA	106.6	NA	-18.7	NA	28.9	NA	13.6	NA	135.3	NA	97.9	NA	58.8	NA	172.1

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
H - Prepped/analyzed past hold time
'1' - Serial Dilution Exceeds Control Limits

F1 - MS and/or MSD Recovery outside of limits.
F2 - MS/MSD RPD exceeds control limits.
^1+ - Initial Calibration Verification is outside acceptance limits, high biased
^+ - Continuing Calibration Verification is outside acceptance limits, high biased

^ - Denotes instrument related QC exceeds the control limits
* - Median Value (for temp)
* - LCS or LCSD is outside acceptance limits

Temperature °C degrees Celcius
Conductivity ms/cm millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

Attachment 9-4 – IL PE Stamp

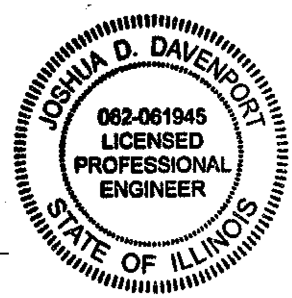
CERTIFICATION
35 Ill. Adm. Code 845.630

In accordance with Section 35 Ill. Adm. Code 845.630(g), I hereby certify based on review of the information contained within the Initial Operating Permit Application for Powerton Station dated October 29, 2021, the groundwater monitoring system has been designed and constructed to satisfy the requirements of 35 Ill. Adm. Code 845.630. For this site the minimum number of wells required is deemed sufficient based on the following: 1) The number of wells, placement and screened intervals are based on a hydrogeologic assessment performed for the site; 2) hydrogeologic considerations included aquifer characteristics affecting flow velocity and physical transport processes; 3) available historical groundwater flow data indicate consistent flow conditions over time; and 4) Illinois Environmental Protection Agency (IEPA) approved the overall hydrogeologic assessment as part of a larger study.

Certified by: ______________________

Date: 10/29/21

Joshua Davenport, P.E.
Professional Engineer Registration No.: 062-061945
KPRG and Associates, Inc.



Attachment 9-5 – CCR Compliance Statistical Approach

K P R G

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

ILLINOIS STATE CCR RULE COMPLIANCE STATISTICAL APPROACH FOR GROUNDWATER DATA EVALUATION

Midwest Generation, LLC
Powerton Generating Station
13082 Manito Rd.
Pekin, Illinois

PREPARED BY: KPRG and Associates, Inc.
14665 West Lisbon Road, Suite 1A
Brookfield, WI 53005

August 23, 2021

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TABLE

1.0 INTRODUCTION

On April 21, 2021, the Illinois Pollution Control Board (IPCB) and Illinois Environmental Protection Agency (Illinois EPA) enacted a final rule regulating coal combustion residuals (CCR) as part of Ill. Adm. Code Title 35, Part 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (State CCR Rule). The State CCR Rule specifically requires that the owner or operator of a CCR unit must develop an Operating Permit that will specify a sampling and analysis program that includes procedures and techniques for sample collection, sample preservation and shipment, analytical procedures, chain of custody (COC) control, and quality assurance and quality control. As a result, each regulated facility must develop a program that meets the State CCR Rule. At the Powerton facility, the Ash Bypass Basin/Ash Surge Basin (ABB/ASB) the Former Ash Basin (FAB) and the Metals Cleaning Basin (MCB) require monitoring under the State CCR Rule. The monitoring well networks around these basins consist of the following wells:

- Combined ABB/ASB monitoring network - upgradient wells MW-01, MW-09 and MW-19 and downgradient wells MW-08, MW-11, MW-12, MW-15, MW-17 and MW-18.

- FAB monitoring network - upgradient wells MW-01 and MW-10 and downgradient wells MW-02 thru MW-05.

- MCB monitoring network – upgradient wells MW-15 and MW-17 and downgradient wells MW-14, MW-20 and MW-21.

The well locations are shown on Figure 1.

Section 845.640(f) of the State CCR Rule requires the development of the statistical approach that will be used for assessing the data and determining whether a statistically significant increase over background concentrations in groundwater has occurred at identified downgradient monitoring points. Potential statistical methods that can be applied to the data are listed in Section 845.640(f) and performance standards are provided in 845.640(g).

This narrative of the statistical approach that will be used for the Powerton facility's groundwater monitoring data is intended to fulfill certification requirements under Section 845.640(f)(2). The professional engineer's certification of this statistical approach is provided in Section 4.0 of this document.

2.0 STATISTICAL METHOD SELECTION and BACKGROUND DATA EVALUATION

Section 845.640(f)(1) identifies five statistical data evaluation methods that can be used for assessing site groundwater data. Relative to the subject site, the prediction interval procedure identified in 845.640(f)(1)(C) will be used. This approach is robust and conforms to varying data distributions and facilitates various non-detect frequencies. U.S. EPA identifies this method as preferred over establishment of tolerance intervals (Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance, March 2009 [Unified Guidance]).

Total recoverable metals groundwater data has been collected for this site at many of the monitoring well locations since 2015 as part of Federal CCR Rule requirements. Under the Federal CCR Rule, the initial eight rounds of quarterly data generated were used to develop a representative background concentration with which to develop applicable prediction limits for subsequent statistical downgradient monitoring well data comparisons. Since additional data has been generated since the initial eight rounds of groundwater monitoring under the Federal CCR Rule, the full, currently available data set through the second quarter 2021 will be evaluated for potential use in developing a representative background dataset. If appending this additional data to the original eight rounds of background sampling is determined to be not statistically appropriate, then the background calculations will be reverted to using the initial eight rounds of background data for subsequent calculations. The established, representative background concentration for the upgradient well locations will be used to develop prediction limits for the regulated unit for each constituent listed in Section 845.600(a) and (b) as provided in Table 1.

Statistical evaluations will be performed with the assistance of the Sanitas™ software package.

2.1 Outlier Testing

The background dataset will be first checked for potential outliers for each constituent. Potential causes of outliers can be, but are not limited to:

- Changes in sampling technique;
- Changes in analytical methods;
- Data transcription errors;
- Unnatural localized event such as a spill; or
- Natural but extreme variations in constituent concentration.

The Unified Guidance does not recommend removing an outlier from the data set unless it can be shown that the outlier is not caused by extreme natural variation. If the outlier can be traced to other than natural causes, the data set will be adjusted appropriately.

2.2 Spatial Variability

If more than one background well is being used for the monitored unit, an evaluation of spatial variability will be performed to determine whether the mean concentration of a constituent varies statistically between the background points. This is generally accomplished by performing an Analysis of Variance (ANOVA). If statistically significant spatial variation is determined to be present, the background points will not be combined between the wells. If the spatial variability is determined to be natural, an intrawell data evaluation approach may be considered for both upgradient and downgradient wells.

2.3 Temporal Variability

Temporal variability in groundwater data from a specific monitoring point occurs when a consistent fluctuation of constituent concentrations occurs over time. The most common example is seasonal variation. If such a variation is noted in the data, the dataset should be corrected to account for the trend; however, any such corrections must be applied judiciously and would be completed in accordance with the Unified Guidance recommended procedures.

2.4 Trend Testing

As discussed above, it is intended to expand the initial background dataset collected under the Federal CCR Rule which consisted of eight rounds of quarterly sampling, with any additional data collected for a specific well since that time to facilitate a larger background data set upon which to develop subsequent interwell, and if necessary intrawell, prediction limits. The expanded background dataset for each upgradient well, for each constituent listed in Table 1, will undergo trend analysis to determine if there may be a potential statistically significant trend in the data. Linear regression will be the primary trend analysis tool, however, other methods such Sen's Slope Estimator may also be used. If a statistically significant trend is identified in the larger combined background dataset, the new data cannot be added to the initial background dataset, and only the original eight rounds of data can be used for that well in background development and associated subsequent calculations.

2.5 Test of Normality

The main underlying assumption in parametric data evaluations, such as establishing prediction limits, is that the underlying data distribution is normal. A quick approximation can be made by calculating the Coefficient of Variance (CV) which is the quotient of the standard deviation divided by the sample mean. In general, if this quotient is greater than 1, the underlying data distribution is probably not normal. The new Unified Guidance is more conservative and suggests that if this quotient is greater than 0.5, the dataset may not be normal and a more robust distribution evaluation should be performed. Therefore, for any CV value greater than 0.5 for a specific dataset, normality will be evaluated using the Shapiro-Wilk Test with an alpha (α) value of 0.05 (or 95%).

If the dataset does not pass this initial test, the data will undergo a log transformation and the test will be repeated for the natural log values of the dataset. If it is determined that this dataset is log-normal, statistical evaluations will be completed on those values and the result converted back to the standard value. If the underlying distribution is also determined not to be log-normal, the Unified Guidance provides for a number of other data transformations that can be performed to evaluate whether those underlying distributions may be normal at which point the entire dataset would be transformed for subsequent calculations.

If a normal underlying distribution can not be determined, non-parametric statistical evaluations will need to be considered which do not rely on a specific underlying distribution.

2.6 Non-Detects

It is not uncommon in environmental datasets to have parameters being detected at low concentrations during one sampling event and being not detected in other sampling events. Having a consistent approach to the handling of non-detect values is an important part of the statistical evaluation process. The handling of non-detect values will be accomplished as follows:

- 100 Percent Non-Detects – Assumed that the constituent is not present and no statistical evaluations will be performed. The upper prediction limit will be set at the Reporting Limit (RL) established by the analytical laboratory.

- 50 Percent or Greater Non-Detects – A non-parametric evaluation will be performed where the confidence interval will be constructed using the highest detected concentration as the upper prediction limit.

- 15 to 50 Percent Non-Detects – Aitchison's Adjustment will be used with subsequent parametric or non-parametric evaluations, as appropriate, based on underlying distributions.

- 0 to 15 Percent Non-Detects - The non-detect values will be replaced with RL/2 and the dataset will be evaluated for distribution normality with subsequent parametric or non-parametric evaluations, as appropriate, based on underlying distributions.

2.7 Prediction Limit Calculation for Normally Distributed Data

For datasets where the distribution or underlying transformed distribution is normal, a parametric statistical approach will be used for establishing the prediction limit at the required 95% statistical confidence. In accordance with Unified Guidance, the following equation will be used:

$$95\%\ Prediction\ Limit = \bar{x} + t_{1-0.05/m,n-1}s\sqrt{1+\frac{1}{n}}$$

Where:

$\bar{x}$ = the sample mean of the detected or adjusted results
S = sample standard deviation of the detected or adjusted results
$t_{1-0.05/m,n-1}$ = the students t-coefficient for degrees of freedom (n-1) and confidence level (1-0.05/m)
n = the number of samples
m = the number of future samples

The number of future sampling events (*m*) will be set at 2 which will account for one sampling event and a confirmation resampling. This will assist in limiting the potential number of false positives. An acceptable site-wide false positive (SWFP) rate of 10% or less is acceptable under the Unified Guidance.

2.8 Prediction Limit Calculation for Non-Normally Distributed Data

If the dataset distribution or underlying distribution is determined not to be normal, a non-parametric approach will need to be used for the establishment of the prediction limit. The non-parametric evaluation will use the highest detected concentration as the upper prediction limit for the specific constituent.

3.0 GROUNDWATER MONITORING

The State CCR Rule does not distinguish between detection monitoring or assessment monitoring as was defined under the Federal CCR Rule. To meet the requirements set forth in Section 845.650(b), a minimum of eight rounds of groundwater data need to be collected for establishing background. As noted above, if more than eight rounds of data are available, then the larger dataset will be evaluated to determine whether the background dataset can be expanded to provide a more robust statistical assessment. At that point, statistical evaluation of the background dataset will be performed to establish the upper prediction limits for each Section 845.600(a) and (b) constituent. It is noted that in the case of pH, a lower prediction limit will also be established since this parameter has an established upper and lower value range for compliance.

Site specific Groundwater Protection Standards (GWPSs) will be developed in accordance with Section 845.600(a)(2) as follows:

- If the constituent has an established State standard listed in Section 845.600(a)(1) and the standard is greater than the calculated background upper prediction limit, then the standard will serve as the GWPS. If the background upper prediction limit is greater than the standard, the upper prediction limit will serve as the GWPS.

- If the constituent does not have an established standard (i.e., calcium and turbidity) then the calculated upper prediction limit will serve as the GWPS.

Once the proposed GWPSs are determined and approved by Illinois EPA, subsequent downgradient well concentrations will be compared against the upper prediction limit (and lower prediction limit in the case of pH), and the GWPSs. If an exceedance of the GWPS is identified during a quarterly sampling event, an immediate resampling of the specific well(s) will be completed for those specific parameters. If the exceedance is confirmed by the resampling, the Illinois EPA will be notified of the exceedance(s) and the notification will be placed in the facilities operating record in accordance with 845.800(d)(16). It is noted that there are some constituents that historically may have had no detections (i.e., 100% non-detects). In this case, in accordance with the Unified Guidance, if there is a detection of such a constituent, then the Double Quantification Rule will be applied. Under this rule, a confirmed exceedance is registered if any well-constituent pair in the 100% non-detect group exhibits quantified measurements (i.e., at or above the Reporting Limit in two consecutive sample and resample events.

If an exceedance of the GWPS is recorded and reported to Illinois EPA, an Alternate Source Demonstration (ASD) may be completed within 60-days of the confirmed exceedance in accordance with Section 845.650(e) and submitted to the Illinois EPA as well as placing the ASD on the facility’s publically accessible CCR website. Illinois EPA will review and approve or disapprove the ASD.

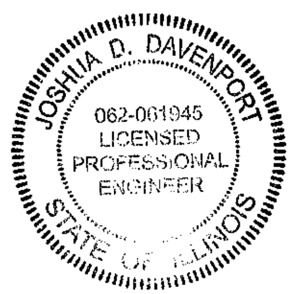
If it is decided not to complete an ASD or if Illinois EPA does not concur with and approve the ASD, a characterization of the nature and extent of the potential release must be completed in accordance with Section 845.650(d)(1) as well as meeting the requirements of Sections 845.660, 845.670 and 845.680.

4.0 CERTIFICATION

In accordance with Section 845.640(f)(2) of the State CCR Rule, I hereby certify based on a review of the information contained within this Illinois State CCR Rule Compliance Statistical Approach for Groundwater Data Evaluation dated August 23, 2021, the statistical procedures developed and selected for evaluation of groundwater data associated with the Midwest Generation Powerton Station CCR Units are adequate and appropriate for evaluating the groundwater data.

Certified by: ______________________

Date: 8/23/21



Joshua Davenport, P.E.

Professional Engineer Registration No. 062-061945

KPRG and Associates, Inc.

FIGURE

E N V I R O N M E N T A L   C O N S U L T A T I O N & R E M E D I A T I O N

K P R G

KPRG and Associates, inc.

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

CCR MONITORING WELL SITE MAP	
POWERTON STATION PEKIN, ILLINOIS	
Scale: 1" = 350'	Date: June 10, 2021
KPRG Project No. 12313.1	FIGURE 1

TABLE

Table 1. Section 845.600 Groundwater Monitoring Parameter List

Parameter	Section 845.600 Standards
Antimony	0.006
Arsenic	0.01
Barium	2
Beryllium	0.004
Boron	2.0
Cadmium	0.005
Chloride	200
Chromium	0.1
Cobalt	0.006
Combined Radium 226 + 228 (pCi/L)	5.0
Fluoride	4.0
Lead	0.0075
Lithium	0.04
Mercury	0.002
Molybdenum	0.10
pH (standard units)	6.5-9.0
Selenium	0.05
Sulfate	400
Thallium	0.002
Total Dissolved Solids	1200
Calcium	NE
Turbidity	NE

All vaues in mg/l unless otherwise specified.
NE- Not Established

Attachment 9-6 – Statistical Evaluation Summary

ATTACHMENT 9-6

BACKGROUND STATISTICAL EVALUATION SUMMARY
STATE RULE CCR GROUNDWATER MONITORING
POWERTON GENERATING STATION

The newly enacted Ill. Adm. Code Title 35, Part 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (State CCR Rule) requires development of proposed Groundwater Protection Standards (GWPSs) for inclusion within the Operating Permit for the regulated surface impoundments at the facility. Upon Illinois Environmental Protection Agency (EPA) review, concurrence and approval of these site-specific proposed GWPSs, subsequent quarterly downgradient groundwater monitoring data will be compared against these standards to determine whether standard quarterly monitoring is to continue or whether additional evaluations need to occur to in accordance with Section 845.650(d), 845.650(e), 845.660 and 845.670. The overall statistical approach to be used for the development of the proposed GWPSs is provided in Attachment 9-5 of the Operating Permit.

Powerton Generating Station has four separate regulated units. Two of the units will be referred to as the combined Ash Bypass Basin and Ash Surge Basin (ABB/ASB), the third unit is the Former Ash Basin (FAB) and the fourth unit is the Metals Cleaning Basin (MCB). The ABB/ASB and the FAB are the subjects of this Operating Permit submittal. The MCB Operating Permit will be submitted under separate cover. The ABB/ASB and the FAB are treated as having distinct monitoring networks and therefore, for the development of GWPSs, will be discussed separately. The proposed site-specific GWPSs for the Powerton Generating Station are summarized in Section 9 of this Operating Permit. Table 9-10 summarizes GWPSs for the ABB/ASB and Table 9-11 summarizes GWPSs for the FAB. The background Prediction Limit values presented in those tables were developed, where possible, by combining or “pooling” as many background data points as possible from the various upgradient monitoring wells. This includes evaluating whether the initial eight rounds of data generated as part of Federal CCR Rule compliance can be combined with subsequent available data from ongoing groundwater monitoring since that time at a specific upgradient monitoring well location, and whether datasets from individual upgradient monitoring points can also be combined or “pooled”. The initial eight rounds were completed for the ABB/ASB between 2015 and 2017, while the initial eight rounds for the FAB were completed between 2017 and 2019. The initial eight rounds of turbidity were completed this calendar year (2021) since this was a new state requirement that was not part of the Federal CCR Rule. The following general decision process was followed to determine whether background data from within a well and/or between upgradient wells can be pooled for background calculations:

- If the combined dataset (original eight rounds of data plus any subsequent data generated since the initial background sampling) at a specific well location (intrawell evaluation) for a specific parameter does not show a statistically trend, the data for that specific parameter at that well location can be pooled. If a statistically significant trend in the data is noted to exist, only the original eight rounds of background sampling can be used for subsequent calculations. If there is more than one background monitoring well, and one of the combined datasets for a specific parameter shows a statistically significant trend but the other does not, then the specific parameter data for the well that did not indicate a trend can potentially be used for subsequent evaluations.

- If there is more than one upgradient monitoring well, then datasets for individual parameters between the wells (interwell evaluation) must pass an analysis of variance to determine whether there may be a statistically significant variation between the two datasets. If no statistically significant variance is noted between the two (or more) upgradient monitoring points, and the individual parameter data passes the intrawell trend evaluation noted above, then the datasets for that parameter can be pooled between the wells to establish a larger background dataset. If there is a statistically significant variation noted between the two (or more) upgradient monitoring points, then the specific parameter datasets from those wells cannot be combined.

- If it is determined that datasets from upgradient monitoring points cannot be combined, then a decision needs to be made as to which monitoring point will be used for a specific parameter for background calculations. At this point some professional judgement needs to be used by considering the number of data points within each dataset, any potential statistical outliers, any statistical seasonality, the distribution and/or underlying distribution of that data, number of detects versus non-detects, etc.

With the above decision process in mind, the various statistical evaluations performed are summarized below. The evaluations were performed with the assistance of the Sanitas® statistical software package.

Outlier Testing

Outlier tests were performed for all monitoring wells (upgradient and downgradient) in the proposed State CCR monitoring well network for all data available since the start of Federal CCR monitoring.

Ash Bypass Basin and Ash Surge Basin

Wells MW-01, MW-09 and MW-19 are designated background wells. The following statistically significant outliers (dates in parentheses) were noted:

- Arsenic – MW-18 (5/5/17 and 12/7/20)
- Cadmium – MW-15 (5/19/16 and 8/18/2016)
- Chloride – MW-15 (2/25/17), MW-17 (11/13/2019), and MW-19 (11/13/2019)
- Combined Radium 226/228 – MW-08 (12/14/20) and MW-18 (2/22/2016)
- Lead – MW-19 (5/5/17)
- Lithium – MW-18 (2/22/16)
- Molybdenum – MW-01 (5/11/21) and MW-18 (12/7/20)
- pH – MW-11 (2/16/17 and 5/16/18), MW-17 (5/14/2018) and MW-18 (2/22/2016)
- Total Dissolved Solids – MW-15 (5/19/16)

- Turbidity – MW-01 (2/23/21)

Since the outliers cannot be attributed to either lab error, transcription error or field sampling error, the outlier values were not removed from the datasets at this time but may be considered during subsequent data evaluations. A statistical run summary which includes the specific statistical method used for each parameter for each well is provided at the end of this discussion.

Former Ash Basin

Wells MW-01 and MW-10 are designated background wells. The following statistically significant outliers were noted.

- Arsenic – MW-02 (2/26/19) and MW-10 (10/30/18 and 2/26/19)
- Barium – MW-01 (11/8/17) and MW-10 (10/30/18 and 2/26/19)
- Boron – MW-03 (12/9/20)
- Calcium – MW-10 (2/26/19)
- Chromium – MW-10 (10/30/18 and 2/26/19)
- Combined Radium 226/228 – MW-03 (8/23/17)
- Molybdenum – MW-01 (5/11/21)
- Turbidity – MW-01 (2/23/21)

Since the outliers cannot be attributed to either lab error, transcription error or field sampling error, the outlier values were not removed from the datasets at this time but may be considered during subsequent data evaluations. A statistical run summary which includes the specific statistical method used for each parameter for each well is provided at the end of this discussion.

Seasonality/Temporal Variability Testing

Seasonality/temporal variability tests were performed for all monitoring wells (upgradient and downgradient) in the proposed State CCR monitoring well network for all data available since the start of Federal CCR monitoring. Statistically significant seasonal/temporal variations were noted in both ABB/ASB and FAB monitoring wells.

Ash Bypass Basin and Ash Surge Basin

Wells MW-01, MW-09 and MW-19 are designated background wells. The following statistically significant seasonal/temporal variations were noted:

- Arsenic – MW-09
- Barium – MW-01
- Boron – MW-12 and MW-18

Former Ash Basin

Wells MW-01 and MW-10 are upgradient wells. The following statistically significant seasonal/temporal variations were noted.

- pH – MW-05

A statistical run summary which includes the specific statistical method used for each parameter for each well is provided at the end of this discussion. The turbidity database to date is insufficient to evaluate potential seasonal/temporal variability at this time.

Trend Analysis

To determine whether data generated since the initial eight rounds of background groundwater sampling since the enactment of the Federal Rule can potentially be pooled at a specific upgradient monitoring well location, trend analysis for each constituent at each designated background well location was performed. The results are summarized as flows:

Ash Bypass Basin and Ash Surge Basin

- MW-01 – No statistically significant trends were noted any parameter.
- MW-09 – Statistically significant trend was noted for molybdenum.
- MW-19 – Statistically significant trends were noted for fluoride, selenium, sulfate and TDS.

A statistical run summary which includes the specific statistical method used for each parameter for each well is provided at the end of this discussion.

Former Ash Basin

- MW-01 – Statistically significant trend was noted for arsenic.
- MW-10 – Statistically significant trends were noted for boron and fluoride.

A statistical run summary which includes the specific statistical method used for each parameter for each well is provided at the end of this discussion.

Spatial Variability Testing

To determine whether the background data sets from background wells can be pooled to establish a representative statistical background, spatial variability testing was performed on the datasets using a parametric analysis of variance (ANOVA). This analysis was done for each of the monitoring parameters. The following observations are made:

Ash Bypass Basin and Ash Surge Basin

- Background wells MW-01, MW-09 and MW-19 all parameter values pooled – No statistically significant variance between the full datasets for chromium, cobalt, lithium, mercury, pH and turbidity.

- Background wells MW-01 and MW-09 all parameter values pooled – No statistically significant variance between full datasets for arsenic, cadmium, chromium, fluoride, lithium, mercury and pH.
- Background wells MW-01 and MW-19 all parameter values pooled – No statistically significant variance between full datasets for cadmium, calcium, chromium, combined radium 226/228, lithium and pH.
- Background MW-09 and MW-19 all parameter values pooled - No statistically significant variance between full datasets for boron, chloride, cobalt, combined radium 226/228, fluoride, lead, mercury, pH, selenium, sulfate and TDS

It is noted that antimony, beryllium and thallium had no detections at any of the designated background well locations during any sampling event, therefore, although an analysis of variance cannot be formally completed, these data sets can be pooled since there is no variation in the reporting limits.

Statistical run summaries which include the specific statistical method used for each parameter for each of the dataset comparisons are provided at the end of this discussion.

Former Ash Basin

- Background wells MW-01 and MW-10 all parameter values pooled – No statistically significant variance between the full datasets for beryllium, cadmium, calcium, chloride chromium, cobalt, lithium, molybdenum, pH, sulfate and TDS.
- Background wells MW-01 and MW-10 original eight background values pooled – No statistically significant variance between full datasets for arsenic, beryllium, boron, calcium, chloride, chromium, combined radium 226/228, fluoride, lead, molybdenum, pH, sulfate and TDS.

It is noted that antimony, mercury and thallium had no detections at any of the upgradient well locations during any sampling event, therefore, although an analysis of variance cannot be formally completed, these data sets can be pooled since there is no variation in the reporting limits.

Statistical run summaries which include the specific statistical method used for each parameter for each of the dataset comparisons are provided at the end of this discussion.

Test of Normality

The Shapiro-Wilk Normality Test with an alpha (α) value of 0.05 (or 95%) was used to evaluate the distribution of the background datasets for each constituent at each background well location and the distribution of pooled datasets for both background wells. A Test of Ladders was also run to evaluate other potential underlying transformational distributions in the case that the non-transformed dataset was found not to be normally distributed. The statistical runs are provided for the various combinations of upgradient wells by parameter at the end of this discussion.

Prediction Limits

Based on the various statistical evaluations discussed above, the following background data sets were used for background prediction limit calculations:

Ash Bypass Basin and Ash Surge Basin

- Background wells MW-01, MW-09 and MW-19 all parameter values pooled for antimony, beryllium, cadmium, chromium, cobalt, lithium, mercury, pH, thallium and turbidity. As noted above there were no detections of antimony, beryllium or thallium at any of the three upgradient well locations and the reporting limits were the same. Relative to the other parameters, there were no statistically significant trends within wells for the combined data observations and there was no statistically significant variance noted between the datasets.
- Background wells MW-01 and MW-09 all parameter values were pooled for fluoride. For this combined parameter dataset, there was no individual trend within each well and there was no statistically significant variance noted between the datasets.
- Background wells MW-01 and MW-19 all parameter values were pooled for calcium and combined radium 226/228. For these combined parameter datasets, there were no individual trends within each well and there was no statistically significant variance noted between the datasets.
- Background wells MW-09 and MW-19 all parameter values were pooled for boron, chloride and lead. For this combined parameter dataset, there were no individual trends within each well and there was no statistically significant variance noted between the datasets.
- Background well MW-01 all parameter values were used for arsenic, selenium, sulfate, and TDS. None of these parameters indicated statistically significant trends within this well and none of these parameters were noted as statistical outliers at this well location. Sulfate and TDS had normal or underlying normal distributions, while distributions for arsenic and selenium for all upgradient wells were found not to be normal.
- Background well MW-19 all parameter values were used for barium and molybdenum. None of these parameters indicated statistically significant trends within this well and none of these parameters were noted as statistical outliers at this well location. Both had normal or underlying normal distributions.

Former Ash Basin

- Background wells MW-01 and MW-10 all parameter values pooled for antimony, beryllium, cadmium, calcium, chloride, chromium, lithium, mercury, molybdenum, pH, sulfate, thallium and TDS. As noted above there were no detections of antimony, mercury or thallium at any of the two upgradient well locations and the reporting limits were the same. Relative to the other parameters, there were no statistically significant trends within wells for the combined data observations and there was no statistically significant variance noted between the datasets.
- Background well MW-01 all parameter values were used for barium, boron, combined radium 226/228 and fluoride. None of these parameters indicated statistically

significant trends within this well and all had normal or underlying normal distributions. Barium was noted to have an outlier value at well MW-01 (0.083 mg/l) and two outliers were also noted at well MW-10 (0.41 mg/l and 0.59 mg/l). Since the noted barium outlier concentration at MW-01 was still substantially below the Section 845.600 standard of 2.0 mg/l, and as stated above there is no known laboratory or field sampling error basis on which to remove this data point, it was decided to include the full available barium dataset for MW-01 in the statistical background calculation.

- Upgradient well MW-10 all parameter values were used for arsenic, cobalt, lead, selenium and turbidity. None of these parameters indicated statistically significant trends within this well. Cobalt, lead, selenium and turbidity had normal or underlying normal distributions, while distributions for arsenic for both background wells were found not to be normal. Arsenic was noted to have two outlier values at well MW-10 (0.011 mg/l and 0.022 mg/l), however there was a statistically significant data trend noted in the other background well (MW-01) for arsenic precluding that expanded dataset to be pooled. While the noted arsenic outlier concentrations are above the 845.600 standard of 0.01 mg/l, there is no site wide data trend for arsenic in other compliance wells during the two sampling periods with the outlier values and there is no known laboratory or field sampling error basis on which to remove these data points. The dataset for arsenic at MW-10 contains only 13 background data points. The Unified Guidance Section 5.2.3 states: *"Even when conditions have not changed, an apparently extreme measurement may represent nothing more than a portion of the background distribution that has yet to be observed. This is particularly true if the background data set contains fewer than 20 samples".* Based on this guidance and some of the other above stated reasons, it was decided to include these outliers in the statistical background calculation for arsenic at well MW-10. This background calculation may be re-evaluated at a later date after at least 20 background data points have been collected.

The calculated prediction limits under the various background dataset selection scenarios for the ABB/ASB and FAB are summarized in Tables 9-10 and 9-11, respectively, in Section 9 of this permit application. A prediction limit statistical run summary which includes the specific statistical method used for each parameter for each well scenario noted above are provided at the end of this discussion.

Poweron ABB ASB Outlier Analysis

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/12/2021, 10:35 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	15	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-08	n/a	n/a	n/a	NP (nrm)	NaN	15	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-09 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	15	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-11	n/a	n/a	n/a	NP (nrm)	NaN	15	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-12	n/a	n/a	n/a	NP (nrm)	NaN	15	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-15	n/a	n/a	n/a	NP (nrm)	NaN	15	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-17	n/a	n/a	n/a	NP (nrm)	NaN	15	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-18	n/a	n/a	n/a	NP (nrm)	NaN	15	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-19 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	11	0.003	0	unknown	ShapiroWilk
Arsenic (mg/L)	MW-01 (bg)	No	n/a	n/a	NP (nrm)	NaN	17	0.003653	0.006819	unknown	ShapiroWilk
Arsenic (mg/L)	MW-08	No	n/a	n/a	EPA 1989	0.05	17	0.002706	0.001081	ln(x)	ShapiroWilk
Arsenic (mg/L)	MW-09 (bg)	No	n/a	n/a	NP (nrm)	NaN	17	0.001806	0.001442	unknown	ShapiroWilk
Arsenic (mg/L)	MW-11	No	n/a	n/a	EPA 1989	0.05	17	0.1044	0.1631	ln(x)	ShapiroWilk
Arsenic (mg/L)	MW-12	No	n/a	n/a	EPA 1989	0.05	17	0.12	0.1385	ln(x)	ShapiroWilk
Arsenic (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	17	0.01944	0.03049	ln(x)	ShapiroWilk
Arsenic (mg/L)	MW-17	No	n/a	n/a	NP (nrm)	NaN	17	0.1784	0.1477	unknown	ShapiroWilk
Arsenic (mg/L)	**MW-18**	**Yes**	**0.0032,0....**	**5/5/2017,...**	**NP (nrm)**	**NaN**	**17**	**0.001312**	**0.000721**	**unknown**	**ShapiroWilk**
Arsenic (mg/L)	MW-19 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	13	0.001031	0.0001109	unknown	ShapiroWilk
Barium (mg/L)	MW-01 (bg)	No	n/a	n/a	NP (nrm)	NaN	17	0.05453	0.01389	unknown	ShapiroWilk
Barium (mg/L)	MW-08	No	n/a	n/a	EPA 1989	0.05	17	0.1035	0.03184	normal	ShapiroWilk
Barium (mg/L)	MW-09 (bg)	No	n/a	n/a	EPA 1989	0.05	17	0.038	0.007374	normal	ShapiroWilk
Barium (mg/L)	MW-11	No	n/a	n/a	NP (nrm)	NaN	17	0.57	0.6928	unknown	ShapiroWilk
Barium (mg/L)	MW-12	No	n/a	n/a	EPA 1989	0.05	17	0.2187	0.2331	ln(x)	ShapiroWilk
Barium (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	17	0.06435	0.02348	ln(x)	ShapiroWilk
Barium (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	17	0.1255	0.1072	ln(x)	ShapiroWilk
Barium (mg/L)	MW-18	No	n/a	n/a	NP (nrm)	NaN	17	0.1271	0.01105	unknown	ShapiroWilk
Barium (mg/L)	MW-19 (bg)	No	n/a	n/a	EPA 1989	0.05	13	0.07792	0.01082	normal	ShapiroWilk
Beryllium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	15	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-08	n/a	n/a	n/a	NP (nrm)	NaN	15	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-09 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	15	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-11	n/a	n/a	n/a	NP (nrm)	NaN	15	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-12	n/a	n/a	n/a	NP (nrm)	NaN	15	0.00102	0.0000...	unknown	ShapiroWilk
Beryllium (mg/L)	MW-15	n/a	n/a	n/a	NP (nrm)	NaN	15	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-17	n/a	n/a	n/a	NP (nrm)	NaN	15	0.00102	0.0000...	unknown	ShapiroWilk
Beryllium (mg/L)	MW-18	n/a	n/a	n/a	NP (nrm)	NaN	15	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-19 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	11	0.001	0	unknown	ShapiroWilk
Boron (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	17	0.3353	0.2393	ln(x)	ShapiroWilk
Boron (mg/L)	MW-08	No	n/a	n/a	EPA 1989	0.05	17	1.06	0.3921	normal	ShapiroWilk
Boron (mg/L)	MW-09 (bg)	No	n/a	n/a	NP (nrm)	NaN	17	3.194	0.9763	unknown	ShapiroWilk
Boron (mg/L)	MW-11	No	n/a	n/a	EPA 1989	0.05	17	1.484	0.4286	normal	ShapiroWilk
Boron (mg/L)	MW-12	No	n/a	n/a	EPA 1989	0.05	17	0.6047	0.1908	normal	ShapiroWilk
Boron (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	17	1.747	0.423	ln(x)	ShapiroWilk
Boron (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	17	1.384	0.2918	normal	ShapiroWilk
Boron (mg/L)	MW-18	No	n/a	n/a	EPA 1989	0.05	17	0.6618	0.1215	normal	ShapiroWilk
Boron (mg/L)	MW-19 (bg)	No	n/a	n/a	EPA 1989	0.05	13	3.392	0.8301	normal	ShapiroWilk
Cadmium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.000...	0.0000...	unknown	ShapiroWilk
Cadmium (mg/L)	MW-08	n/a	n/a	n/a	NP (nrm)	NaN	17	0.000...	0.0000...	unknown	ShapiroWilk
Cadmium (mg/L)	MW-09 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0005	0	unknown	ShapiroWilk
Cadmium (mg/L)	MW-11	n/a	n/a	n/a	NP (nrm)	NaN	17	0.000...	0.0000...	unknown	ShapiroWilk
Cadmium (mg/L)	MW-12	No	n/a	n/a	NP (nrm)	NaN	17	0.001597	0.001927	unknown	ShapiroWilk

Poweron ABB ASB Outlier Analysis

Powerton Generating Station Client: NRG Data: Powerton Printed 8/12/2021, 10:35 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Cadmium (mg/L)	**MW-15**	**Yes**	**0.00098,0...**	**5/19/2016...**	**NP (nrm)**	**NaN**	**17**	**0.000...**	**0.0008708**	**unknown**	**ShapiroWilk**
Cadmium (mg/L)	MW-17	No	n/a	n/a	NP (nrm)	NaN	17	0.001012	0.0006228	unknown	ShapiroWilk
Cadmium (mg/L)	MW-18	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0005	0	unknown	ShapiroWilk
Cadmium (mg/L)	MW-19 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	13	0.0005	0	unknown	ShapiroWilk
Calcium (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	17	95.94	14.66	normal	ShapiroWilk
Calcium (mg/L)	MW-08	No	n/a	n/a	NP (nrm)	NaN	17	135.4	22.1	unknown	ShapiroWilk
Calcium (mg/L)	MW-09 (bg)	No	n/a	n/a	NP (nrm)	NaN	17	79.18	8.033	unknown	ShapiroWilk
Calcium (mg/L)	MW-11	No	n/a	n/a	EPA 1989	0.05	17	128.5	21.15	normal	ShapiroWilk
Calcium (mg/L)	MW-12	No	n/a	n/a	EPA 1989	0.05	17	123.6	26.48	normal	ShapiroWilk
Calcium (mg/L)	MW-15	No	n/a	n/a	NP (nrm)	NaN	17	195.9	45.42	unknown	ShapiroWilk
Calcium (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	17	185.3	39.39	normal	ShapiroWilk
Calcium (mg/L)	MW-18	No	n/a	n/a	NP (nrm)	NaN	17	127.1	9.852	unknown	ShapiroWilk
Calcium (mg/L)	MW-19 (bg)	No	n/a	n/a	EPA 1989	0.05	13	94.31	15.57	normal	ShapiroWilk
Chloride (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	17	48.12	7.737	normal	ShapiroWilk
Chloride (mg/L)	MW-08	No	n/a	n/a	EPA 1989	0.05	17	230.9	121.5	normal	ShapiroWilk
Chloride (mg/L)	MW-09 (bg)	No	n/a	n/a	NP (nrm)	NaN	17	36.35	2.234	unknown	ShapiroWilk
Chloride (mg/L)	MW-11	No	n/a	n/a	EPA 1989	0.05	17	104.4	26.68	normal	ShapiroWilk
Chloride (mg/L)	MW-12	No	n/a	n/a	EPA 1989	0.05	17	180.6	20.45	normal	ShapiroWilk
Chloride (mg/L)	**MW-15**	**Yes**	**110**	**2/25/2016**	**Dixon`s**	**0.05**	**17**	**187.1**	**27.1**	**normal**	**ShapiroWilk**
Chloride (mg/L)	**MW-17**	**Yes**	**600**	**11/13/2019**	**NP (nrm)**	**NaN**	**17**	**237.6**	**98.27**	**unknown**	**ShapiroWilk**
Chloride (mg/L)	MW-18	No	n/a	n/a	EPA 1989	0.05	17	191.8	25.55	normal	ShapiroWilk
Chloride (mg/L)	**MW-19 (bg)**	**Yes**	**53**	**11/13/2019**	**Dixon`s**	**0.05**	**13**	**37.92**	**5.204**	**normal**	**ShapiroWilk**
Chromium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.006294	0.004845	unknown	ShapiroWilk
Chromium (mg/L)	MW-08	n/a	n/a	n/a	NP (nrm)	NaN	15	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	MW-09 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	15	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	MW-11	n/a	n/a	n/a	NP (nrm)	NaN	15	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	MW-12	n/a	n/a	n/a	NP (nrm)	NaN	15	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	MW-15	n/a	n/a	n/a	NP (nrm)	NaN	15	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	MW-17	n/a	n/a	n/a	NP (nrm)	NaN	15	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	MW-18	n/a	n/a	n/a	NP (nrm)	NaN	15	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	MW-19 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	11	0.005	0	unknown	ShapiroWilk
Cobalt (mg/L)	MW-01 (bg)	No	n/a	n/a	NP (nrm)	NaN	18	0.002667	0.00363	unknown	ShapiroWilk
Cobalt (mg/L)	MW-08	n/a	n/a	n/a	NP (nrm)	NaN	17	0.001	0	unknown	ShapiroWilk
Cobalt (mg/L)	MW-09 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.001135	0.0005326	unknown	ShapiroWilk
Cobalt (mg/L)	MW-11	No	n/a	n/a	EPA 1989	0.05	17	0.002988	0.0009493	normal	ShapiroWilk
Cobalt (mg/L)	MW-12	n/a	n/a	n/a	NP (nrm)	NaN	17	0.001018	0.0000...	unknown	ShapiroWilk
Cobalt (mg/L)	MW-15	n/a	n/a	n/a	NP (nrm)	NaN	17	0.001012	0.0000...	unknown	ShapiroWilk
Cobalt (mg/L)	MW-17	No	n/a	n/a	NP (nrm)	NaN	17	0.001388	0.000511	unknown	ShapiroWilk
Cobalt (mg/L)	MW-18	n/a	n/a	n/a	NP (nrm)	NaN	17	0.001	0	unknown	ShapiroWilk
Cobalt (mg/L)	MW-19 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	13	0.001023	0.0000...	unknown	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	17	0.6338	0.172	normal	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	**MW-08**	**Yes**	**1.31**	**12/14/2020**	**Dixon`s**	**0.05**	**17**	**0.6072**	**0.2317**	**normal**	**ShapiroWilk**
Combined Radium 226 + 228 (pCi/L)	MW-09 (bg)	No	n/a	n/a	NP (nrm)	NaN	17	0.4845	0.1213	unknown	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-11	No	n/a	n/a	EPA 1989	0.05	17	0.9534	0.6105	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-12	No	n/a	n/a	NP (nrm)	NaN	17	0.9695	0.8136	unknown	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	17	0.5055	0.1451	normal	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	17	1.853	1.944	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	**MW-18**	**Yes**	**1.88**	**2/22/2016**	**Dixon`s**	**0.05**	**17**	**0.6792**	**0.3539**	**ln(x)**	**ShapiroWilk**
Combined Radium 226 + 228 (pCi/L)	MW-19 (bg)	No	n/a	n/a	EPA 1989	0.05	13	0.5295	0.1765	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	17	0.1771	0.03704	normal	ShapiroWilk

Poweron ABB ASB Outlier Analysis

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/12/2021, 10:35 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Fluoride (mg/L)	MW-08	No	n/a	n/a	EPA 1989	0.05	17	0.3594	0.05414	normal	ShapiroWilk
Fluoride (mg/L)	MW-09 (bg)	No	n/a	n/a	EPA 1989	0.05	17	0.1647	0.02853	normal	ShapiroWilk
Fluoride (mg/L)	MW-11	No	n/a	n/a	EPA 1989	0.05	17	0.5729	0.08971	normal	ShapiroWilk
Fluoride (mg/L)	MW-12	No	n/a	n/a	Dixon`s	0.05	17	0.4412	0.08528	normal	ShapiroWilk
Fluoride (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	17	0.5335	0.04987	normal	ShapiroWilk
Fluoride (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	17	0.6294	0.09653	normal	ShapiroWilk
Fluoride (mg/L)	MW-18	No	n/a	n/a	EPA 1989	0.05	17	0.6047	0.07001	normal	ShapiroWilk
Fluoride (mg/L)	MW-19 (bg)	No	n/a	n/a	EPA 1989	0.05	13	0.15	0.0216	normal	ShapiroWilk
Lead (mg/L)	MW-01 (bg)	No	n/a	n/a	NP (nrm)	NaN	18	0.004516	0.008072	unknown	ShapiroWilk
Lead (mg/L)	MW-08	No	n/a	n/a	NP (nrm)	NaN	17	0.000...	0.0001655	unknown	ShapiroWilk
Lead (mg/L)	MW-09 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.000...	0.0000...	unknown	ShapiroWilk
Lead (mg/L)	MW-11	No	n/a	n/a	NP (nrm)	NaN	17	0.000...	0.0004384	unknown	ShapiroWilk
Lead (mg/L)	MW-12	No	n/a	n/a	NP (nrm)	NaN	17	0.001191	0.001114	unknown	ShapiroWilk
Lead (mg/L)	MW-15	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0005	0	unknown	ShapiroWilk
Lead (mg/L)	MW-17	No	n/a	n/a	NP (nrm)	NaN	17	0.000...	0.000415	unknown	ShapiroWilk
Lead (mg/L)	MW-18	n/a	n/a	n/a	NP (nrm)	NaN	17	0.000...	0.0000...	unknown	ShapiroWilk
Lead (mg/L)	**MW-19 (bg)**	**Yes**	**0.0012**	**5/5/2017**	**NP (nrm)**	**NaN**	**13**	**0.000...**	**0.0001944**	**unknown**	**ShapiroWilk**
Lithium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.01012	0.0004851	unknown	ShapiroWilk
Lithium (mg/L)	MW-08	No	n/a	n/a	EPA 1989	0.05	17	0.01982	0.007577	normal	ShapiroWilk
Lithium (mg/L)	MW-09 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.01	0	unknown	ShapiroWilk
Lithium (mg/L)	MW-11	n/a	n/a	n/a	NP (nrm)	NaN	17	0.01012	0.0004851	unknown	ShapiroWilk
Lithium (mg/L)	MW-12	No	n/a	n/a	EPA 1989	0.05	17	0.01388	0.003407	ln(x)	ShapiroWilk
Lithium (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	17	0.029	0.007408	ln(x)	ShapiroWilk
Lithium (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	17	0.02035	0.005862	ln(x)	ShapiroWilk
Lithium (mg/L)	**MW-18**	**Yes**	**0.022**	**2/22/2016**	**Dixon`s**	**0.05**	**17**	**0.01382**	**0.002675**	**normal**	**ShapiroWilk**
Lithium (mg/L)	MW-19 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	13	0.01	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-08	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-09 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.000...	0.0000...	unknown	ShapiroWilk
Mercury (mg/L)	MW-11	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-12	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-15	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-17	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-18	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-19 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	13	0.0002	0	unknown	ShapiroWilk
Molybdenum (mg/L)	**MW-01 (bg)**	**Yes**	**0.01**	**5/11/2021**	**NP (nrm)**	**NaN**	**17**	**0.005724**	**0.001328**	**unknown**	**ShapiroWilk**
Molybdenum (mg/L)	MW-08	No	n/a	n/a	EPA 1989	0.05	17	0.01624	0.008238	ln(x)	ShapiroWilk
Molybdenum (mg/L)	MW-09 (bg)	No	n/a	n/a	EPA 1989	0.05	17	0.03318	0.007452	ln(x)	ShapiroWilk
Molybdenum (mg/L)	MW-11	No	n/a	n/a	NP (nrm)	NaN	17	0.01634	0.006475	unknown	ShapiroWilk
Molybdenum (mg/L)	MW-12	No	n/a	n/a	NP (nrm)	NaN	17	0.02012	0.006679	unknown	ShapiroWilk
Molybdenum (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	17	0.02612	0.006809	normal	ShapiroWilk
Molybdenum (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	17	0.07559	0.03481	normal	ShapiroWilk
Molybdenum (mg/L)	**MW-18**	**Yes**	**0.061**	**12/7/2020**	**NP (nrm)**	**NaN**	**17**	**0.008529**	**0.01352**	**unknown**	**ShapiroWilk**
Molybdenum (mg/L)	MW-19 (bg)	No	n/a	n/a	EPA 1989	0.05	13	0.039	0.007778	normal	ShapiroWilk
pH (n/a)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	17	7.186	0.2747	normal	ShapiroWilk
pH (n/a)	MW-08	No	n/a	n/a	NP (nrm)	NaN	17	7.308	0.2953	unknown	ShapiroWilk
pH (n/a)	MW-09 (bg)	No	n/a	n/a	EPA 1989	0.05	17	7.312	0.2248	normal	ShapiroWilk
pH (n/a)	**MW-11**	**Yes**	**7.89,6.62**	**5/16/2018...**	**Dixon`s**	**0.05**	**17**	**7.195**	**0.2541**	**normal**	**ShapiroWilk**
pH (n/a)	MW-12	No	n/a	n/a	EPA 1989	0.05	17	7.498	0.2921	normal	ShapiroWilk
pH (n/a)	MW-15	No	n/a	n/a	EPA 1989	0.05	17	6.995	0.2247	normal	ShapiroWilk

Poweron ABB ASB Outlier Analysis

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/12/2021, 10:35 AM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
pH (n/a)	**MW-17**	**Yes**	**7.79**	**5/14/2018**	**Dixon`s**	**0.05**	**17**	**7.233**	**0.2064**	**normal**	**ShapiroWilk**
pH (n/a)	**MW-18**	**Yes**	**7.06**	**2/22/2016**	**Dixon`s**	**0.05**	**17**	**7.821**	**0.2939**	**normal**	**ShapiroWilk**
pH (n/a)	MW-19 (bg)	No	n/a	n/a	EPA 1989	0.05	13	7.346	0.2818	normal	ShapiroWilk
Selenium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.002524	0.0000...	unknown	ShapiroWilk
Selenium (mg/L)	MW-08	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0025	0	unknown	ShapiroWilk
Selenium (mg/L)	MW-09 (bg)	No	n/a	n/a	NP (nrm)	NaN	17	0.004224	0.002535	unknown	ShapiroWilk
Selenium (mg/L)	MW-11	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0025	0	unknown	ShapiroWilk
Selenium (mg/L)	MW-12	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0025	0	unknown	ShapiroWilk
Selenium (mg/L)	MW-15	No	n/a	n/a	EPA 1989	0.05	17	0.01685	0.02215	ln(x)	ShapiroWilk
Selenium (mg/L)	MW-17	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0025	0	unknown	ShapiroWilk
Selenium (mg/L)	MW-18	n/a	n/a	n/a	NP (nrm)	NaN	17	0.0025	0	unknown	ShapiroWilk
Selenium (mg/L)	MW-19 (bg)	No	n/a	n/a	NP (nrm)	NaN	13	0.003792	0.001512	unknown	ShapiroWilk
Sulfate (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	17	50.76	15.29	normal	ShapiroWilk
Sulfate (mg/L)	MW-08	No	n/a	n/a	EPA 1989	0.05	17	230.9	115.8	normal	ShapiroWilk
Sulfate (mg/L)	MW-09 (bg)	No	n/a	n/a	EPA 1989	0.05	17	137.9	38.26	normal	ShapiroWilk
Sulfate (mg/L)	MW-11	No	n/a	n/a	EPA 1989	0.05	17	241.2	69	ln(x)	ShapiroWilk
Sulfate (mg/L)	MW-12	No	n/a	n/a	EPA 1989	0.05	17	478.2	136.7	normal	ShapiroWilk
Sulfate (mg/L)	MW-15	No	n/a	n/a	NP (nrm)	NaN	17	630	278.2	unknown	ShapiroWilk
Sulfate (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	17	689.4	147.7	normal	ShapiroWilk
Sulfate (mg/L)	MW-18	No	n/a	n/a	EPA 1989	0.05	17	290.6	80.89	normal	ShapiroWilk
Sulfate (mg/L)	MW-19 (bg)	No	n/a	n/a	Dixon`s	0.05	13	148.2	34.32	normal	ShapiroWilk
Thallium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-08	n/a	n/a	n/a	NP (nrm)	NaN	17	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-09 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	17	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-11	n/a	n/a	n/a	NP (nrm)	NaN	17	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-12	n/a	n/a	n/a	NP (nrm)	NaN	17	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-15	n/a	n/a	n/a	NP (nrm)	NaN	17	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-17	No	n/a	n/a	NP (nrm)	NaN	17	0.003129	0.001857	unknown	ShapiroWilk
Thallium (mg/L)	MW-18	n/a	n/a	n/a	NP (nrm)	NaN	17	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-19 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	13	0.002	0	unknown	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	17	500	69.73	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-08	No	n/a	n/a	EPA 1989	0.05	17	1106	361.1	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-09 (bg)	No	n/a	n/a	EPA 1989	0.05	17	581.2	112.2	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-11	No	n/a	n/a	EPA 1989	0.05	17	927.6	161.7	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-12	No	n/a	n/a	EPA 1989	0.05	17	1251	190.9	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	**MW-15**	**Yes**	**2800**	**5/19/2016**	**Dixon`s**	**0.05**	**17**	**1735**	**380.7**	**normal**	**ShapiroWilk**
Total Dissolved Solids (mg/L)	MW-17	No	n/a	n/a	EPA 1989	0.05	17	1700	327.9	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-18	No	n/a	n/a	NP (nrm)	NaN	17	1135	123.5	unknown	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-19 (bg)	No	n/a	n/a	NP (nrm)	NaN	13	643.1	115.9	unknown	ShapiroWilk

Outlier Analysis FAB

Powerton Generating Station Client: NRG Data: Powerton FAB Printed 8/13/2021, 12:17 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	16	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	11	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	11	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	11	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	14	0.003	0	unknown	ShapiroWilk
Antimony (mg/L)	MW-10 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	11	0.003	0	unknown	ShapiroWilk
Arsenic (mg/L)	MW-01 (bg)	No	n/a	n/a	NP (nrm)	NaN	18	0.00195	0.001931	unknown	ShapiroWilk
Arsenic (mg/L)	**MW-02**	**Yes**	**0.0026**	**2/26/2019**	**Dixon`s**	**0.05**	**13**	**0.0014**	**0.0004183**	**normal**	**ShapiroWilk**
Arsenic (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	13	0.001192	0.0001935	unknown	ShapiroWilk
Arsenic (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	13	0.001031	0.0000...	unknown	ShapiroWilk
Arsenic (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	16	0.001	1.2e-11	unknown	ShapiroWilk
Arsenic (mg/L)	**MW-10 (bg)**	**Yes**	**0.011,0.022**	**10/30/201...**	**Dixon`s**	**0.05**	**13**	**0.004046**	**0.006002**	**normal**	**ShapiroWilk**
Barium (mg/L)	**MW-01 (bg)**	**Yes**	**0.083**	**11/8/2017**	**Dixon`s**	**0.05**	**18**	**0.05183**	**0.01011**	**normal**	**ShapiroWilk**
Barium (mg/L)	MW-02	No	n/a	n/a	EPA 1989	0.05	13	0.06423	0.0125	normal	ShapiroWilk
Barium (mg/L)	MW-03	No	n/a	n/a	NP (nrm)	NaN	13	0.06562	0.007943	unknown	ShapiroWilk
Barium (mg/L)	MW-04	No	n/a	n/a	EPA 1989	0.05	13	0.03285	0.008591	ln(x)	ShapiroWilk
Barium (mg/L)	MW-05	No	n/a	n/a	EPA 1989	0.05	16	0.05369	0.007153	normal	ShapiroWilk
Barium (mg/L)	**MW-10 (bg)**	**Yes**	**0.41,0.59**	**10/30/201...**	**Dixon`s**	**0.05**	**13**	**0.2815**	**0.1071**	**normal**	**ShapiroWilk**
Beryllium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	16	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	11	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	11	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	11	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	14	0.001	0	unknown	ShapiroWilk
Beryllium (mg/L)	MW-10 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	11	0.001364	0.001206	unknown	ShapiroWilk
Boron (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	18	0.3339	0.2358	ln(x)	ShapiroWilk
Boron (mg/L)	MW-02	No	n/a	n/a	EPA 1989	0.05	13	0.7333	0.9931	ln(x)	ShapiroWilk
Boron (mg/L)	**MW-03**	**Yes**	**0.86**	**12/9/2020**	**Dixon`s**	**0.05**	**13**	**0.3328**	**0.1844**	**normal**	**ShapiroWilk**
Boron (mg/L)	MW-04	No	n/a	n/a	EPA 1989	0.05	13	0.5585	0.1403	normal	ShapiroWilk
Boron (mg/L)	MW-05	No	n/a	n/a	EPA 1989	0.05	16	0.6169	0.1222	ln(x)	ShapiroWilk
Boron (mg/L)	MW-10 (bg)	No	n/a	n/a	NP (nrm)	NaN	13	0.6746	0.61	unknown	ShapiroWilk
Cadmium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	18	0.0005	0	unknown	ShapiroWilk
Cadmium (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	11	0.0005	0	unknown	ShapiroWilk
Cadmium (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	11	0.0005	0	unknown	ShapiroWilk
Cadmium (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	11	0.0005	0	unknown	ShapiroWilk
Cadmium (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	14	0.0005	0	unknown	ShapiroWilk
Cadmium (mg/L)	MW-10 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	11	0.000...	0.0003086	unknown	ShapiroWilk
Calcium (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	18	95.78	14.37	ln(x)	ShapiroWilk
Calcium (mg/L)	MW-02	No	n/a	n/a	EPA 1989	0.05	13	86.23	8.228	normal	ShapiroWilk
Calcium (mg/L)	MW-03	No	n/a	n/a	NP (nrm)	NaN	13	79.23	5.847	unknown	ShapiroWilk
Calcium (mg/L)	MW-04	No	n/a	n/a	EPA 1989	0.05	13	86	10.54	normal	ShapiroWilk
Calcium (mg/L)	MW-05	No	n/a	n/a	EPA 1989	0.05	16	102.3	11.89	normal	ShapiroWilk
Calcium (mg/L)	**MW-10 (bg)**	**Yes**	**150**	**2/26/2019**	**Dixon`s**	**0.05**	**13**	**104.5**	**16.72**	**normal**	**ShapiroWilk**
Chloride (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	18	47.83	7.846	normal	ShapiroWilk
Chloride (mg/L)	MW-02	No	n/a	n/a	EPA 1989	0.05	13	48.77	4.166	normal	ShapiroWilk
Chloride (mg/L)	MW-03	No	n/a	n/a	EPA 1989	0.05	13	53.23	7.452	normal	ShapiroWilk
Chloride (mg/L)	MW-04	No	n/a	n/a	EPA 1989	0.05	13	65.46	17.28	normal	ShapiroWilk
Chloride (mg/L)	MW-05	No	n/a	n/a	EPA 1989	0.05	16	84.13	21.28	normal	ShapiroWilk
Chloride (mg/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	13	48.15	4.279	normal	ShapiroWilk
Chromium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	18	0.005111	0.0004714	unknown	ShapiroWilk
Chromium (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	13	0.005	0	unknown	ShapiroWilk

Outlier Analysis FAB

Powerton Generating Station Client: NRG Data: Powerton FAB Printed 8/13/2021, 12:17 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Chromium (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	13	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	13	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	16	0.005	0	unknown	ShapiroWilk
Chromium (mg/L)	**MW-10 (bg)**	**Yes**	**0.024,0.063**	**10/30/201...**	**NP (nrm)**	**NaN**	**13**	**0.0112**	**0.01643**	**unknown**	**ShapiroWilk**
Cobalt (mg/L)	MW-01 (bg)	No	n/a	n/a	NP (nrm)	NaN	18	0.001772	0.001476	unknown	ShapiroWilk
Cobalt (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	13	0.001	0	unknown	ShapiroWilk
Cobalt (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	13	0.001	0	unknown	ShapiroWilk
Cobalt (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	13	0.001015	0.0000...	unknown	ShapiroWilk
Cobalt (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	16	0.001	0	unknown	ShapiroWilk
Cobalt (mg/L)	MW-10 (bg)	No	n/a	n/a	NP (nrm)	NaN	13	0.01793	0.02202	unknown	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	18	0.6154	0.1656	normal	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-02	No	n/a	n/a	EPA 1989	0.05	13	0.5498	0.2315	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	**MW-03**	**Yes**	**1.2**	**8/23/2017**	**Dixon`s**	**0.05**	**13**	**0.5121**	**0.2291**	**normal**	**ShapiroWilk**
Combined Radium 226 + 228 (pCi/L)	MW-04	No	n/a	n/a	Dixon`s	0.05	13	0.5114	0.2117	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-05	No	n/a	n/a	EPA 1989	0.05	16	0.4712	0.1076	normal	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	13	1.46	1.056	ln(x)	ShapiroWilk
Fluoride (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	18	0.1767	0.03896	normal	ShapiroWilk
Fluoride (mg/L)	MW-02	No	n/a	n/a	EPA 1989	0.05	13	0.1815	0.02444	normal	ShapiroWilk
Fluoride (mg/L)	MW-03	No	n/a	n/a	EPA 1989	0.05	13	0.2446	0.02727	normal	ShapiroWilk
Fluoride (mg/L)	MW-04	No	n/a	n/a	EPA 1989	0.05	13	0.2731	0.04171	normal	ShapiroWilk
Fluoride (mg/L)	MW-05	No	n/a	n/a	EPA 1989	0.05	16	0.3131	0.04332	normal	ShapiroWilk
Fluoride (mg/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	13	0.2108	0.02629	normal	ShapiroWilk
Lead (mg/L)	MW-01 (bg)	No	n/a	n/a	NP (nrm)	NaN	18	0.002458	0.003375	unknown	ShapiroWilk
Lead (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	13	0.000...	0.0002219	unknown	ShapiroWilk
Lead (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	13	0.000...	0.0000...	unknown	ShapiroWilk
Lead (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	13	0.000...	0.0001941	unknown	ShapiroWilk
Lead (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	16	0.000...	0.0001025	unknown	ShapiroWilk
Lead (mg/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	13	0.006195	0.01074	ln(x)	ShapiroWilk
Lithium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	18	0.01	0	unknown	ShapiroWilk
Lithium (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	12	0.01	0	unknown	ShapiroWilk
Lithium (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	12	0.01	0	unknown	ShapiroWilk
Lithium (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	12	0.01	0	unknown	ShapiroWilk
Lithium (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	15	0.01	0	unknown	ShapiroWilk
Lithium (mg/L)	MW-10 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	12	0.01242	0.006487	unknown	ShapiroWilk
Mercury (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	18	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	12	0.000...	0.0000...	unknown	ShapiroWilk
Mercury (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	12	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	12	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	15	0.0002	0	unknown	ShapiroWilk
Mercury (mg/L)	MW-10 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	12	0.0002	0	unknown	ShapiroWilk
Molybdenum (mg/L)	**MW-01 (bg)**	**Yes**	**0.01**	**5/11/2021**	**NP (nrm)**	**NaN**	**18**	**0.005522**	**0.001183**	**unknown**	**ShapiroWilk**
Molybdenum (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	13	0.005415	0.001252	unknown	ShapiroWilk
Molybdenum (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	13	0.005	0	unknown	ShapiroWilk
Molybdenum (mg/L)	MW-04	No	n/a	n/a	NP (nrm)	NaN	13	0.006123	0.002316	unknown	ShapiroWilk
Molybdenum (mg/L)	MW-05	No	n/a	n/a	NP (nrm)	NaN	16	0.006112	0.00107	unknown	ShapiroWilk
Molybdenum (mg/L)	MW-10 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	13	0.005123	0.0004438	unknown	ShapiroWilk
pH (n/a)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	18	7.166	0.2539	normal	ShapiroWilk
pH (n/a)	MW-02	No	n/a	n/a	EPA 1989	0.05	13	7.455	0.3042	normal	ShapiroWilk
pH (n/a)	MW-03	No	n/a	n/a	EPA 1989	0.05	13	7.266	0.3052	normal	ShapiroWilk
pH (n/a)	MW-04	No	n/a	n/a	EPA 1989	0.05	13	7.155	0.263	normal	ShapiroWilk

Outlier Analysis FAB

Powerton Generating Station Client: NRG Data: Powerton FAB Printed 8/13/2021, 12:17 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
pH (n/a)	MW-05	No	n/a	n/a	EPA 1989	0.05	16	7.068	0.2899	normal	ShapiroWilk
pH (n/a)	MW-10 (bg)	No	n/a	n/a	NP (nrm)	NaN	13	7.041	0.3036	unknown	ShapiroWilk
Selenium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	18	0.002522	0.0000...	unknown	ShapiroWilk
Selenium (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	13	0.002515	0.0000...	unknown	ShapiroWilk
Selenium (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	13	0.002585	0.0003051	unknown	ShapiroWilk
Selenium (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	13	0.003015	0.001858	unknown	ShapiroWilk
Selenium (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	16	0.0025	0	unknown	ShapiroWilk
Selenium (mg/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	13	0.0046	0.0009129	normal	ShapiroWilk
Sulfate (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	18	51.44	16	normal	ShapiroWilk
Sulfate (mg/L)	MW-02	No	n/a	n/a	EPA 1989	0.05	13	46.08	17.59	normal	ShapiroWilk
Sulfate (mg/L)	MW-03	No	n/a	n/a	EPA 1989	0.05	13	48.69	19.97	normal	ShapiroWilk
Sulfate (mg/L)	MW-04	No	n/a	n/a	Dixon`s	0.05	13	70.62	33.04	normal	ShapiroWilk
Sulfate (mg/L)	MW-05	No	n/a	n/a	EPA 1989	0.05	16	138.4	41.77	normal	ShapiroWilk
Sulfate (mg/L)	MW-10 (bg)	No	n/a	n/a	EPA 1989	0.05	13	54.85	15.14	normal	ShapiroWilk
Thallium (mg/L)	MW-01 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	18	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-02	n/a	n/a	n/a	NP (nrm)	NaN	11	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-03	n/a	n/a	n/a	NP (nrm)	NaN	11	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-04	n/a	n/a	n/a	NP (nrm)	NaN	11	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-05	n/a	n/a	n/a	NP (nrm)	NaN	14	0.002	0	unknown	ShapiroWilk
Thallium (mg/L)	MW-10 (bg)	n/a	n/a	n/a	NP (nrm)	NaN	11	0.002	0	unknown	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-01 (bg)	No	n/a	n/a	EPA 1989	0.05	18	503.9	66.87	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-02	No	n/a	n/a	EPA 1989	0.05	13	452.3	54.95	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-03	No	n/a	n/a	EPA 1989	0.05	13	433.1	47.33	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-04	No	n/a	n/a	EPA 1989	0.05	13	523.8	111.1	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-05	No	n/a	n/a	EPA 1989	0.05	16	722.5	138.1	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-10 (bg)	No	n/a	n/a	NP (nrm)	NaN	13	513.8	41.94	unknown	ShapiroWilk

Seasonality ABBASB

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/12/2021, 11:30 AM

Constituent	Well	Sig.	K.-W.	Chi-Sq.	df	N	Alpha
Antimony (mg/L)	MW-01 (bg)	No	0	0	0	15	0.05
Antimony (mg/L)	MW-08	No	0	0	0	15	0.05
Antimony (mg/L)	MW-09 (bg)	No	0	0	0	15	0.05
Antimony (mg/L)	MW-11	No	0	0	0	15	0.05
Antimony (mg/L)	MW-12	No	0	0	0	15	0.05
Antimony (mg/L)	MW-15	No	0	0	0	15	0.05
Antimony (mg/L)	MW-17	No	0	0	0	15	0.05
Antimony (mg/L)	MW-18	No	0	0	0	15	0.05
Arsenic (mg/L)	MW-01 (bg)	No	1.208	7.815	3	17	0.05
Arsenic (mg/L)	MW-08	No	1.554	7.815	3	17	0.05
Arsenic (mg/L)	**MW-09 (bg)**	**Yes**	**10.11**	**7.815**	**3**	**17**	**0.05**
Arsenic (mg/L)	MW-11	No	2.369	7.815	3	17	0.05
Arsenic (mg/L)	MW-12	No	1.787	7.815	3	17	0.05
Arsenic (mg/L)	MW-15	No	0.267	7.815	3	17	0.05
Arsenic (mg/L)	MW-17	No	3.792	7.815	3	17	0.05
Arsenic (mg/L)	MW-18	No	3.6	7.815	3	17	0.05
Arsenic (mg/L)	MW-19 (bg)	No	3.6	7.815	3	13	0.05
Barium (mg/L)	**MW-01 (bg)**	**Yes**	**8.186**	**7.815**	**3**	**17**	**0.05**
Barium (mg/L)	MW-08	No	0.971	7.815	3	17	0.05
Barium (mg/L)	MW-09 (bg)	No	2.492	7.815	3	17	0.05
Barium (mg/L)	MW-11	No	2.728	7.815	3	17	0.05
Barium (mg/L)	MW-12	No	1.138	7.815	3	17	0.05
Barium (mg/L)	MW-15	No	0.9203	7.815	3	17	0.05
Barium (mg/L)	MW-17	No	2.487	7.815	3	17	0.05
Barium (mg/L)	MW-18	No	0.8944	7.815	3	17	0.05
Barium (mg/L)	MW-19 (bg)	No	0.8944	7.815	3	13	0.05
Beryllium (mg/L)	MW-01 (bg)	No	0	0	3	15	0.05
Beryllium (mg/L)	MW-08	No	0	0	3	15	0.05
Beryllium (mg/L)	MW-09 (bg)	No	0	0	3	15	0.05
Beryllium (mg/L)	MW-11	No	0	0	3	15	0.05
Beryllium (mg/L)	MW-12	No	0	0	3	15	0.05
Beryllium (mg/L)	MW-15	No	0	0	3	15	0.05
Beryllium (mg/L)	MW-17	No	2	7.815	3	15	0.05
Beryllium (mg/L)	MW-18	No	0	0	3	15	0.05
Boron (mg/L)	MW-01 (bg)	No	5.32	7.815	3	17	0.05
Boron (mg/L)	MW-08	No	1.843	7.815	3	17	0.05
Boron (mg/L)	MW-09 (bg)	No	1.146	7.815	3	17	0.05
Boron (mg/L)	MW-11	No	0.1714	7.815	3	17	0.05
Boron (mg/L)	**MW-12**	**Yes**	**11.55**	**7.815**	**3**	**17**	**0.05**
Boron (mg/L)	MW-15	No	1.834	7.815	3	17	0.05
Boron (mg/L)	MW-17	No	4.522	7.815	3	17	0.05
Boron (mg/L)	**MW-18**	**Yes**	**8.235**	**7.815**	**3**	**17**	**0.05**
Boron (mg/L)	MW-19 (bg)	No	8.235	7.815	3	13	0.05
Cadmium (mg/L)	MW-01 (bg)	No	2.4	7.815	3	17	0.05
Cadmium (mg/L)	MW-08	No	4.667	7.815	3	17	0.05
Cadmium (mg/L)	MW-09 (bg)	No	0	0	3	17	0.05
Cadmium (mg/L)	MW-11	No	4.667	7.815	3	17	0.05
Cadmium (mg/L)	MW-12	No	1.16	7.815	3	17	0.05
Cadmium (mg/L)	MW-15	No	1.687	7.815	3	17	0.05
Cadmium (mg/L)	MW-17	No	3.274	7.815	3	17	0.05

Seasonality ABBASB

Powerton Generating Station Client: NRG Data: Powerton Printed 8/12/2021, 11:30 AM

Constituent	Well	Sig.	K.-W.	Chi-Sq.	df	N	Alpha
Cadmium (mg/L)	MW-18	No	0	0	3	17	0.05
Cadmium (mg/L)	MW-19 (bg)	No	0	0	3	13	0.05
Calcium (mg/L)	MW-01 (bg)	No	6.203	7.815	3	17	0.05
Calcium (mg/L)	MW-08	No	1.076	7.815	3	17	0.05
Calcium (mg/L)	MW-09 (bg)	No	1.145	7.815	3	17	0.05
Calcium (mg/L)	MW-11	No	1.224	7.815	3	17	0.05
Calcium (mg/L)	MW-12	No	2.379	7.815	3	17	0.05
Calcium (mg/L)	MW-15	No	3.219	7.815	3	17	0.05
Calcium (mg/L)	MW-17	No	2.514	7.815	3	17	0.05
Calcium (mg/L)	MW-18	No	0.9169	7.815	3	17	0.05
Calcium (mg/L)	MW-19 (bg)	No	0.9169	7.815	3	13	0.05
Chloride (mg/L)	MW-01 (bg)	No	5.385	7.815	3	17	0.05
Chloride (mg/L)	MW-08	No	1.77	7.815	3	17	0.05
Chloride (mg/L)	MW-09 (bg)	No	3.489	7.815	3	17	0.05
Chloride (mg/L)	MW-11	No	2.13	7.815	3	17	0.05
Chloride (mg/L)	MW-12	No	1.251	7.815	3	17	0.05
Chloride (mg/L)	MW-15	No	0.5227	7.815	3	17	0.05
Chloride (mg/L)	MW-17	No	0.9027	7.815	3	17	0.05
Chloride (mg/L)	MW-18	No	3.277	7.815	3	17	0.05
Chloride (mg/L)	MW-19 (bg)	No	3.277	7.815	3	13	0.05
Chromium (mg/L)	MW-01 (bg)	No	1.5	7.815	3	17	0.05
Chromium (mg/L)	MW-08	No	1.5	7.815	3	15	0.05
Chromium (mg/L)	MW-09 (bg)	No	1.5	7.815	3	15	0.05
Chromium (mg/L)	MW-11	No	1.5	7.815	3	15	0.05
Chromium (mg/L)	MW-12	No	1.5	7.815	3	15	0.05
Chromium (mg/L)	MW-15	No	1.5	7.815	3	15	0.05
Chromium (mg/L)	MW-17	No	0	0	3	15	0.05
Chromium (mg/L)	MW-18	No	0	0	3	15	0.05
Cobalt (mg/L)	MW-01 (bg)	No	2.105	7.815	3	18	0.05
Cobalt (mg/L)	MW-08	No	0	0	3	17	0.05
Cobalt (mg/L)	MW-09 (bg)	No	2.567	7.815	3	17	0.05
Cobalt (mg/L)	MW-11	No	2.874	7.815	3	17	0.05
Cobalt (mg/L)	MW-12	No	4.667	7.815	3	17	0.05
Cobalt (mg/L)	MW-15	No	2.4	7.815	3	17	0.05
Cobalt (mg/L)	MW-17	No	2.92	7.815	3	17	0.05
Cobalt (mg/L)	MW-18	No	0	0	3	17	0.05
Cobalt (mg/L)	MW-19 (bg)	No	0	0	3	13	0.05
Combined Radium 226 + 228 (pCi/L)	MW-01 (bg)	No	2.439	7.815	3	17	0.05
Combined Radium 226 + 228 (pCi/L)	MW-08	No	3.765	7.815	3	17	0.05
Combined Radium 226 + 228 (pCi/L)	MW-09 (bg)	No	0.7268	7.815	3	17	0.05
Combined Radium 226 + 228 (pCi/L)	MW-11	No	3.758	7.815	3	17	0.05
Combined Radium 226 + 228 (pCi/L)	MW-12	No	3.178	7.815	3	17	0.05
Combined Radium 226 + 228 (pCi/L)	MW-15	No	1.02	7.815	3	17	0.05
Combined Radium 226 + 228 (pCi/L)	MW-17	No	1.035	7.815	3	17	0.05
Combined Radium 226 + 228 (pCi/L)	MW-18	No	2.092	7.815	3	17	0.05
Combined Radium 226 + 228 (pCi/L)	MW-19 (bg)	No	2.092	7.815	3	13	0.05
Fluoride (mg/L)	MW-01 (bg)	No	0.963	7.815	3	17	0.05
Fluoride (mg/L)	MW-08	No	2.688	7.815	3	17	0.05
Fluoride (mg/L)	MW-09 (bg)	No	1.539	7.815	3	17	0.05
Fluoride (mg/L)	MW-11	No	1.814	7.815	3	17	0.05

Seasonality ABBASB

Powerton Generating Station Client: NRG Data: Powerton Printed 8/12/2021, 11:30 AM

Constituent	Well	Sig.	K.-W.	Chi-Sq.	df	N	Alpha
Fluoride (mg/L)	MW-12	No	6.835	7.815	3	17	0.05
Fluoride (mg/L)	MW-15	No	0.7717	7.815	3	17	0.05
Fluoride (mg/L)	MW-17	No	1.867	7.815	3	17	0.05
Fluoride (mg/L)	MW-18	No	0.6421	7.815	3	17	0.05
Fluoride (mg/L)	MW-19 (bg)	No	0.6421	7.815	3	13	0.05
Lead (mg/L)	MW-01 (bg)	No	1.446	7.815	3	18	0.05
Lead (mg/L)	MW-08	No	5.607	7.815	3	17	0.05
Lead (mg/L)	MW-09 (bg)	No	2.4	7.815	3	17	0.05
Lead (mg/L)	MW-11	No	1.14	7.815	3	17	0.05
Lead (mg/L)	MW-12	No	3.988	7.815	3	17	0.05
Lead (mg/L)	MW-15	No	0	0	3	17	0.05
Lead (mg/L)	MW-17	No	2.171	7.815	3	17	0.05
Lead (mg/L)	MW-18	No	2.4	7.815	3	17	0.05
Lead (mg/L)	MW-19 (bg)	No	2.4	7.815	3	13	0.05
Lithium (mg/L)	MW-01 (bg)	No	2.4	7.815	3	17	0.05
Lithium (mg/L)	MW-08	No	2.667	7.815	3	17	0.05
Lithium (mg/L)	MW-09 (bg)	No	0	0	3	17	0.05
Lithium (mg/L)	MW-11	No	1.833	7.815	3	17	0.05
Lithium (mg/L)	MW-12	No	4.438	7.815	3	17	0.05
Lithium (mg/L)	MW-15	No	0.7891	7.815	3	17	0.05
Lithium (mg/L)	MW-17	No	0.2949	7.815	3	17	0.05
Lithium (mg/L)	MW-18	No	5.078	7.815	3	17	0.05
Lithium (mg/L)	MW-19 (bg)	No	5.078	7.815	3	13	0.05
Mercury (mg/L)	MW-01 (bg)	No	0	0	3	17	0.05
Mercury (mg/L)	MW-08	No	0	0	3	17	0.05
Mercury (mg/L)	MW-09 (bg)	No	1.833	7.815	3	17	0.05
Mercury (mg/L)	MW-11	No	0	0	3	17	0.05
Mercury (mg/L)	MW-12	No	0	0	3	17	0.05
Mercury (mg/L)	MW-15	No	0	0	3	17	0.05
Mercury (mg/L)	MW-17	No	0	0	3	17	0.05
Mercury (mg/L)	MW-18	No	0	0	3	17	0.05
Mercury (mg/L)	MW-19 (bg)	No	0	0	3	13	0.05
Molybdenum (mg/L)	MW-01 (bg)	No	1.562	7.815	3	17	0.05
Molybdenum (mg/L)	MW-08	No	3.185	7.815	3	17	0.05
Molybdenum (mg/L)	MW-09 (bg)	No	1.154	7.815	3	17	0.05
Molybdenum (mg/L)	MW-11	No	1.561	7.815	3	17	0.05
Molybdenum (mg/L)	MW-12	No	2.713	7.815	3	17	0.05
Molybdenum (mg/L)	MW-15	No	5.93	7.815	3	17	0.05
Molybdenum (mg/L)	MW-17	No	7.677	7.815	3	17	0.05
Molybdenum (mg/L)	MW-18	No	1.674	7.815	3	17	0.05
Molybdenum (mg/L)	MW-19 (bg)	No	1.674	7.815	3	13	0.05
pH (n/a)	MW-01 (bg)	No	0.9435	7.815	3	17	0.05
pH (n/a)	MW-08	No	1.471	7.815	3	17	0.05
pH (n/a)	MW-09 (bg)	No	2.499	7.815	3	17	0.05
pH (n/a)	MW-11	No	2.06	7.815	3	17	0.05
pH (n/a)	MW-12	No	6.169	7.815	3	17	0.05
pH (n/a)	MW-15	No	0.09162	7.815	3	17	0.05
pH (n/a)	MW-17	No	4.866	7.815	3	17	0.05
pH (n/a)	MW-18	No	3.609	7.815	3	17	0.05
pH (n/a)	MW-19 (bg)	No	3.609	7.815	3	13	0.05

Seasonality ABBASB

Powerton Generating Station Client: NRG Data: Powerton Printed 8/12/2021, 11:30 AM

Constituent	Well	Sig.	K.-W.	Chi-Sq.	df	N	Alpha
Selenium (mg/L)	MW-01 (bg)	No	3.25	7.815	3	17	0.05
Selenium (mg/L)	MW-08	No	0	0	3	17	0.05
Selenium (mg/L)	MW-09 (bg)	No	6.582	7.815	3	17	0.05
Selenium (mg/L)	MW-11	No	0	0	3	17	0.05
Selenium (mg/L)	MW-12	No	0	0	3	17	0.05
Selenium (mg/L)	MW-15	No	0.9603	7.815	3	17	0.05
Selenium (mg/L)	MW-17	No	0	0	3	17	0.05
Selenium (mg/L)	MW-18	No	0	0	3	17	0.05
Selenium (mg/L)	MW-19 (bg)	No	0	0	3	13	0.05
Sulfate (mg/L)	MW-01 (bg)	No	0.8146	7.815	3	17	0.05
Sulfate (mg/L)	MW-08	No	1.534	7.815	3	17	0.05
Sulfate (mg/L)	MW-09 (bg)	No	3.164	7.815	3	17	0.05
Sulfate (mg/L)	MW-11	No	3.964	7.815	3	17	0.05
Sulfate (mg/L)	MW-12	No	2.582	7.815	3	17	0.05
Sulfate (mg/L)	MW-15	No	0.2204	7.815	3	17	0.05
Sulfate (mg/L)	MW-17	No	0.4915	7.815	3	17	0.05
Sulfate (mg/L)	MW-18	No	3.727	7.815	3	17	0.05
Sulfate (mg/L)	MW-19 (bg)	No	3.727	7.815	3	13	0.05
Thallium (mg/L)	MW-01 (bg)	No	0	0	3	17	0.05
Thallium (mg/L)	MW-08	No	0	0	3	17	0.05
Thallium (mg/L)	MW-09 (bg)	No	0	0	3	17	0.05
Thallium (mg/L)	MW-11	No	0	0	3	17	0.05
Thallium (mg/L)	MW-12	No	0	0	3	17	0.05
Thallium (mg/L)	MW-15	No	0	0	3	17	0.05
Thallium (mg/L)	MW-17	No	3.634	7.815	3	17	0.05
Thallium (mg/L)	MW-18	No	0	0	3	17	0.05
Thallium (mg/L)	MW-19 (bg)	No	0	0	3	13	0.05
Total Dissolved Solids (mg/L)	MW-01 (bg)	No	1.281	7.815	3	17	0.05
Total Dissolved Solids (mg/L)	MW-08	No	2.318	7.815	3	17	0.05
Total Dissolved Solids (mg/L)	MW-09 (bg)	No	5.057	7.815	3	17	0.05
Total Dissolved Solids (mg/L)	MW-11	No	2.211	7.815	3	17	0.05
Total Dissolved Solids (mg/L)	MW-12	No	3.959	7.815	3	17	0.05
Total Dissolved Solids (mg/L)	MW-15	No	1.996	7.815	3	17	0.05
Total Dissolved Solids (mg/L)	MW-17	No	3.007	7.815	3	17	0.05
Total Dissolved Solids (mg/L)	MW-18	No	1.28	7.815	3	17	0.05
Total Dissolved Solids (mg/L)	MW-19 (bg)	No	1.28	7.815	3	13	0.05

Seasonality FAB

Powerton Generating Station   Client: NRG   Data: Powerton FAB   Printed 8/12/2021, 11:37 AM

Constituent	Well	Sig.	K.-W.	Chi-Sq.	df	N	Alpha
Antimony (mg/L)	MW-01 (bg)	No	0	0	3	16	0.05
Antimony (mg/L)	MW-05	No	0	0	3	14	0.05
Arsenic (mg/L)	MW-01 (bg)	No	1.38	7.815	3	18	0.05
Arsenic (mg/L)	MW-02	No	1.38	7.815	3	13	0.05
Arsenic (mg/L)	MW-03	No	1.38	7.815	3	13	0.05
Arsenic (mg/L)	MW-04	No	1.38	7.815	3	13	0.05
Arsenic (mg/L)	MW-05	No	3	7.815	3	16	0.05
Arsenic (mg/L)	MW-10 (bg)	No	3	7.815	3	13	0.05
Barium (mg/L)	MW-01 (bg)	No	7.255	7.815	3	18	0.05
Barium (mg/L)	MW-02	No	7.255	7.815	3	13	0.05
Barium (mg/L)	MW-03	No	7.255	7.815	3	13	0.05
Barium (mg/L)	MW-04	No	7.255	7.815	3	13	0.05
Barium (mg/L)	MW-05	No	1.252	7.815	3	16	0.05
Barium (mg/L)	MW-10 (bg)	No	1.252	7.815	3	13	0.05
Beryllium (mg/L)	MW-01 (bg)	No	0	0	3	16	0.05
Beryllium (mg/L)	MW-05	No	0	0	3	14	0.05
Boron (mg/L)	MW-01 (bg)	No	4.364	7.815	3	18	0.05
Boron (mg/L)	MW-02	No	4.364	7.815	3	13	0.05
Boron (mg/L)	MW-03	No	4.364	7.815	3	13	0.05
Boron (mg/L)	MW-04	No	4.364	7.815	3	13	0.05
Boron (mg/L)	MW-05	No	0.7946	7.815	3	16	0.05
Boron (mg/L)	MW-10 (bg)	No	0.7946	7.815	3	13	0.05
Cadmium (mg/L)	MW-01 (bg)	No	0	0	3	18	0.05
Cadmium (mg/L)	MW-05	No	0	0	3	14	0.05
Calcium (mg/L)	MW-01 (bg)	No	4.731	7.815	3	18	0.05
Calcium (mg/L)	MW-02	No	4.731	7.815	3	13	0.05
Calcium (mg/L)	MW-03	No	4.731	7.815	3	13	0.05
Calcium (mg/L)	MW-04	No	4.731	7.815	3	13	0.05
Calcium (mg/L)	MW-05	No	5.122	7.815	3	16	0.05
Calcium (mg/L)	MW-10 (bg)	No	5.122	7.815	3	13	0.05
Chloride (mg/L)	MW-01 (bg)	No	6.964	7.815	3	18	0.05
Chloride (mg/L)	MW-02	No	6.964	7.815	3	13	0.05
Chloride (mg/L)	MW-03	No	6.964	7.815	3	13	0.05
Chloride (mg/L)	MW-04	No	6.964	7.815	3	13	0.05
Chloride (mg/L)	MW-05	No	4.177	7.815	3	16	0.05
Chloride (mg/L)	MW-10 (bg)	No	4.177	7.815	3	13	0.05
Chromium (mg/L)	MW-01 (bg)	No	2.6	7.815	3	18	0.05
Chromium (mg/L)	MW-02	No	2.6	7.815	3	13	0.05
Chromium (mg/L)	MW-03	No	2.6	7.815	3	13	0.05
Chromium (mg/L)	MW-04	No	2.6	7.815	3	13	0.05
Chromium (mg/L)	MW-05	No	0	0	3	16	0.05
Chromium (mg/L)	MW-10 (bg)	No	0	0	3	13	0.05
Cobalt (mg/L)	MW-01 (bg)	No	2.121	7.815	3	18	0.05
Cobalt (mg/L)	MW-02	No	2.121	7.815	3	13	0.05
Cobalt (mg/L)	MW-03	No	2.121	7.815	3	13	0.05
Cobalt (mg/L)	MW-04	No	2.121	7.815	3	13	0.05
Cobalt (mg/L)	MW-05	No	0	0	3	16	0.05
Cobalt (mg/L)	MW-10 (bg)	No	0	0	3	13	0.05
Combined Radium 226 + 228 (pCi/L)	MW-01 (bg)	No	2.153	7.815	3	18	0.05
Combined Radium 226 + 228 (pCi/L)	MW-02	No	2.153	7.815	3	13	0.05

Seasonality FAB

Powerton Generating Station Client: NRG Data: Powerton FAB Printed 8/12/2021, 11:37 AM

Constituent	Well	Sig.	K.-W.	Chi-Sq.	df	N	Alpha
Combined Radium 226 + 228 (pCi/L)	MW-03	No	2.153	7.815	3	13	0.05
Combined Radium 226 + 228 (pCi/L)	MW-04	No	2.153	7.815	3	13	0.05
Combined Radium 226 + 228 (pCi/L)	MW-05	No	1.704	7.815	3	16	0.05
Combined Radium 226 + 228 (pCi/L)	MW-10 (bg)	No	1.704	7.815	3	13	0.05
Fluoride (mg/L)	MW-01 (bg)	No	0.4979	7.815	3	18	0.05
Fluoride (mg/L)	MW-02	No	0.4979	7.815	3	13	0.05
Fluoride (mg/L)	MW-03	No	0.4979	7.815	3	13	0.05
Fluoride (mg/L)	MW-04	No	0.4979	7.815	3	13	0.05
Fluoride (mg/L)	MW-05	No	1.98	7.815	3	16	0.05
Fluoride (mg/L)	MW-10 (bg)	No	1.98	7.815	3	13	0.05
Lead (mg/L)	MW-01 (bg)	No	2.793	7.815	3	18	0.05
Lead (mg/L)	MW-02	No	2.793	7.815	3	13	0.05
Lead (mg/L)	MW-03	No	2.793	7.815	3	13	0.05
Lead (mg/L)	MW-04	No	2.793	7.815	3	13	0.05
Lead (mg/L)	MW-05	No	3	7.815	3	16	0.05
Lead (mg/L)	MW-10 (bg)	No	3	7.815	3	13	0.05
Lithium (mg/L)	MW-01 (bg)	No	0	0	3	18	0.05
Lithium (mg/L)	MW-02	No	0	0	3	12	0.05
Lithium (mg/L)	MW-03	No	0	0	3	12	0.05
Lithium (mg/L)	MW-04	No	0	0	3	12	0.05
Lithium (mg/L)	MW-05	No	0	0	3	15	0.05
Lithium (mg/L)	MW-10 (bg)	No	0	0	3	12	0.05
Mercury (mg/L)	MW-01 (bg)	No	0	0	3	18	0.05
Mercury (mg/L)	MW-02	No	0	0	3	12	0.05
Mercury (mg/L)	MW-03	No	0	0	3	12	0.05
Mercury (mg/L)	MW-04	No	0	0	3	12	0.05
Mercury (mg/L)	MW-05	No	0	0	3	15	0.05
Mercury (mg/L)	MW-10 (bg)	No	0	0	3	12	0.05
Molybdenum (mg/L)	MW-01 (bg)	No	1.442	7.815	3	18	0.05
Molybdenum (mg/L)	MW-02	No	1.442	7.815	3	13	0.05
Molybdenum (mg/L)	MW-03	No	1.442	7.815	3	13	0.05
Molybdenum (mg/L)	MW-04	No	1.442	7.815	3	13	0.05
Molybdenum (mg/L)	MW-05	No	2.004	7.815	3	16	0.05
Molybdenum (mg/L)	MW-10 (bg)	No	2.004	7.815	3	13	0.05
pH (n/a)	MW-01 (bg)	No	1.95	7.815	3	18	0.05
pH (n/a)	MW-02	No	1.95	7.815	3	13	0.05
pH (n/a)	MW-03	No	1.95	7.815	3	13	0.05
pH (n/a)	MW-04	No	1.95	7.815	3	13	0.05
pH (n/a)	**MW-05**	**Yes**	**8.69**	**7.815**	**3**	**16**	**0.05**
pH (n/a)	MW-10 (bg)	No	8.69	7.815	3	13	0.05
Selenium (mg/L)	MW-01 (bg)	No	2.6	7.815	3	18	0.05
Selenium (mg/L)	MW-02	No	2.6	7.815	3	13	0.05
Selenium (mg/L)	MW-03	No	2.6	7.815	3	13	0.05
Selenium (mg/L)	MW-04	No	2.6	7.815	3	13	0.05
Selenium (mg/L)	MW-05	No	0	0	3	16	0.05
Selenium (mg/L)	MW-10 (bg)	No	0	0	3	13	0.05
Sulfate (mg/L)	MW-01 (bg)	No	3	7.815	3	18	0.05
Sulfate (mg/L)	MW-02	No	3	7.815	3	13	0.05
Sulfate (mg/L)	MW-03	No	3	7.815	3	13	0.05
Sulfate (mg/L)	MW-04	No	3	7.815	3	13	0.05

Seasonality FAB

Powerton Generating Station   Client: NRG   Data: Powerton FAB   Printed 8/12/2021, 11:37 AM

Constituent	Well	Sig.	K.-W.	Chi-Sq.	df	N	Alpha
Sulfate (mg/L)	MW-05	No	2.399	7.815	3	16	0.05
Sulfate (mg/L)	MW-10 (bg)	No	2.399	7.815	3	13	0.05
Thallium (mg/L)	MW-01 (bg)	No	0	0	3	18	0.05
Thallium (mg/L)	MW-05	No	0	0	3	14	0.05
Total Dissolved Solids (mg/L)	MW-01 (bg)	No	4.39	7.815	3	18	0.05
Total Dissolved Solids (mg/L)	MW-02	No	4.39	7.815	3	13	0.05
Total Dissolved Solids (mg/L)	MW-03	No	4.39	7.815	3	13	0.05
Total Dissolved Solids (mg/L)	MW-04	No	4.39	7.815	3	13	0.05
Total Dissolved Solids (mg/L)	MW-05	No	2.629	7.815	3	16	0.05
Total Dissolved Solids (mg/L)	MW-10 (bg)	No	2.629	7.815	3	13	0.05

Powerton ABB ASB Trend Test

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/10/2021, 9:42 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Antimony (mg/L)	MW-01 (bg)	0	0	58	No	17	100	n/a	n/a	0.02	NP (NDs)
Antimony (mg/L)	MW-09 (bg)	0	0	48	No	15	100	n/a	n/a	0.02	NP (NDs)
Antimony (mg/L)	MW-19 (bg)	0	0	31	No	11	100	n/a	n/a	0.02	NP (NDs)
Arsenic (mg/L)	MW-01 (bg)	0	-51	-68	No	19	57.89	n/a	n/a	0.02	NP (Nor...
Arsenic (mg/L)	MW-09 (bg)	0	-3	-58	No	17	52.94	n/a	n/a	0.02	NP (Nor...
Arsenic (mg/L)	MW-19 (bg)	0	6	39	No	13	92.31	n/a	n/a	0.02	NP (NDs)
Barium (mg/L)	MW-01 (bg)	-0.00...	-27	-68	No	19	0	n/a	n/a	0.02	NP (Nor...
Barium (mg/L)	MW-09 (bg)	0.001422	1.341	2.249	No	17	0	Yes	no	0.02	Param.
Barium (mg/L)	MW-19 (bg)	-0.00...	-27	-39	No	13	0	n/a	n/a	0.02	NP (Nor...
Beryllium (mg/L)	MW-01 (bg)	0	0	58	No	17	100	n/a	n/a	0.02	NP (NDs)
Beryllium (mg/L)	MW-09 (bg)	0	0	48	No	15	100	n/a	n/a	0.02	NP (NDs)
Beryllium (mg/L)	MW-19 (bg)	0	0	31	No	11	100	n/a	n/a	0.02	NP (NDs)
Boron (mg/L)	MW-01 (bg)	-0.00...	-0.00...	2.224	No	19	0	Yes	square...	0.02	Param.
Boron (mg/L)	MW-09 (bg)	-0.06533	-0.4427	2.249	No	17	0	Yes	no	0.02	Param.
Boron (mg/L)	MW-19 (bg)	-0.305	-2.218	2.328	No	13	0	Yes	no	0.02	Param.
Cadmium (mg/L)	MW-01 (bg)	0	10	68	No	19	94.74	n/a	n/a	0.02	NP (NDs)
Cadmium (mg/L)	MW-09 (bg)	0	0	58	No	17	100	n/a	n/a	0.02	NP (NDs)
Cadmium (mg/L)	MW-19 (bg)	0	0	39	No	13	100	n/a	n/a	0.02	NP (NDs)
Calcium (mg/L)	MW-01 (bg)	-1.248	-0.6301	2.224	No	19	0	Yes	no	0.02	Param.
Calcium (mg/L)	MW-09 (bg)	-0.5163	-0.425	2.249	No	17	0	Yes	no	0.02	Param.
Calcium (mg/L)	MW-19 (bg)	-1.775	-0.5807	2.328	No	13	0	Yes	no	0.02	Param.
Chloride (mg/L)	MW-01 (bg)	1.199	1.131	2.224	No	19	0	Yes	no	0.02	Param.
Chloride (mg/L)	MW-09 (bg)	-4272480	-1.71	2.249	No	17	0	Yes	x^5	0.02	Param.
Chloride (mg/L)	MW-19 (bg)	-0.3565	-9	-39	No	13	0	n/a	n/a	0.02	NP (Nor...
Chromium (mg/L)	MW-01 (bg)	0	-3	-68	No	19	89.47	n/a	n/a	0.02	NP (NDs)
Chromium (mg/L)	MW-09 (bg)	0	0	48	No	15	100	n/a	n/a	0.02	NP (NDs)
Chromium (mg/L)	MW-19 (bg)	0	0	31	No	11	100	n/a	n/a	0.02	NP (NDs)
Cobalt (mg/L)	MW-01 (bg)	0	-38	-73	No	20	65	n/a	n/a	0.02	NP (Nor...
Cobalt (mg/L)	MW-09 (bg)	0	-3	-58	No	17	88.24	n/a	n/a	0.02	NP (NDs)
Cobalt (mg/L)	MW-19 (bg)	0	-8	-39	No	13	84.62	n/a	n/a	0.02	NP (NDs)
Combined Radium 226 + 228 (pCi/L)	MW-01 (bg)	-0.01553	-0.643	2.224	No	19	52.63	Yes	no	0.02	Param.
Combined Radium 226 + 228 (pCi/L)	MW-09 (bg)	0.01962	30	58	No	17	82.35	n/a	n/a	0.02	NP (NDs)
Combined Radium 226 + 228 (pCi/L)	MW-19 (bg)	0.00533	0.2342	2.328	No	13	53.85	Yes	square...	0.02	Param.
Fluoride (mg/L)	MW-01 (bg)	0.004035	0.7664	2.224	No	19	0	Yes	no	0.02	Param.
Fluoride (mg/L)	MW-09 (bg)	0.008285	2.194	2.249	No	17	0	Yes	no	0.02	Param.
Fluoride (mg/L)	**MW-19 (bg)**	**0.009155**	**2.773**	**2.328**	**Yes**	**13**	**0**	**Yes**	**no**	**0.02**	**Param.**
Lead (mg/L)	MW-01 (bg)	-0.00...	-46	-73	No	20	45	n/a	n/a	0.02	NP (Nor...
Lead (mg/L)	MW-09 (bg)	0	10	58	No	17	94.12	n/a	n/a	0.02	NP (NDs)
Lead (mg/L)	MW-19 (bg)	0	-26	-39	No	13	69.23	n/a	n/a	0.02	NP (Nor...
Lithium (mg/L)	MW-01 (bg)	0	10	68	No	19	94.74	n/a	n/a	0.02	NP (NDs)
Lithium (mg/L)	MW-09 (bg)	0	0	58	No	17	100	n/a	n/a	0.02	NP (NDs)
Lithium (mg/L)	MW-19 (bg)	0	0	39	No	13	100	n/a	n/a	0.02	NP (NDs)
Mercury (mg/L)	MW-01 (bg)	0	0	68	No	19	100	n/a	n/a	0.02	NP (NDs)
Mercury (mg/L)	MW-09 (bg)	0	4	58	No	17	94.12	n/a	n/a	0.02	NP (NDs)
Mercury (mg/L)	MW-19 (bg)	0	0	39	No	13	100	n/a	n/a	0.02	NP (NDs)
Molybdenum (mg/L)	MW-01 (bg)	0	17	68	No	19	57.89	n/a	n/a	0.02	NP (Nor...
Molybdenum (mg/L)	**MW-09 (bg)**	**-0.00...**	**-5.318**	**-2.249**	**Yes**	**17**	**0**	**Yes**	**square...**	**0.02**	**Param.**
Molybdenum (mg/L)	MW-19 (bg)	0.002316	1.674	2.328	No	13	0	Yes	no	0.02	Param.
pH (n/a)	MW-01 (bg)	0.02745	0.7533	2.224	No	19	0	Yes	no	0.02	Param.
pH (n/a)	MW-09 (bg)	0.009659	0.2965	2.249	No	17	0	Yes	no	0.02	Param.

Powerton ABB ASB Trend Test

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/10/2021, 9:42 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
pH (n/a)	MW-19 (bg)	-0.04872	-0.899	2.328	No	13	0	Yes	no	0.02	Param.
Selenium (mg/L)	MW-01 (bg)	0	-16	-68	No	19	94.74	n/a	n/a	0.02	NP (NDs)
Selenium (mg/L)	MW-09 (bg)	0	-6	-58	No	17	47.06	n/a	n/a	0.02	NP (Nor...
Selenium (mg/L)	**MW-19 (bg)**	**-0.00...**	**-2.557**	**-2.328**	**Yes**	**13**	**38.46**	**Yes**	**no**	**0.02**	**Param.**
Sulfate (mg/L)	MW-01 (bg)	-4.185	-2.092	2.224	No	19	0	Yes	no	0.02	Param.
Sulfate (mg/L)	MW-09 (bg)	-3.501	-0.6088	2.249	No	17	0	Yes	no	0.02	Param.
Sulfate (mg/L)	**MW-19 (bg)**	**-15.6**	**-3.145**	**-2.328**	**Yes**	**13**	**0**	**Yes**	**no**	**0.02**	**Param.**
Thallium (mg/L)	MW-01 (bg)	0	0	68	No	19	100	n/a	n/a	0.02	NP (NDs)
Thallium (mg/L)	MW-09 (bg)	0	0	58	No	17	100	n/a	n/a	0.02	NP (NDs)
Thallium (mg/L)	MW-19 (bg)	0	0	39	No	13	100	n/a	n/a	0.02	NP (NDs)
Total Dissolved Solids (mg/L)	MW-01 (bg)	-3.804	-0.3814	2.224	No	19	0	Yes	no	0.02	Param.
Total Dissolved Solids (mg/L)	MW-09 (bg)	-27.14	-1.743	2.249	No	17	0	Yes	no	0.02	Param.
Total Dissolved Solids (mg/L)	**MW-19 (bg)**	**-46.02**	**-2.495**	**-2.328**	**Yes**	**13**	**0**	**Yes**	**no**	**0.02**	**Param.**

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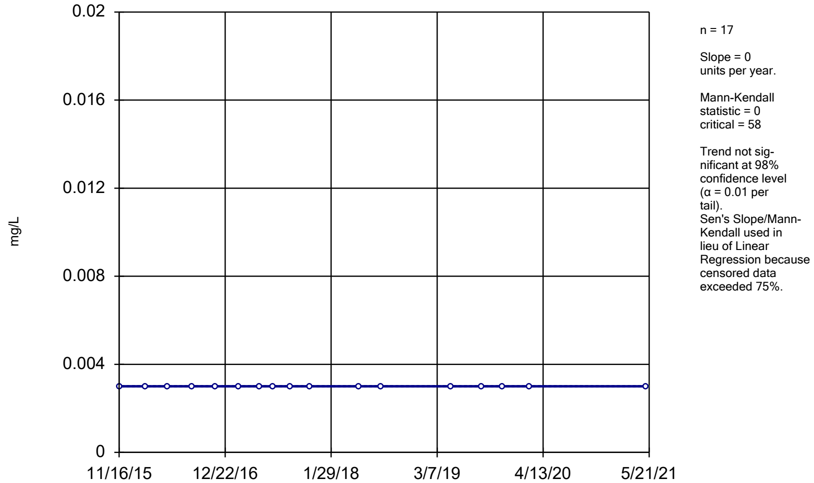
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)



Constituent: Antimony Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

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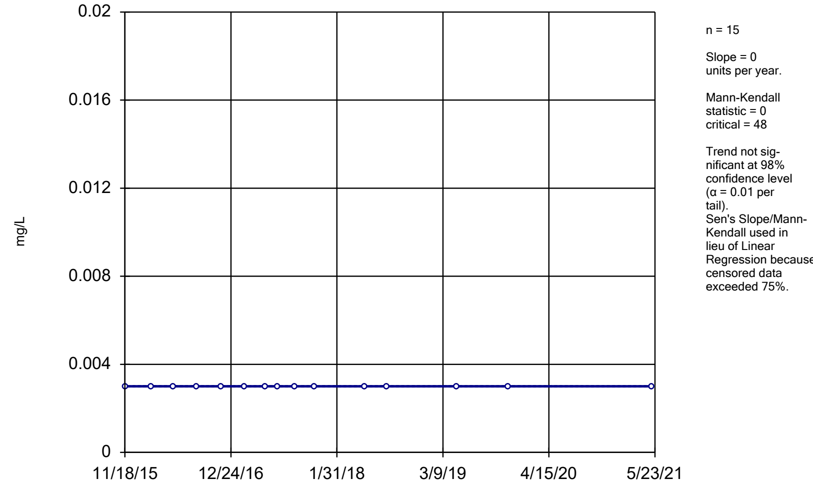
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-09 (bg)



Constituent: Antimony Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

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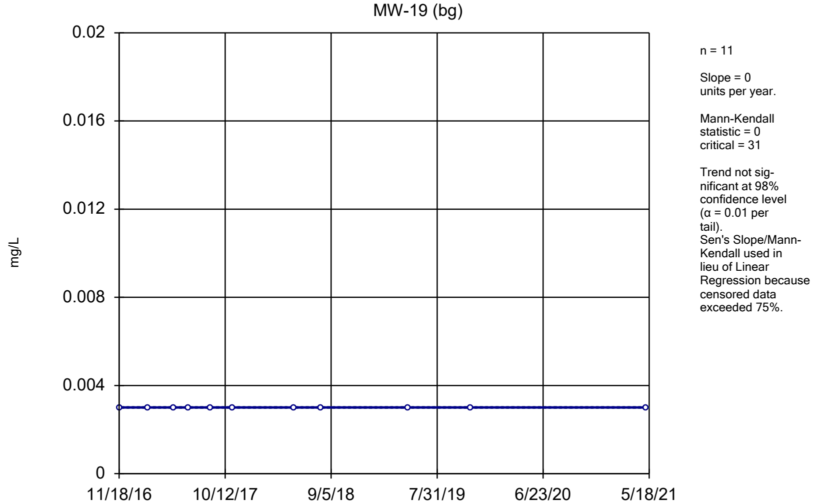
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-19 (bg)



Constituent: Antimony Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

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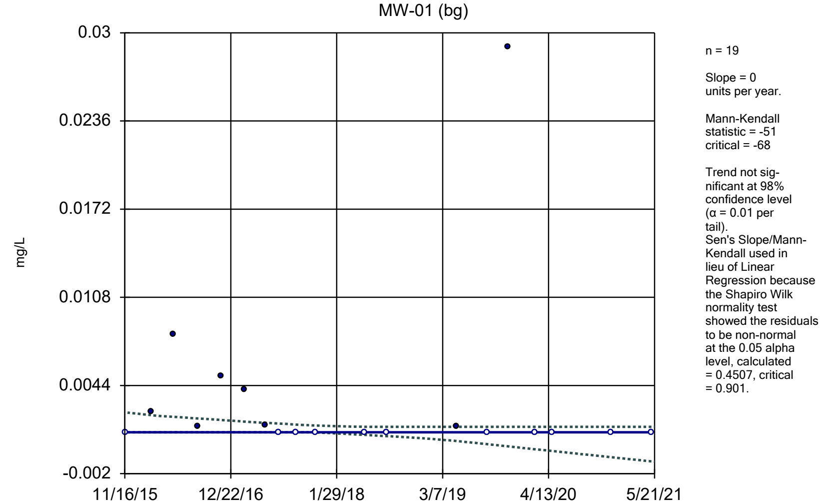
Hollow symbols indicate censored values.

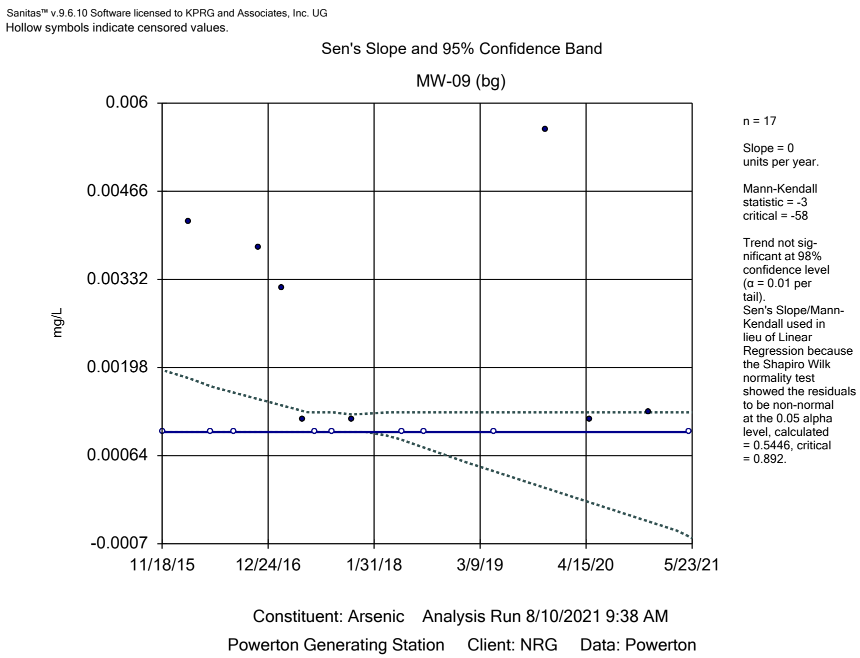
Sen's Slope and 95% Confidence Band

MW-01 (bg)

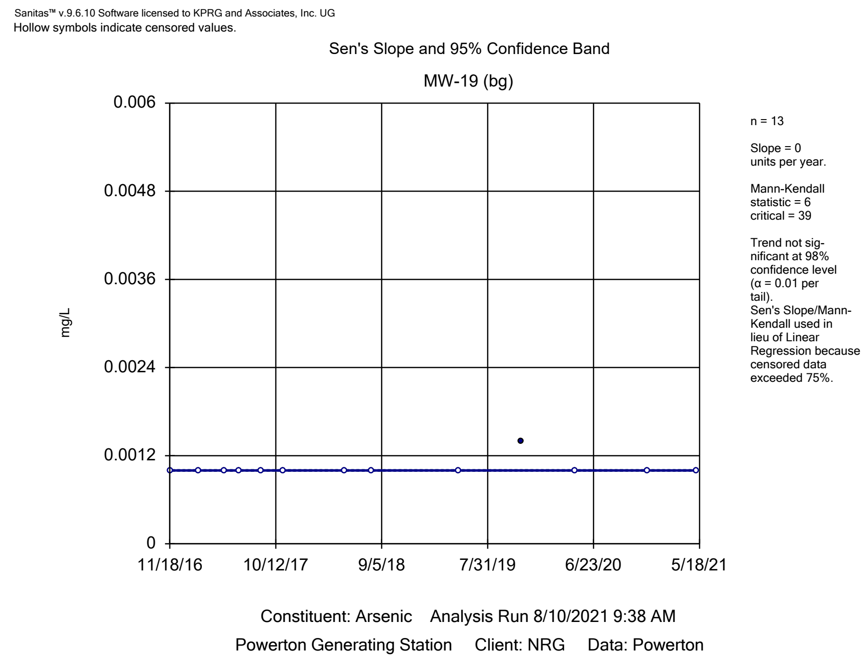


Constituent: Arsenic Analysis Run 8/10/2021 9:38 AM

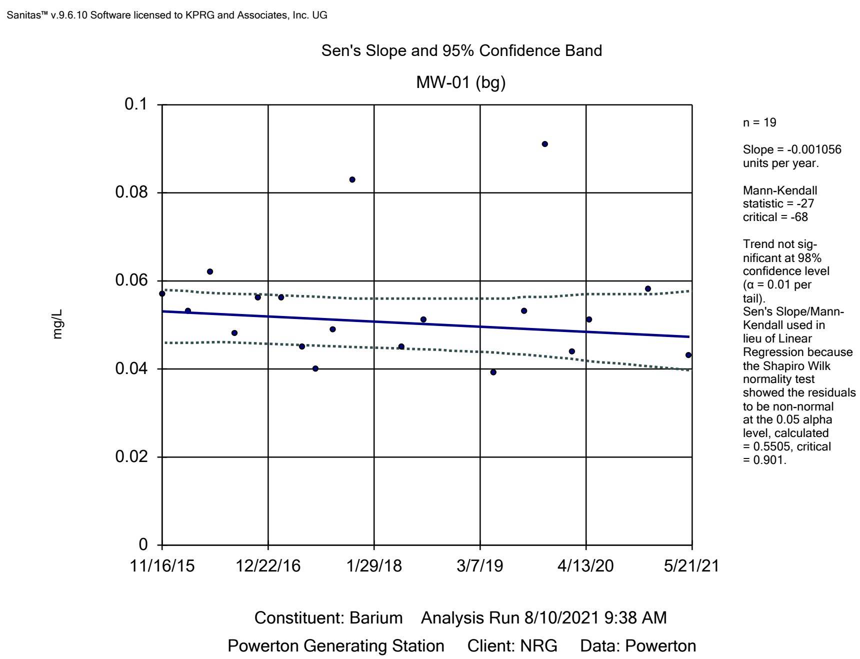
Powerton Generating Station Client: NRG Data: Powerton



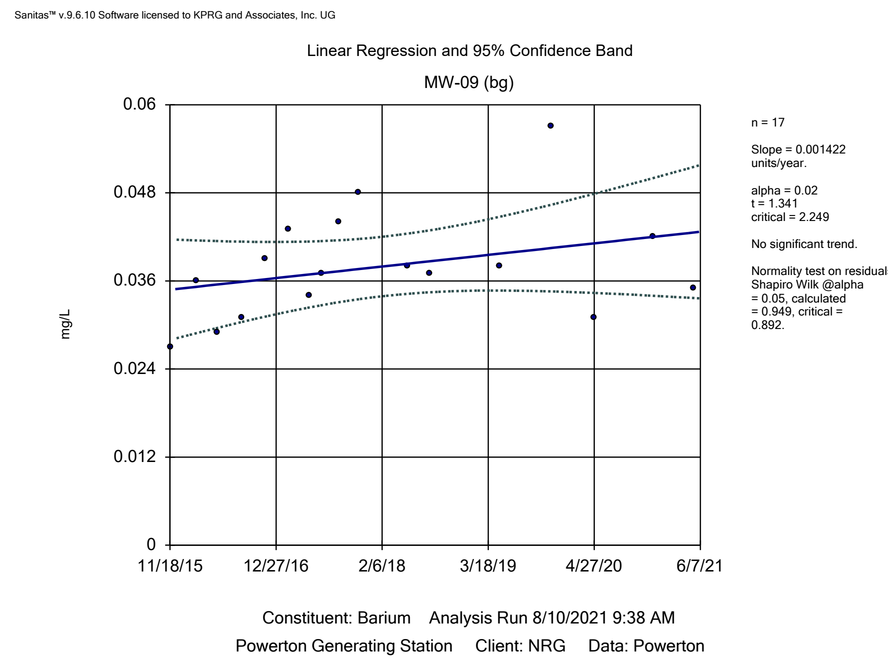
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-09 (bg)
0.006
0.00466
0.00332
0.00198
0.00064
-0.0007
mg/L
11/18/15
12/24/16
1/31/18
3/9/19
4/15/20
5/23/21
n = 17
Slope = 0 units per year.
Mann-Kendall statistic = -3 critical = -58
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.05 alpha level, calculated = 0.5446, critical = 0.892.
Constituent: Arsenic Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton



Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-19 (bg)
0.006
0.0048
0.0036
0.0024
0.0012
0
mg/L
11/18/16
10/12/17
9/5/18
7/31/19
6/23/20
5/18/21
n = 13
Slope = 0 units per year.
Mann-Kendall statistic = 6 critical = 39
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.
Constituent: Arsenic Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton



Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Sen's Slope and 95% Confidence Band
MW-01 (bg)
0.1
0.08
0.06
0.04
0.02
0
mg/L
11/16/15
12/22/16
1/29/18
3/7/19
4/13/20
5/21/21
n = 19
Slope = -0.001056 units per year.
Mann-Kendall statistic = -27 critical = -68
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.05 alpha level, calculated = 0.5505, critical = 0.901.
Constituent: Barium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

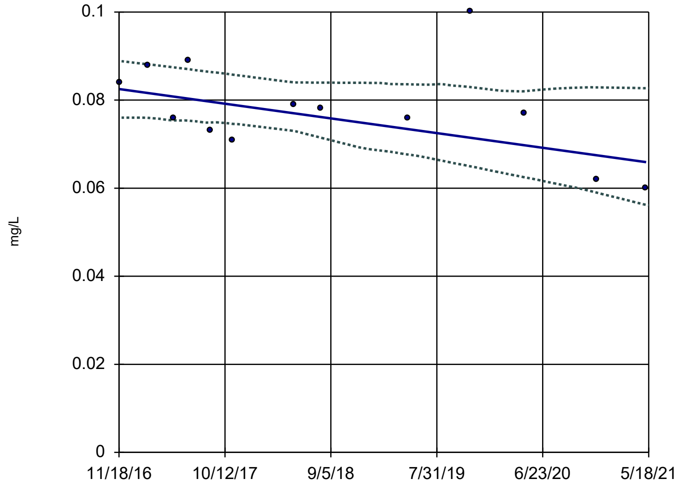


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-09 (bg)
0.06
0.048
0.036
0.024
0.012
0
mg/L
11/18/15
12/27/16
2/6/18
3/18/19
4/27/20
6/7/21
n = 17
Slope = 0.001422 units/year.
alpha = 0.02
t = 1.341
critical = 2.249
No significant trend.
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.949, critical = 0.892.
Constituent: Barium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Sen's Slope and 95% Confidence Band

MW-19 (bg)



n = 13

Slope = -0.003704 units per year.

Mann-Kendall statistic = -27 critical = -39

Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.05 alpha level, calculated = 0.7036, critical = 0.866.

Constituent: Barium Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

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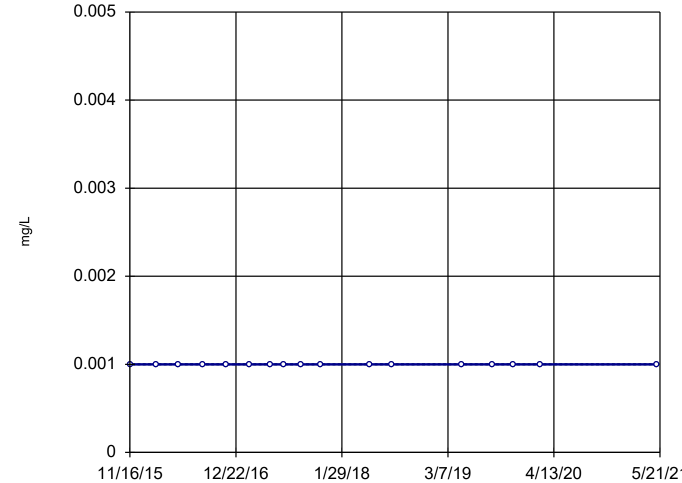
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)



n = 17

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 58

Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.

Constituent: Beryllium Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

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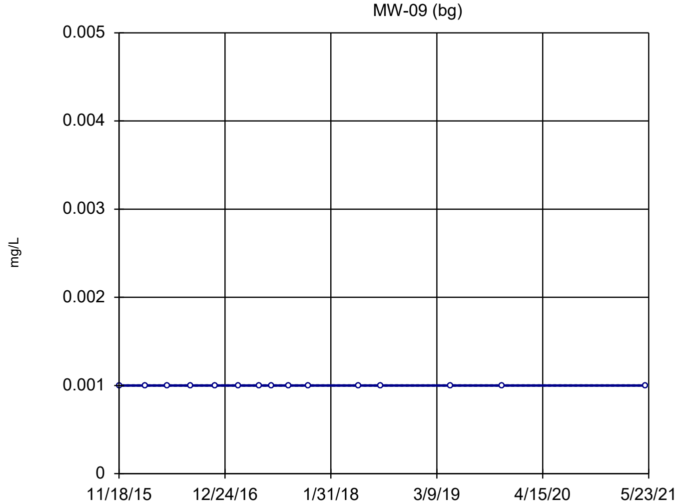
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-09 (bg)



n = 15

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 48

Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.

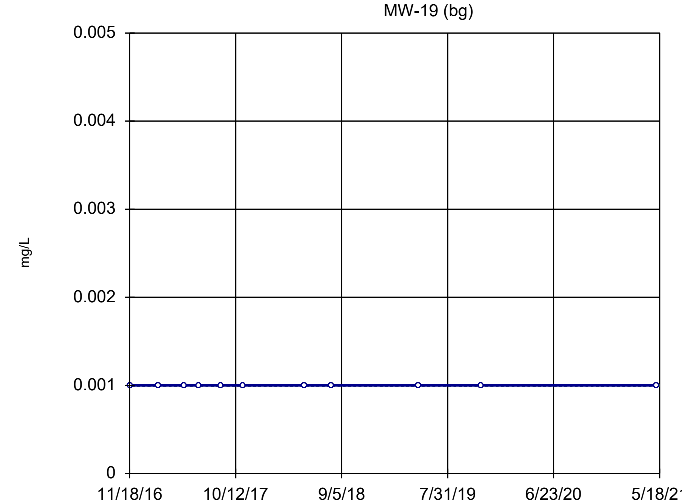
Constituent: Beryllium Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-19 (bg)



n = 11

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 31

Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.

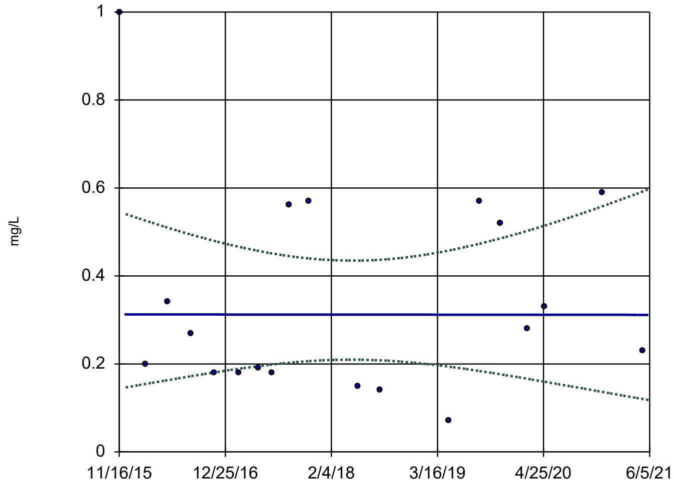
Constituent: Beryllium Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 19

Slope = -0.0001529
square root units/year.

alpha = 0.02
t = -0.005766
critical = 2.224

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9258 after square
root transformation,
critical = 0.901.

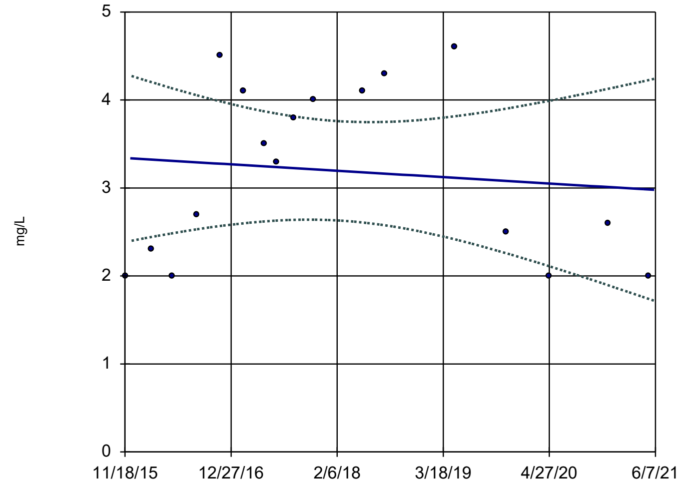
Constituent: Boron   Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station   Client: NRG   Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-09 (bg)



n = 17

Slope = -0.06533
units/year.

alpha = 0.02
t = -0.4427
critical = 2.249

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.916, critical =
0.892.

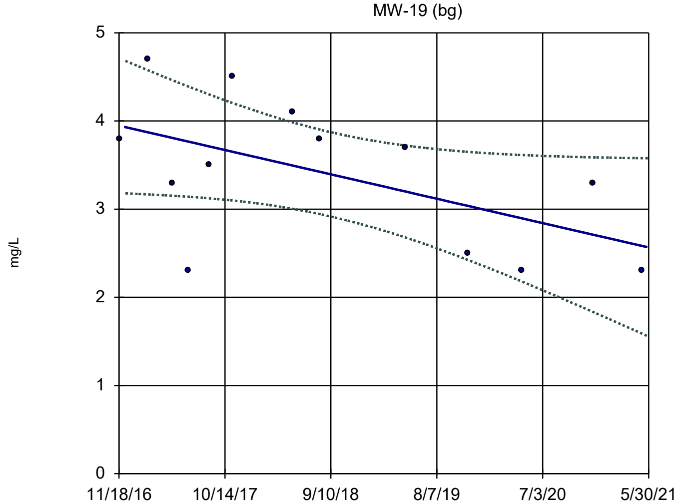
Constituent: Boron   Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station   Client: NRG   Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-19 (bg)



n = 13

Slope = -0.305
units/year.

alpha = 0.02
t = -2.218
critical = 2.328

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9223, critical
= 0.866.

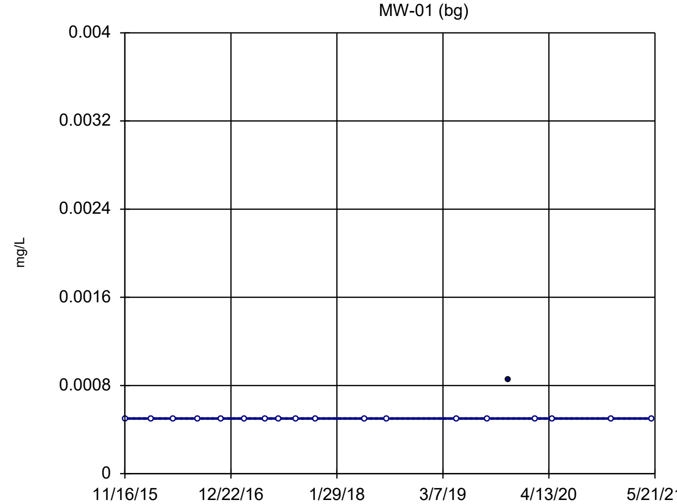
Constituent: Boron   Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station   Client: NRG   Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)



n = 19

Slope = 0
units per year.

Mann-Kendall
statistic = 10
critical = 68

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.

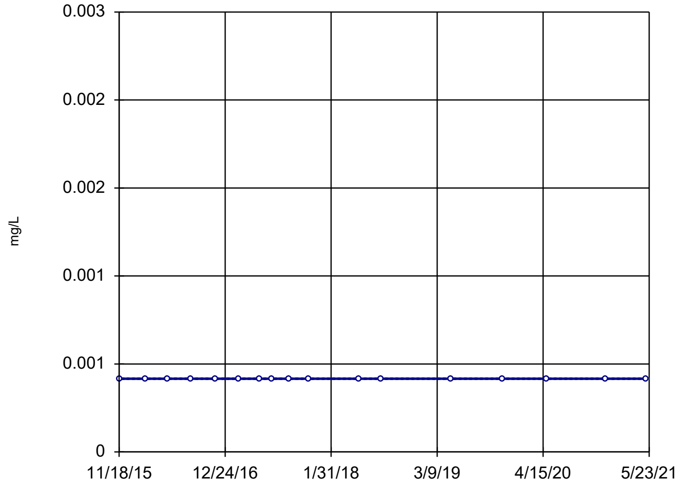
Constituent: Cadmium   Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station   Client: NRG   Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-09 (bg)



n = 17

Slope = 0
units per year.

Mann-Kendall
statistic = 0
critical = 58

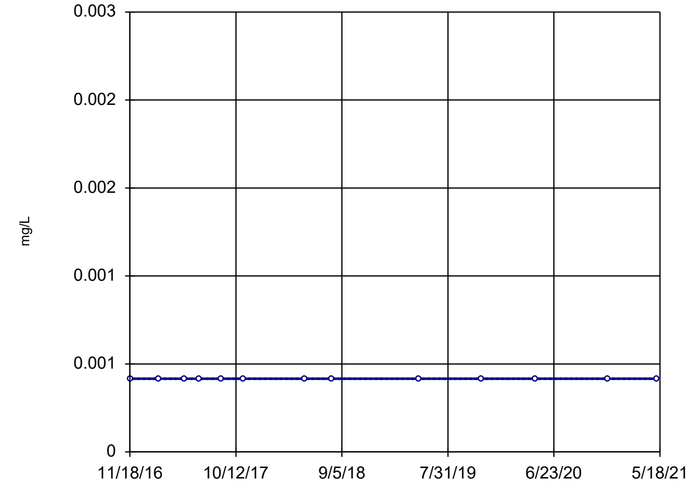
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.

Constituent: Cadmium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-19 (bg)



n = 13

Slope = 0
units per year.

Mann-Kendall
statistic = 0
critical = 39

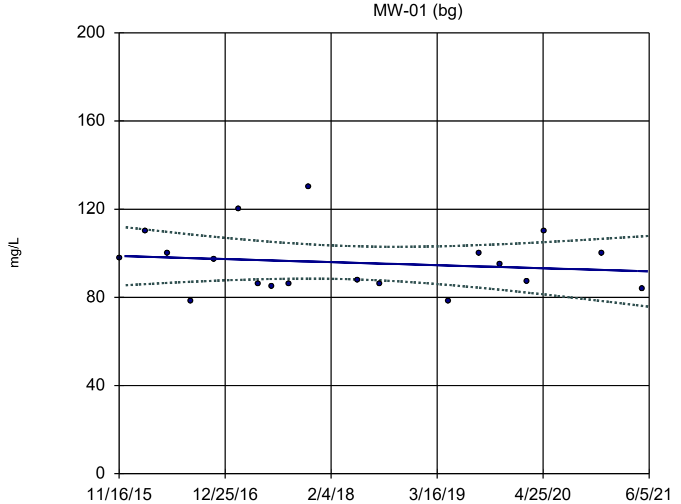
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.

Constituent: Cadmium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 19

Slope = -1.248
units/year.

alpha = 0.02
t = -0.6301
critical = 2.224

No significant trend.

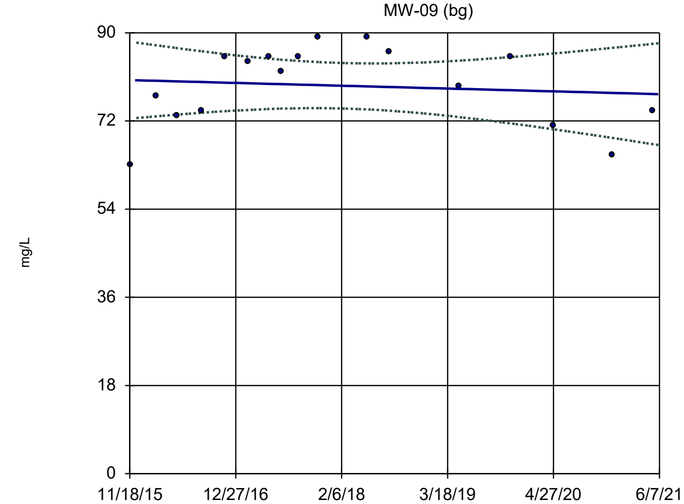
Normality test on residuals:
Shapiro Wilk @alpha = 0.05, calculated = 0.9383, critical = 0.901.

Constituent: Calcium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-09 (bg)



n = 17

Slope = -0.5163
units/year.

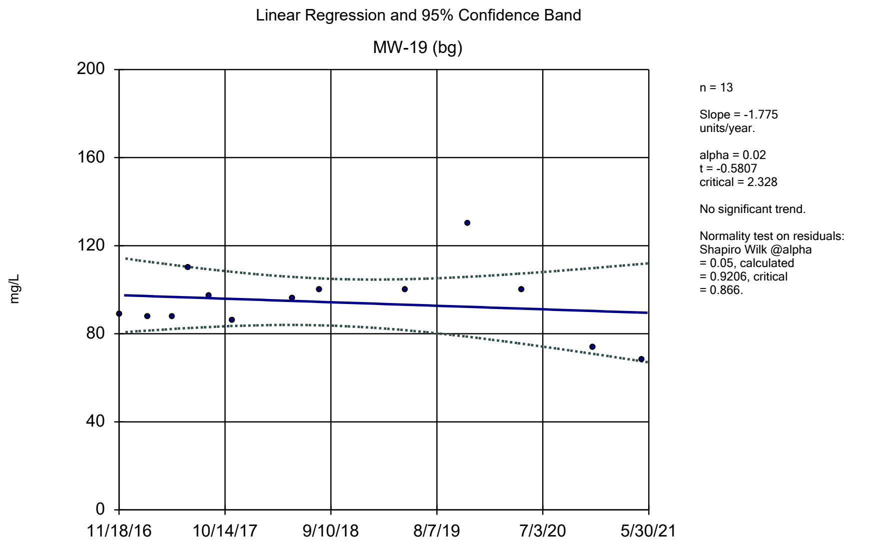
alpha = 0.02
t = -0.425
critical = 2.249

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha = 0.05, calculated = 0.9245, critical = 0.892.

Constituent: Calcium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

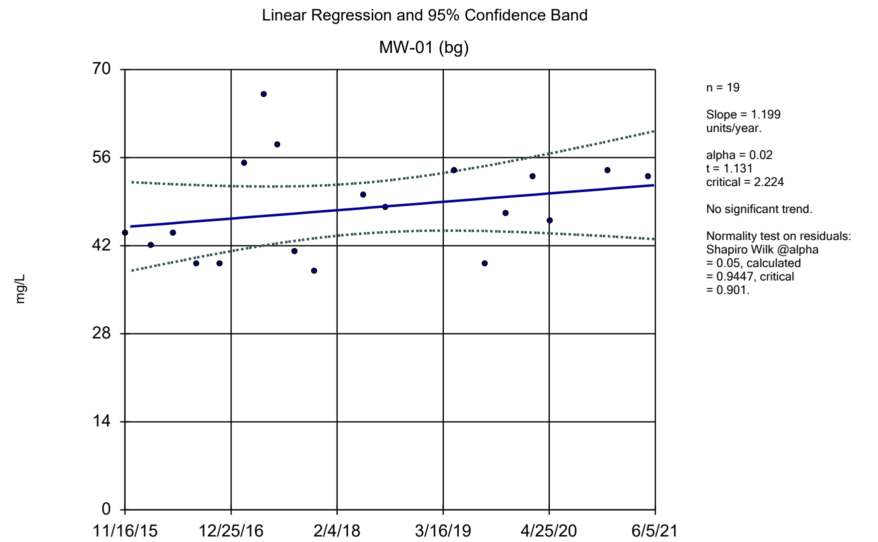
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



Constituent: Calcium Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

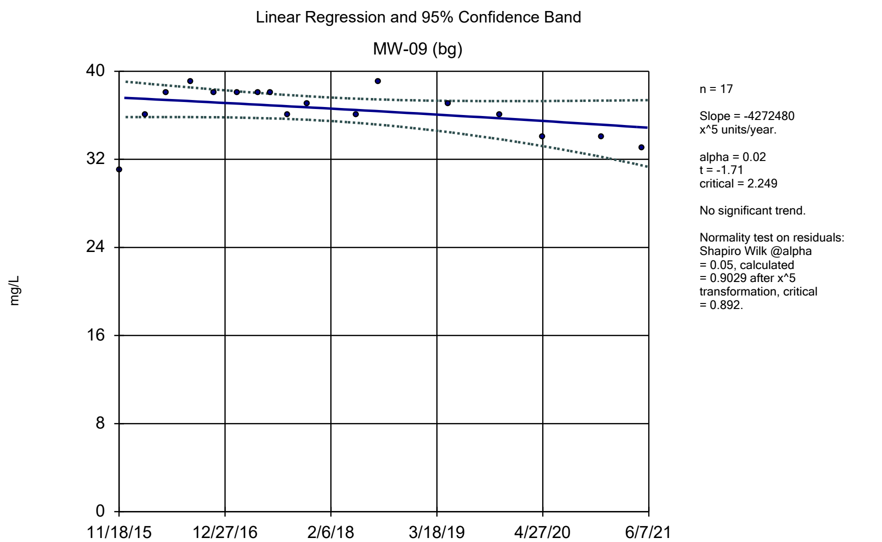
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



Constituent: Chloride Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

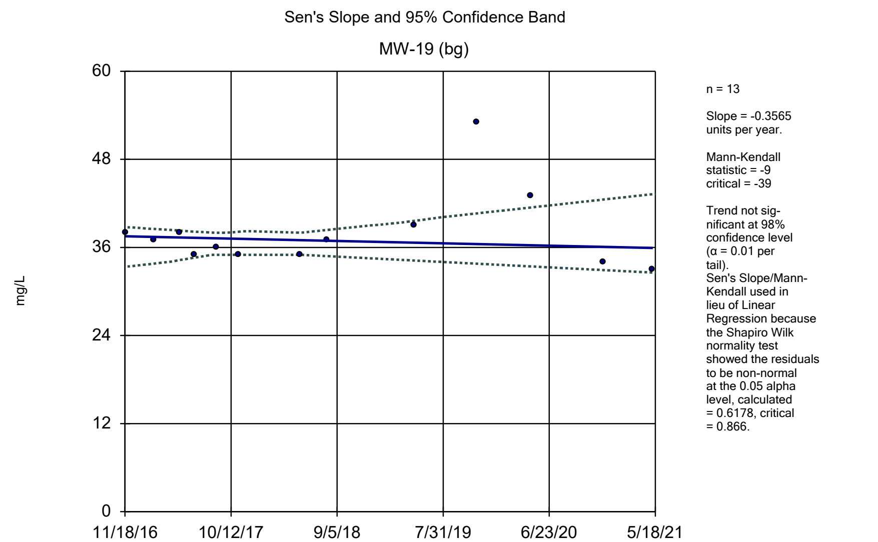
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



Constituent: Chloride Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

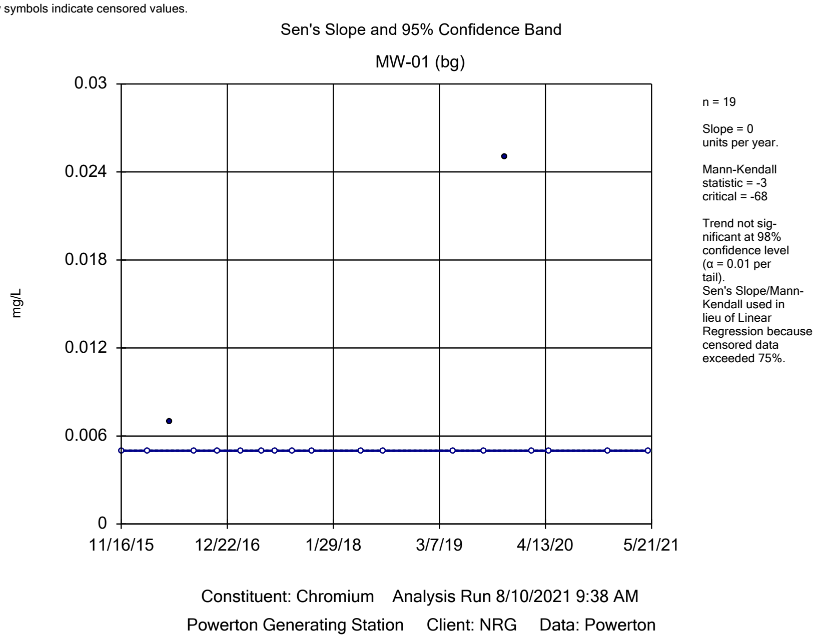
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



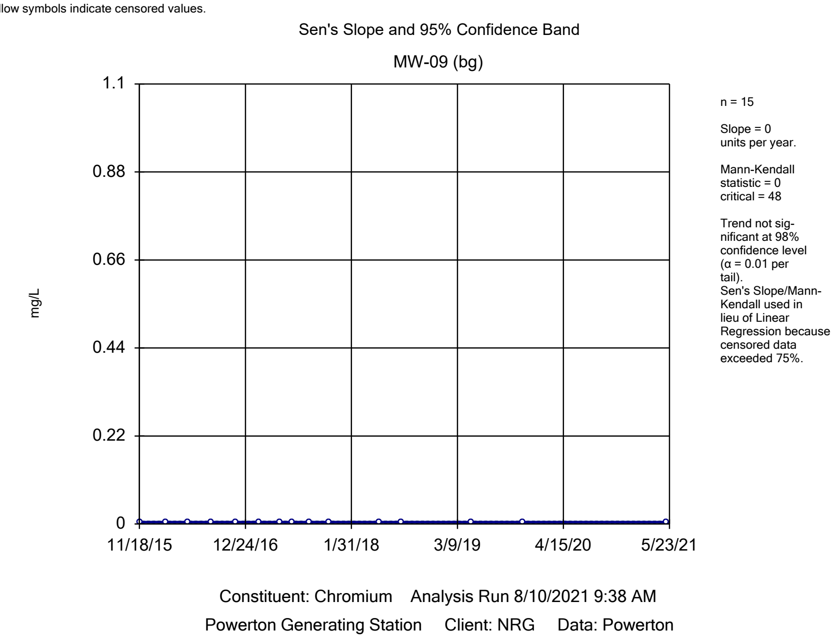
Constituent: Chloride Analysis Run 8/10/2021 9:38 AM

Powerton Generating Station Client: NRG Data: Powerton

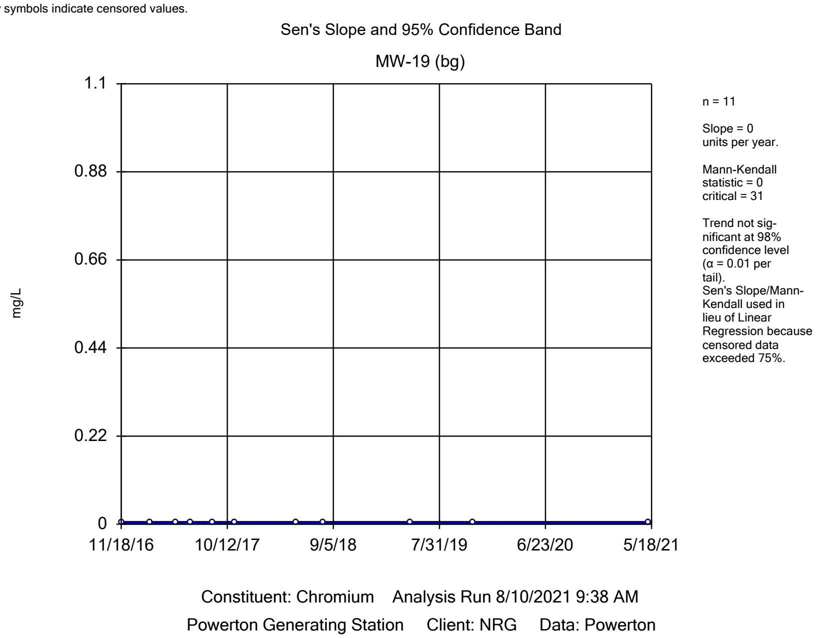
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.



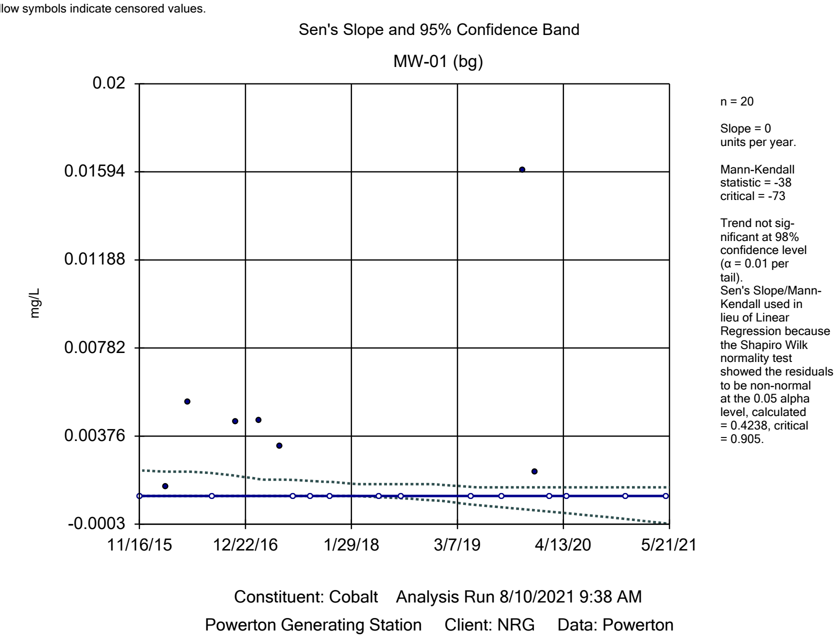
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

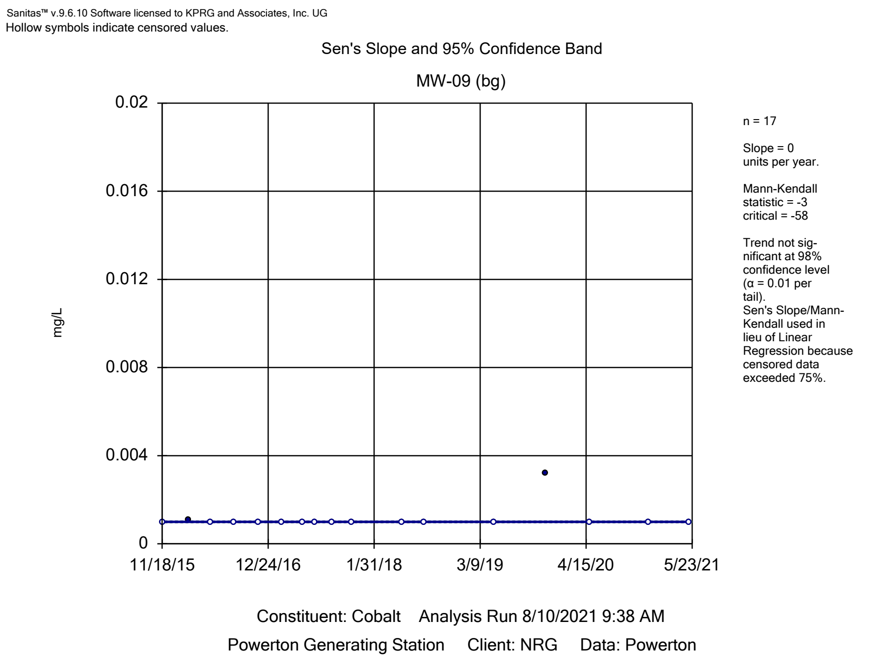


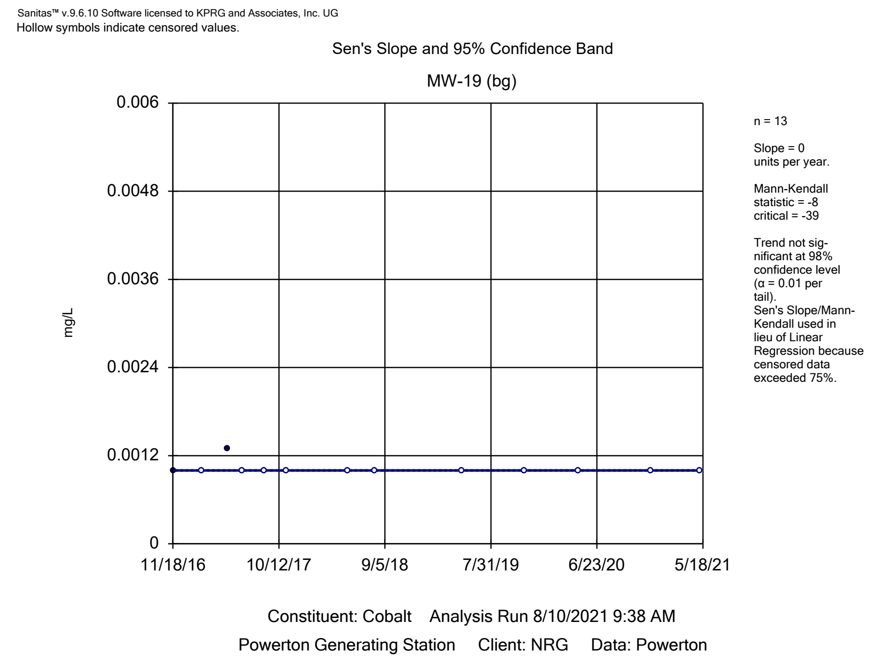
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

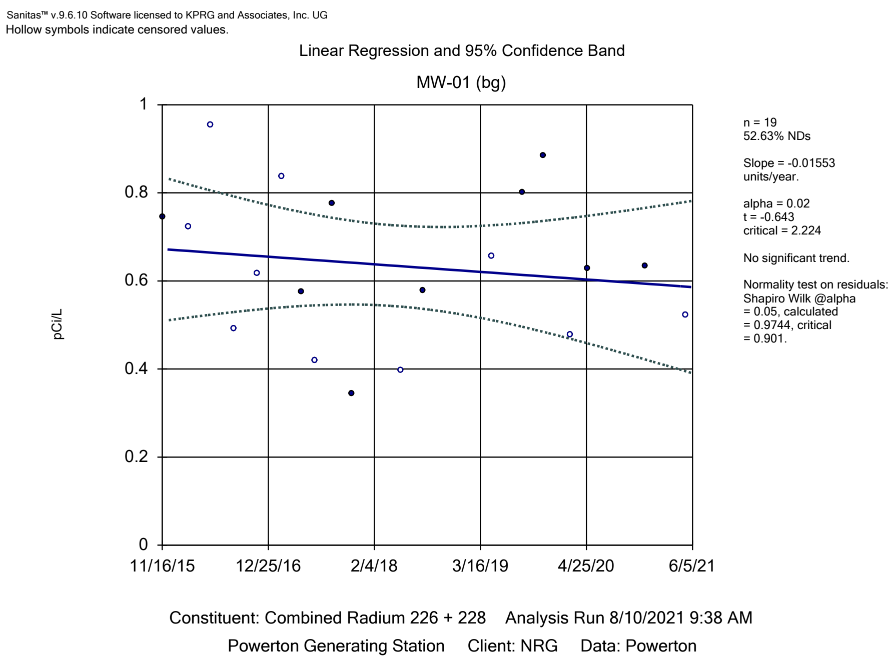


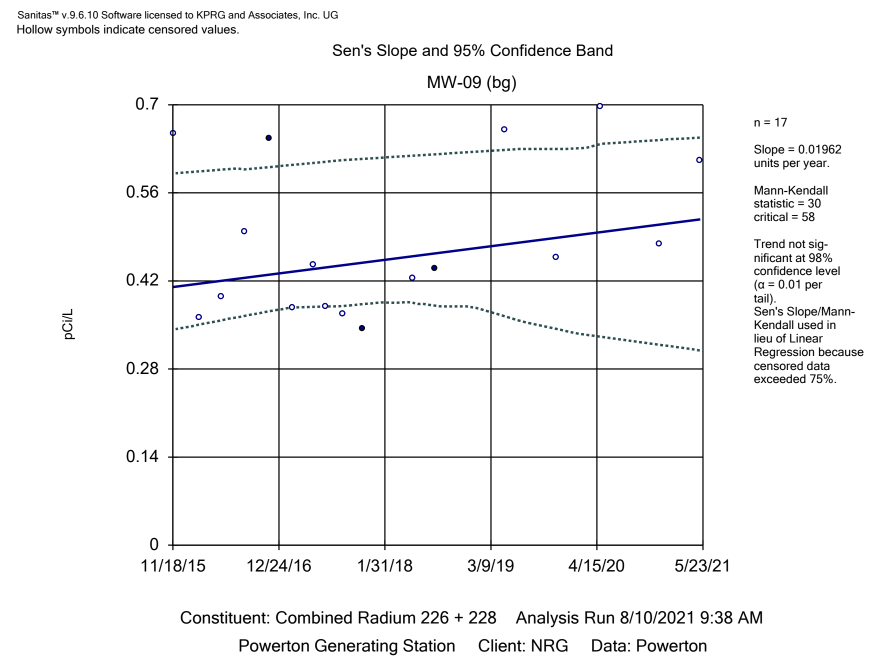
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

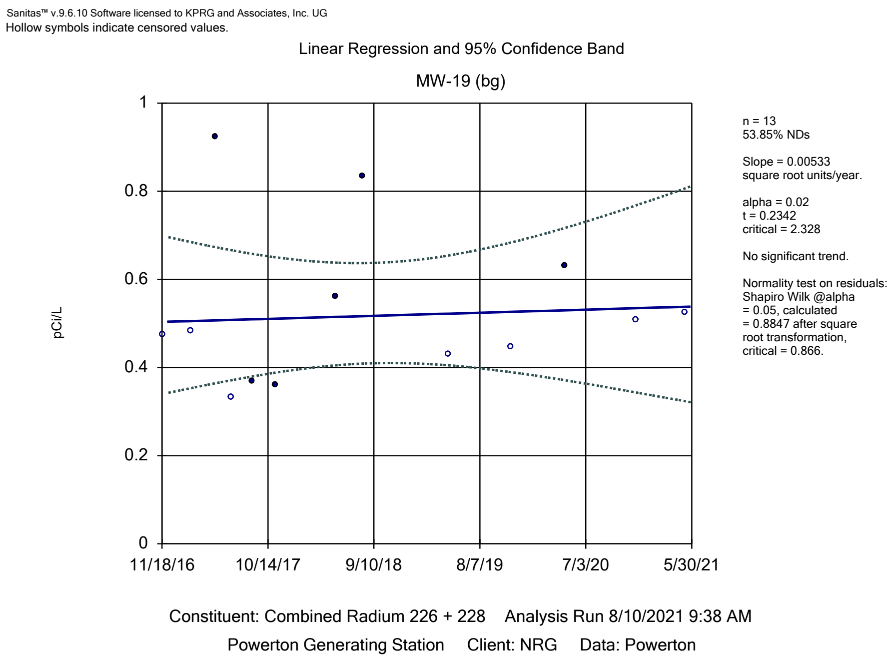


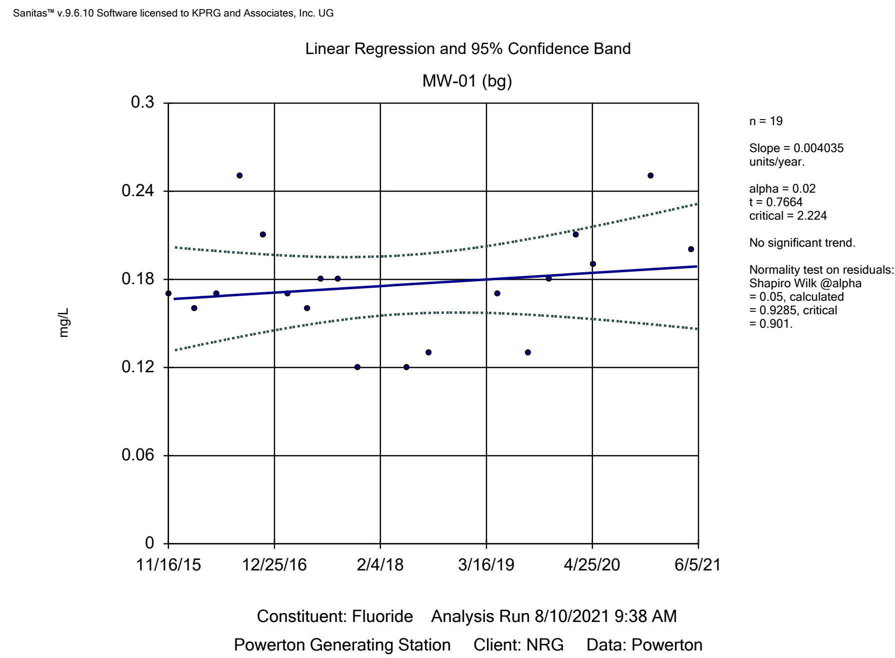

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-09 (bg)
mg/L
0.02
0.016
0.012
0.008
0.004
0
11/18/15
12/24/16
1/31/18
3/9/19
4/15/20
5/23/21
n = 17
Slope = 0
units per year.
Mann-Kendall
statistic = -3
critical = -58
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.
Constituent: Cobalt Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

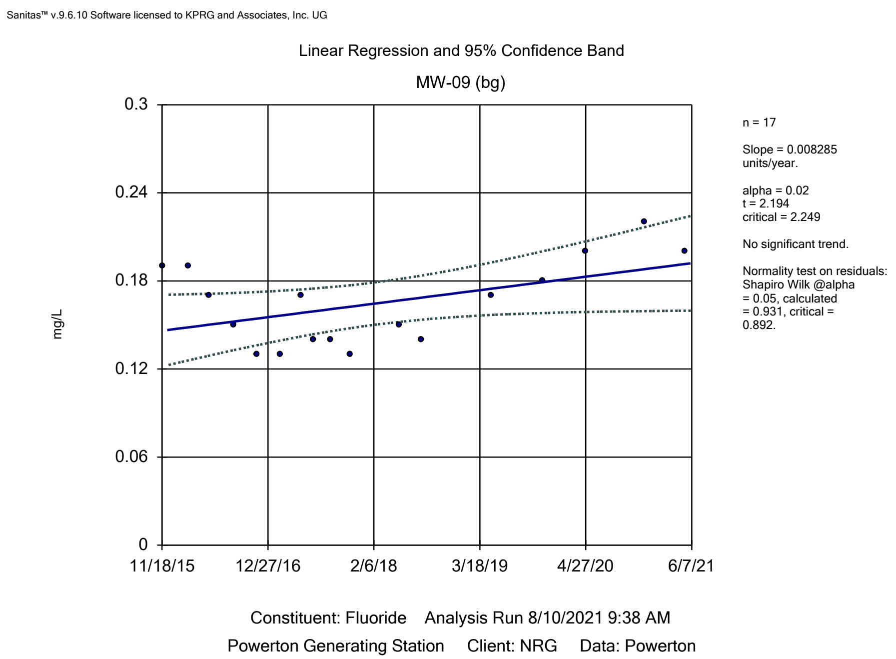

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-19 (bg)
mg/L
0.006
0.0048
0.0036
0.0024
0.0012
0
11/18/16
10/12/17
9/5/18
7/31/19
6/23/20
5/18/21
n = 13
Slope = 0
units per year.
Mann-Kendall
statistic = -8
critical = -39
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.
Constituent: Cobalt Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

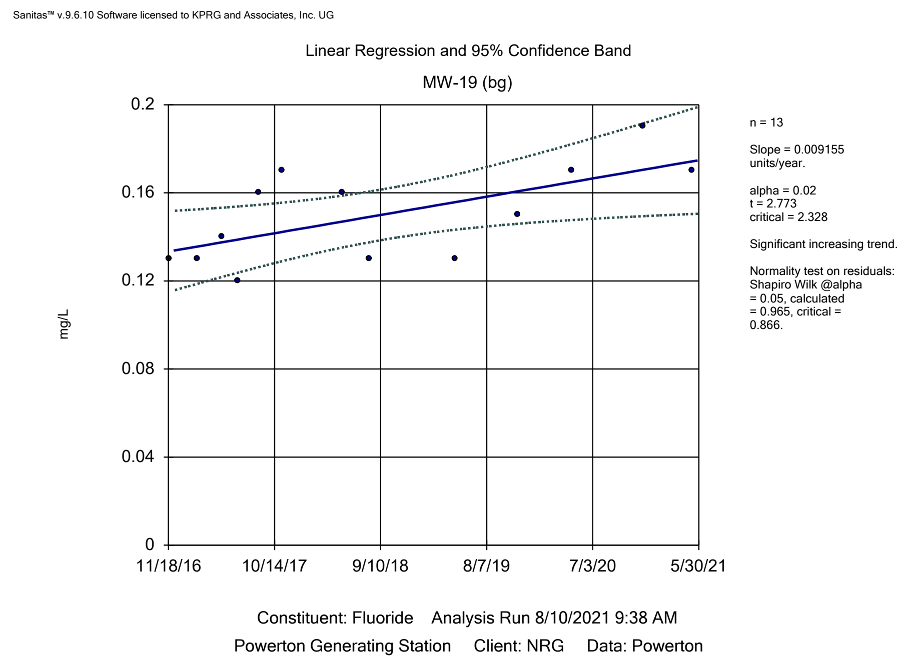

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Linear Regression and 95% Confidence Band
MW-01 (bg)
pCi/L
1
0.8
0.6
0.4
0.2
0
11/16/15
12/25/16
2/4/18
3/16/19
4/25/20
6/5/21
n = 19
52.63% NDs
Slope = -0.01553
units/year.
alpha = 0.02
t = -0.643
critical = 2.224
No significant trend.
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9744, critical
= 0.901.
Constituent: Combined Radium 226 + 228 Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

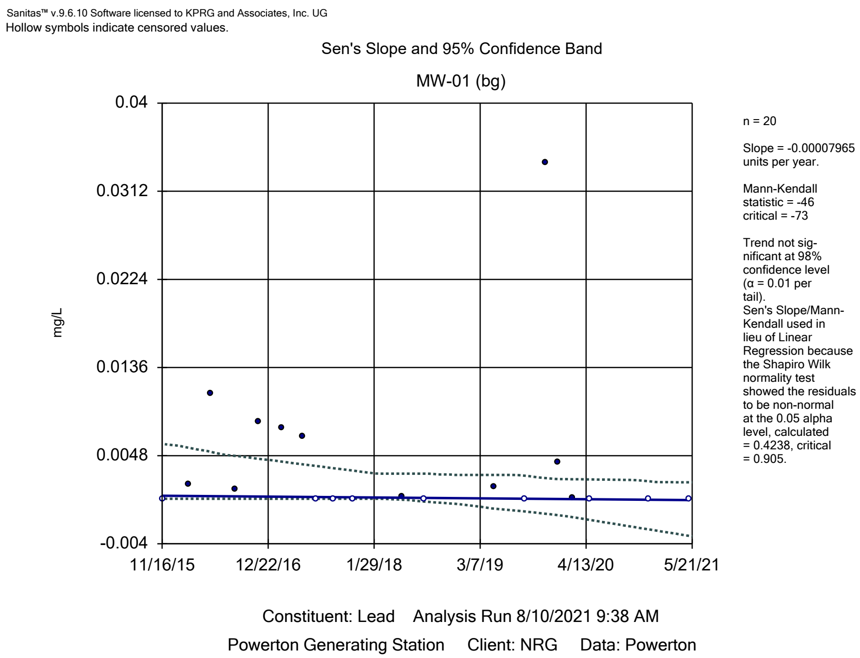

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-09 (bg)
pCi/L
0.7
0.56
0.42
0.28
0.14
0
11/18/15
12/24/16
1/31/18
3/9/19
4/15/20
5/23/21
n = 17
Slope = 0.01962
units per year.
Mann-Kendall
statistic = 30
critical = 58
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.
Constituent: Combined Radium 226 + 228 Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

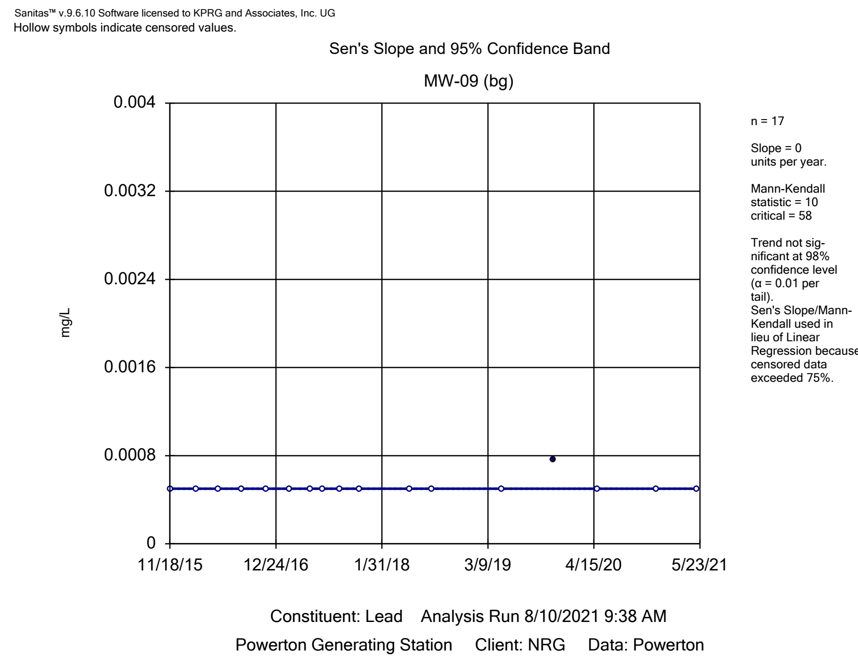

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Linear Regression and 95% Confidence Band
MW-19 (bg)
pCi/L
1
0.8
0.6
0.4
0.2
0
11/18/16
10/14/17
9/10/18
8/7/19
7/3/20
5/30/21
n = 13
53.85% NDs
Slope = 0.00533
square root units/year.
alpha = 0.02
t = 0.2342
critical = 2.328
No significant trend.
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.8847 after square
root transformation,
critical = 0.866.
Constituent: Combined Radium 226 + 228 Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

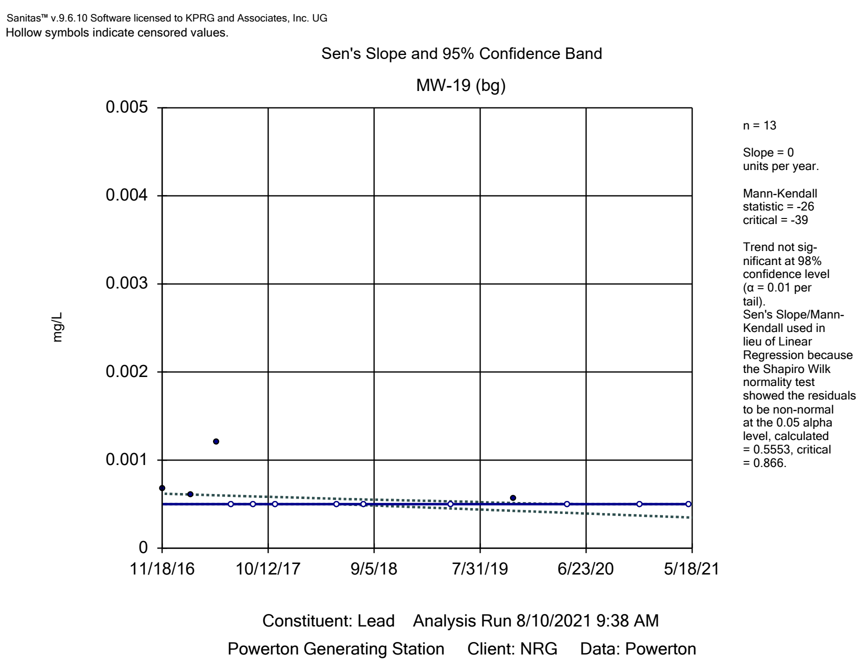

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-01 (bg)
mg/L
0.3
0.24
0.18
0.12
0.06
0
11/16/15
12/25/16
2/4/18
3/16/19
4/25/20
6/5/21
n = 19
Slope = 0.004035
units/year.
alpha = 0.02
t = 0.7664
critical = 2.224
No significant trend.
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9285, critical
= 0.901.
Constituent: Fluoride Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

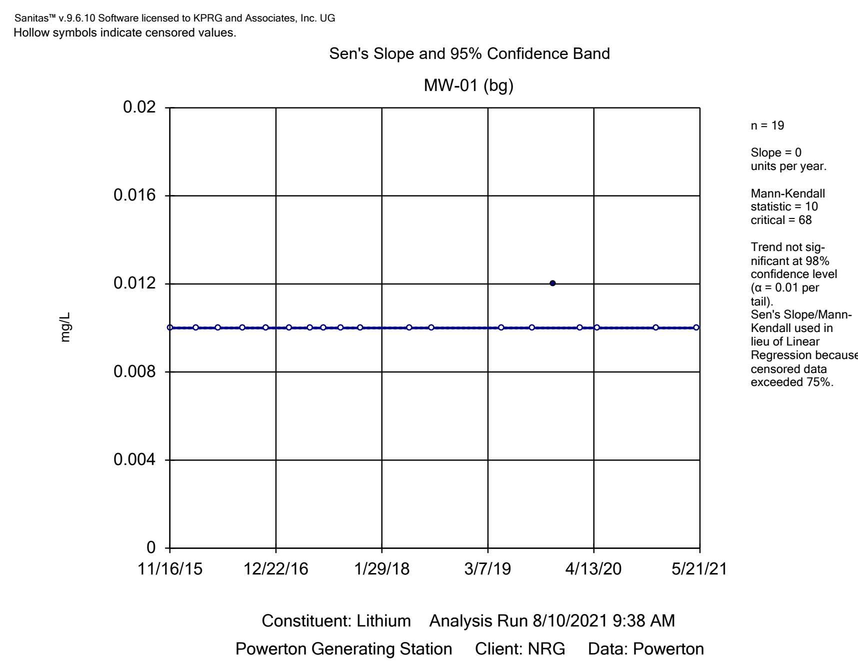

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-09 (bg)
mg/L
0.3
0.24
0.18
0.12
0.06
0
11/18/15
12/27/16
2/6/18
3/18/19
4/27/20
6/7/21
n = 17
Slope = 0.008285
units/year.
alpha = 0.02
t = 2.194
critical = 2.249
No significant trend.
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.931, critical =
0.892.
Constituent: Fluoride Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-19 (bg)
mg/L
0.2
0.16
0.12
0.08
0.04
0
11/18/16
10/14/17
9/10/18
8/7/19
7/3/20
5/30/21
n = 13
Slope = 0.009155
units/year.
alpha = 0.02
t = 2.773
critical = 2.328
Significant increasing trend.
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.965, critical =
0.866.
Constituent: Fluoride Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-01 (bg)
mg/L
0.04
0.0312
0.0224
0.0136
0.0048
-0.004
11/16/15
12/22/16
1/29/18
3/7/19
4/13/20
5/21/21
n = 20
Slope = -0.00007965 units per year.
Mann-Kendall statistic = -46 critical = -73
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.05 alpha level, calculated = 0.4238, critical = 0.905.
Constituent: Lead Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-09 (bg)
mg/L
0.004
0.0032
0.0024
0.0016
0.0008
0
11/18/15
12/24/16
1/31/18
3/9/19
4/15/20
5/23/21
n = 17
Slope = 0 units per year.
Mann-Kendall statistic = 10 critical = 58
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.
Constituent: Lead Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

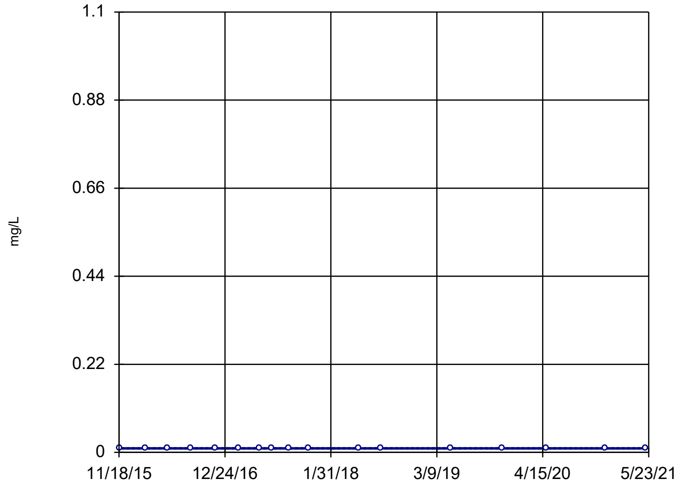

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-19 (bg)
mg/L
0.005
0.004
0.003
0.002
0.001
0
11/18/16
10/12/17
9/5/18
7/31/19
6/23/20
5/18/21
n = 13
Slope = 0 units per year.
Mann-Kendall statistic = -26 critical = -39
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.05 alpha level, calculated = 0.5553, critical = 0.866.
Constituent: Lead Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-01 (bg)
mg/L
0.02
0.016
0.012
0.008
0.004
0
11/16/15
12/22/16
1/29/18
3/7/19
4/13/20
5/21/21
n = 19
Slope = 0 units per year.
Mann-Kendall statistic = 10 critical = 68
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.
Constituent: Lithium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-09 (bg)



n = 17

Slope = 0
units per year.

Mann-Kendall
statistic = 0
critical = 58

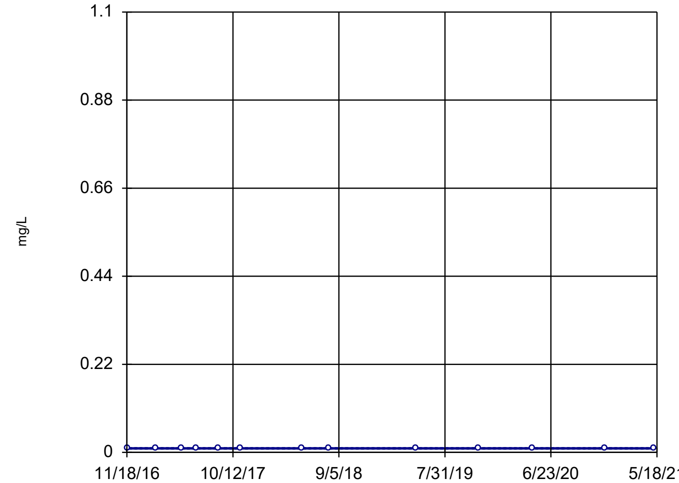
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.

Constituent: Lithium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-19 (bg)



n = 13

Slope = 0
units per year.

Mann-Kendall
statistic = 0
critical = 39

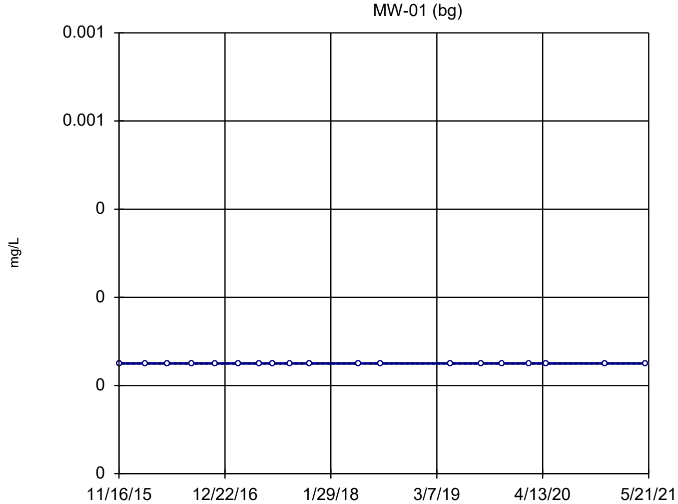
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.

Constituent: Lithium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)



n = 19

Slope = 0
units per year.

Mann-Kendall
statistic = 0
critical = 68

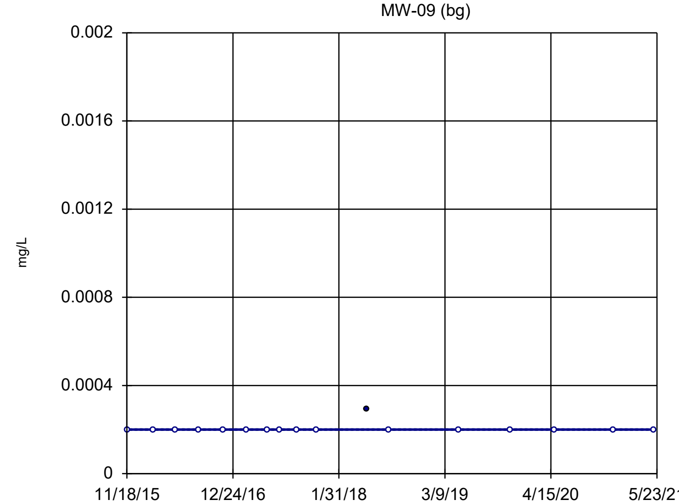
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.

Constituent: Mercury Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-09 (bg)



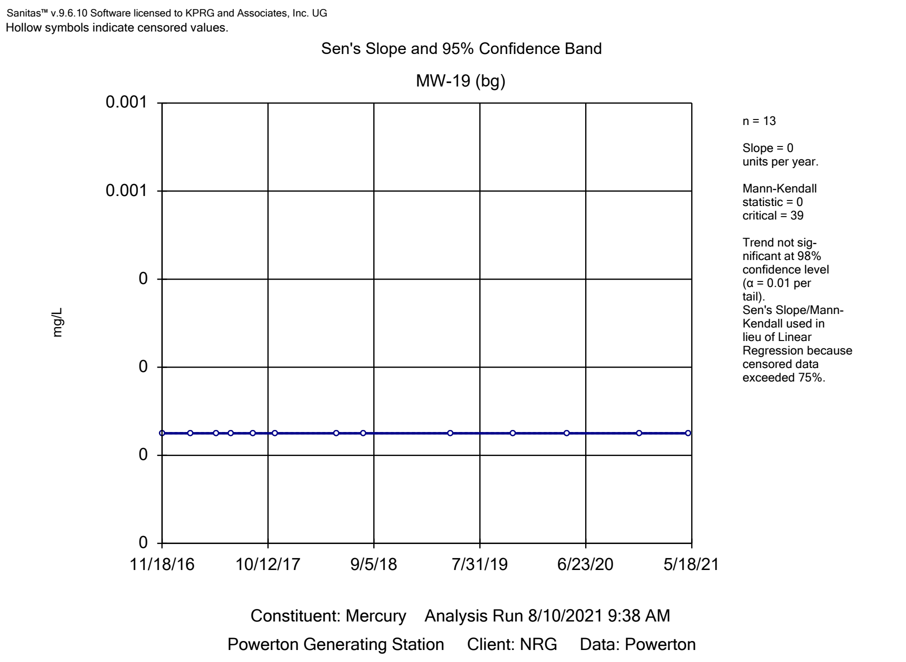
n = 17

Slope = 0
units per year.

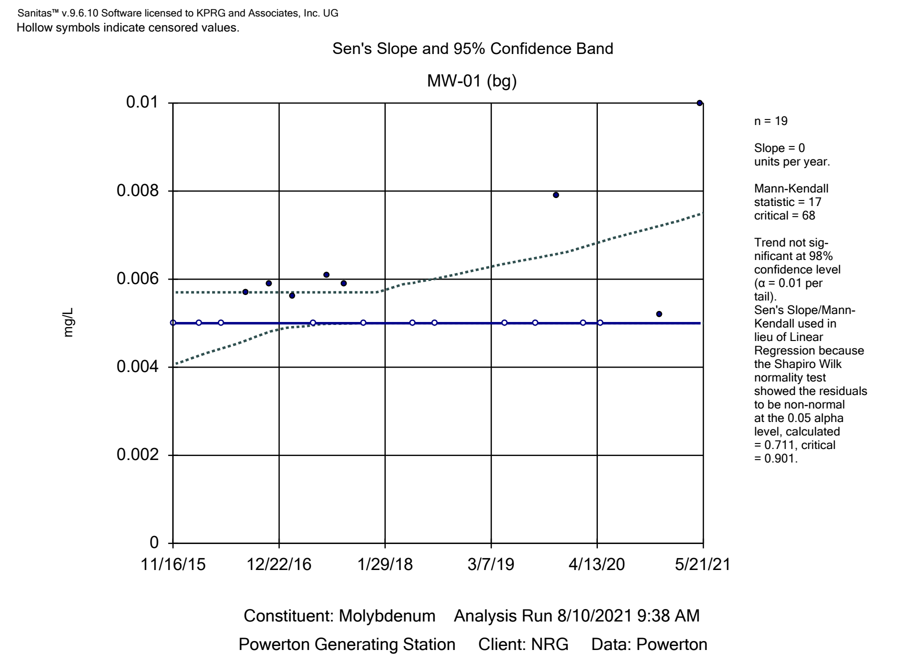
Mann-Kendall
statistic = 4
critical = 58

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.

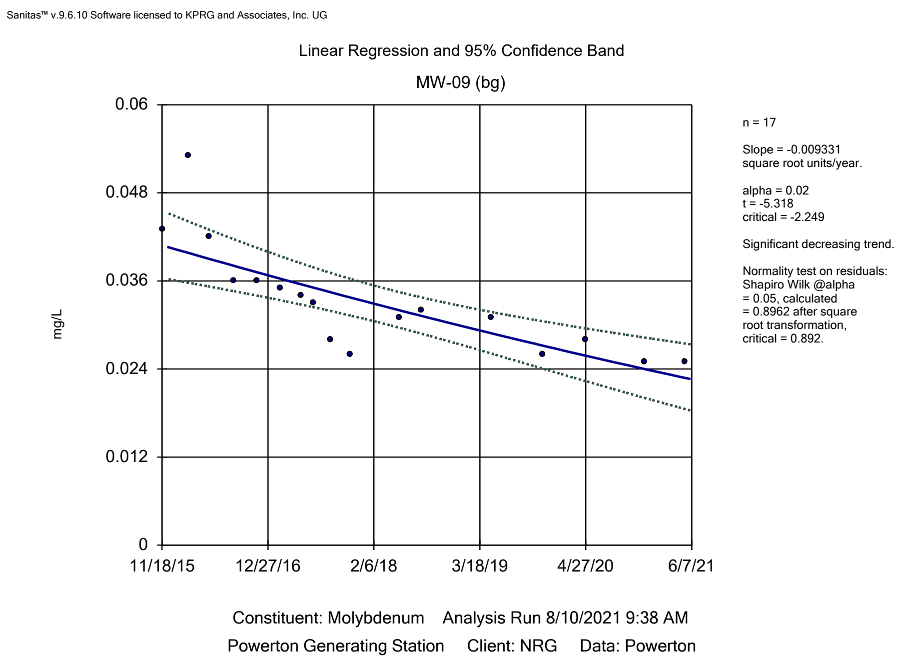
Constituent: Mercury Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton



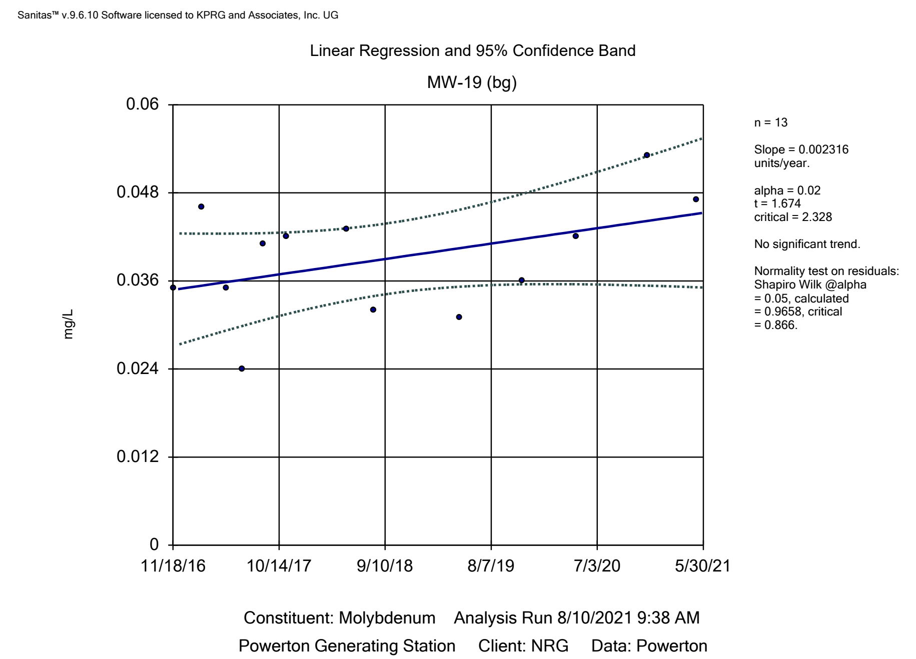
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-19 (bg)
mg/L
n = 13
Slope = 0 units per year.
Mann-Kendall statistic = 0 critical = 39
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.
Constituent: Mercury Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton



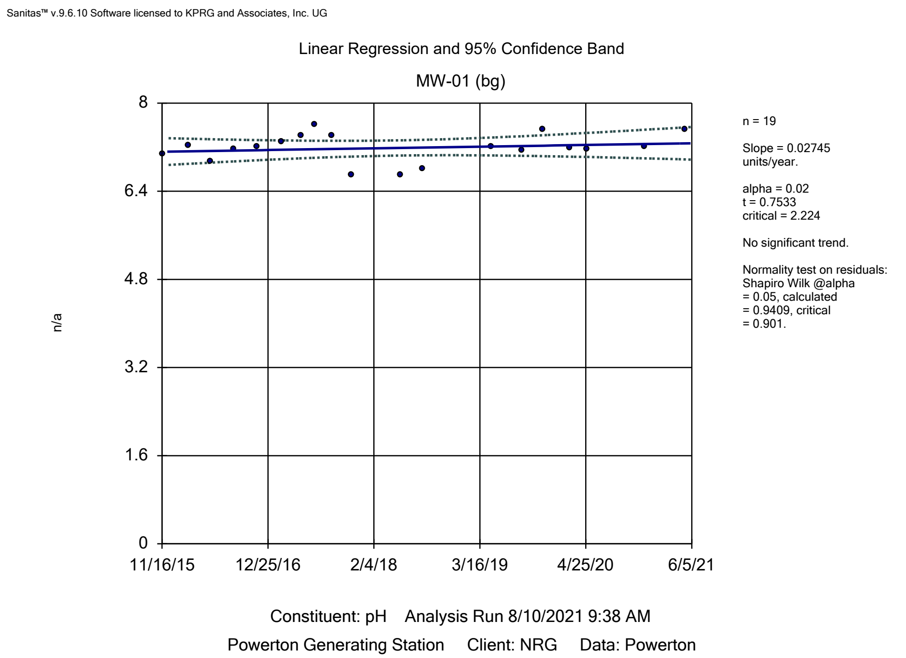
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-01 (bg)
mg/L
n = 19
Slope = 0 units per year.
Mann-Kendall statistic = 17 critical = 68
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.05 alpha level, calculated = 0.711, critical = 0.901.
Constituent: Molybdenum Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton



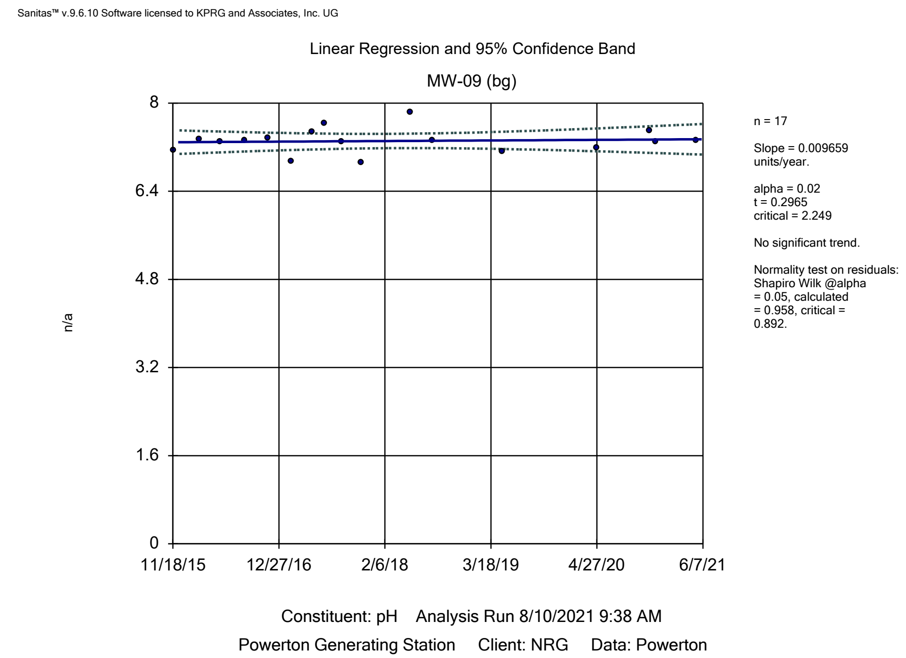
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-09 (bg)
mg/L
n = 17
Slope = -0.009331 square root units/year.
alpha = 0.02
t = -5.318
critical = -2.249
Significant decreasing trend.
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.8962 after square root transformation, critical = 0.892.
Constituent: Molybdenum Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton



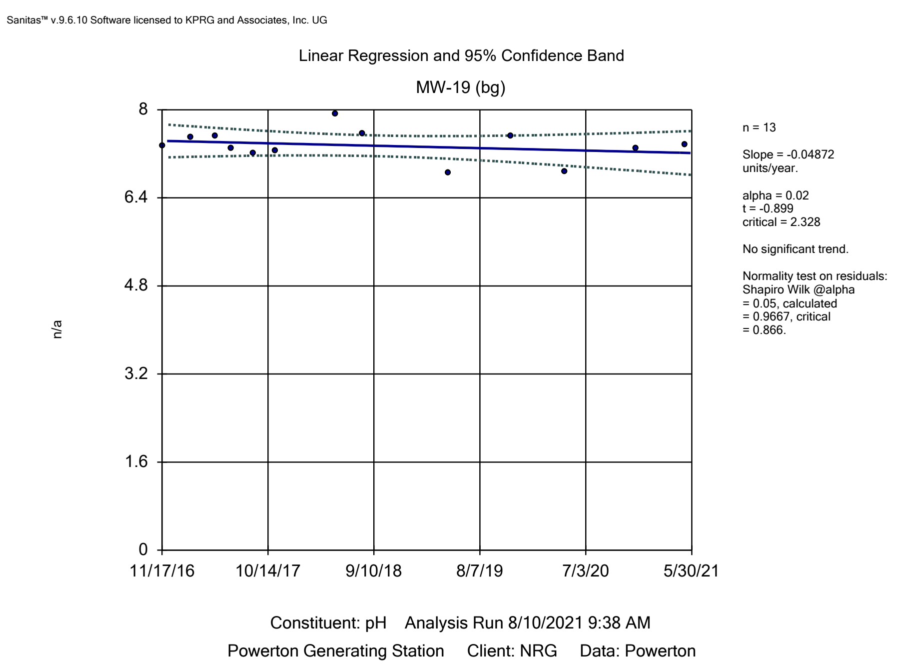
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-19 (bg)
mg/L
n = 13
Slope = 0.002316 units/year.
alpha = 0.02
t = 1.674
critical = 2.328
No significant trend.
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.9658, critical = 0.866.
Constituent: Molybdenum Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton



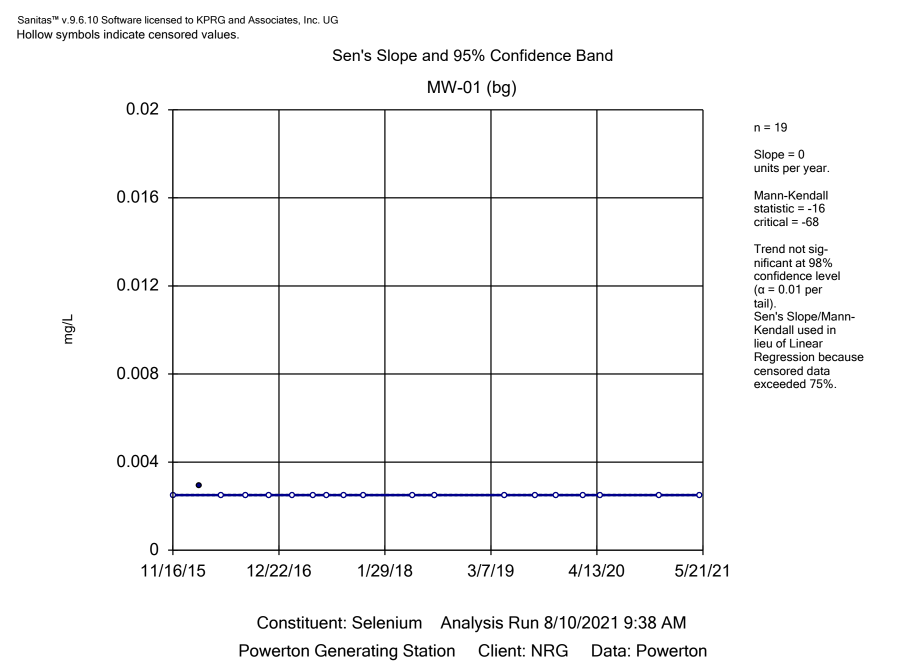
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-01 (bg)
n/a
8
6.4
4.8
3.2
1.6
0
11/16/15
12/25/16
2/4/18
3/16/19
4/25/20
6/5/21
n = 19
Slope = 0.02745 units/year.
alpha = 0.02
t = 0.7533
critical = 2.224
No significant trend.
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.9409, critical = 0.901.
Constituent: pH Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton



Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-09 (bg)
n/a
8
6.4
4.8
3.2
1.6
0
11/18/15
12/27/16
2/6/18
3/18/19
4/27/20
6/7/21
n = 17
Slope = 0.009659 units/year.
alpha = 0.02
t = 0.2965
critical = 2.249
No significant trend.
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.958, critical = 0.892.
Constituent: pH Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton



Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-19 (bg)
n/a
8
6.4
4.8
3.2
1.6
0
11/17/16
10/14/17
9/10/18
8/7/19
7/3/20
5/30/21
n = 13
Slope = -0.04872 units/year.
alpha = 0.02
t = -0.899
critical = 2.328
No significant trend.
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.9667, critical = 0.866.
Constituent: pH Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

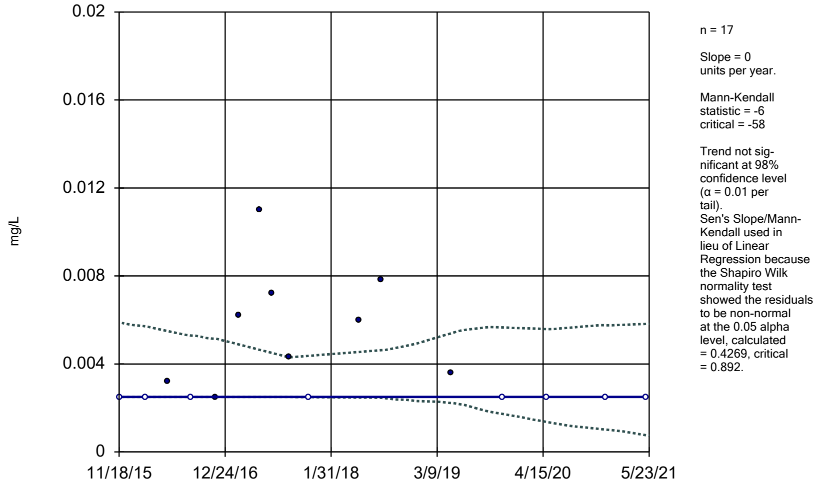


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-01 (bg)
mg/L
0.02
0.016
0.012
0.008
0.004
0
11/16/15
12/22/16
1/29/18
3/7/19
4/13/20
5/21/21
n = 19
Slope = 0 units per year.
Mann-Kendall statistic = -16 critical = -68
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.
Constituent: Selenium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-09 (bg)

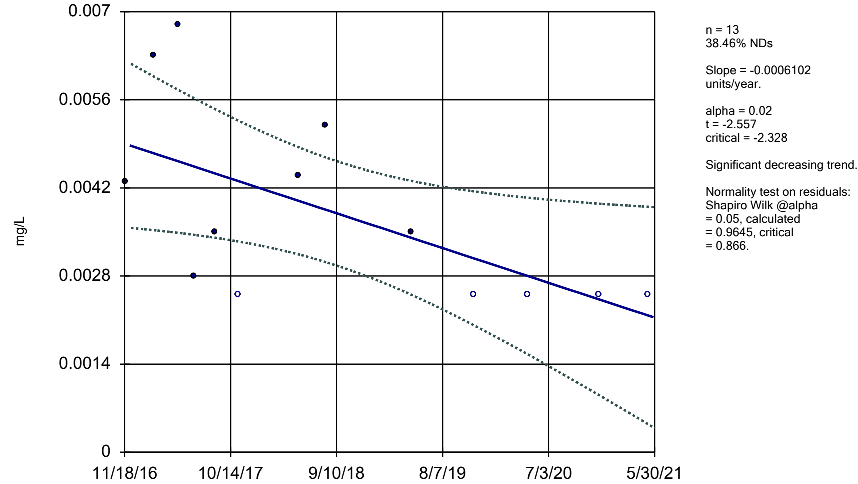


Constituent: Selenium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Linear Regression and 95% Confidence Band

MW-19 (bg)

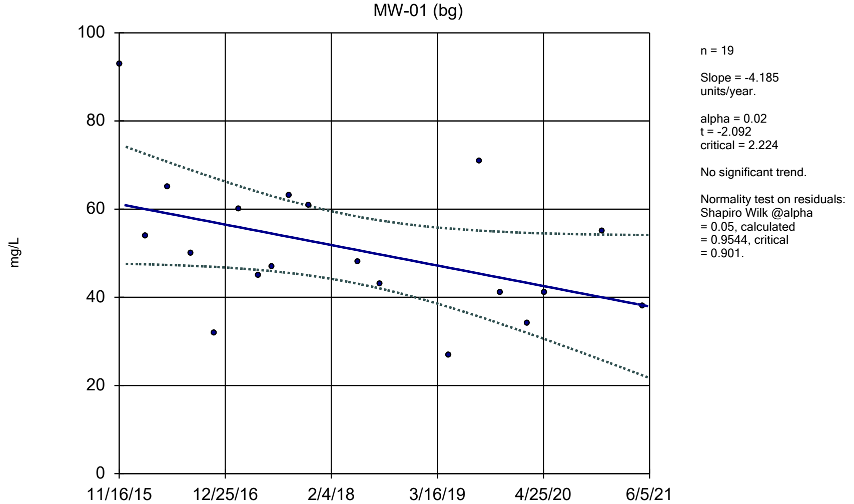


Constituent: Selenium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-01 (bg)

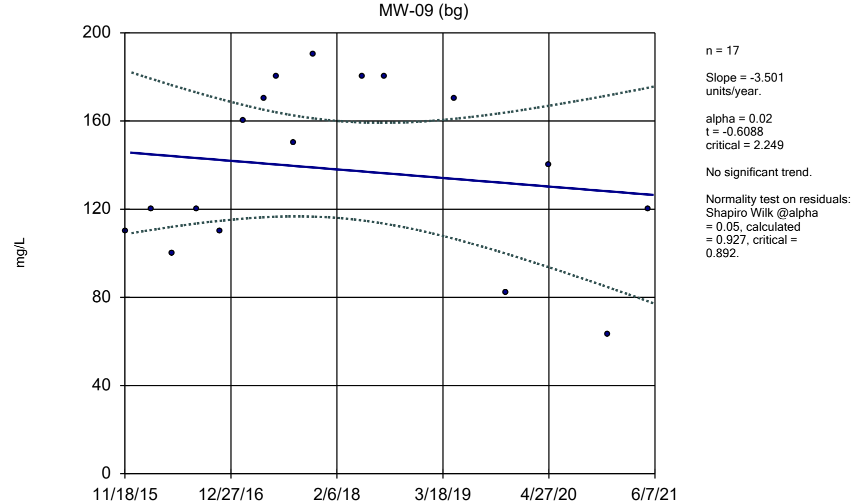


Constituent: Sulfate Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

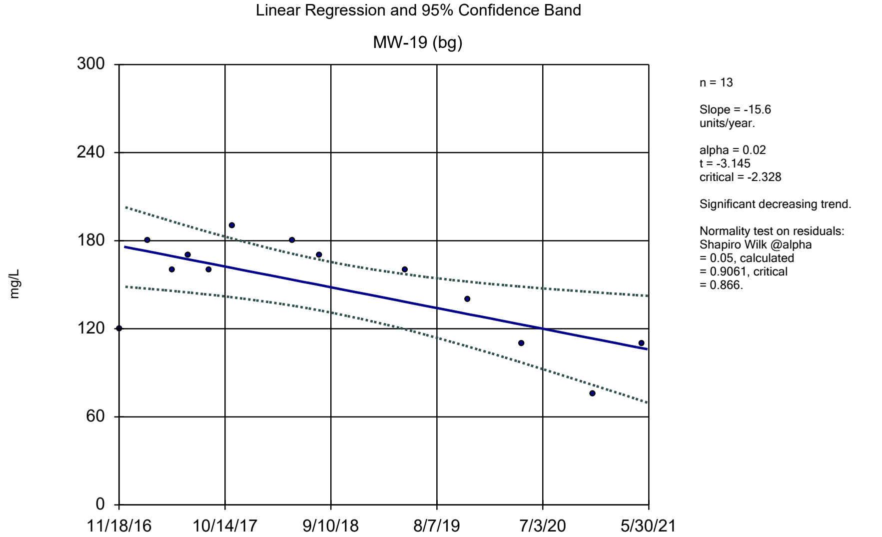
Linear Regression and 95% Confidence Band

MW-09 (bg)



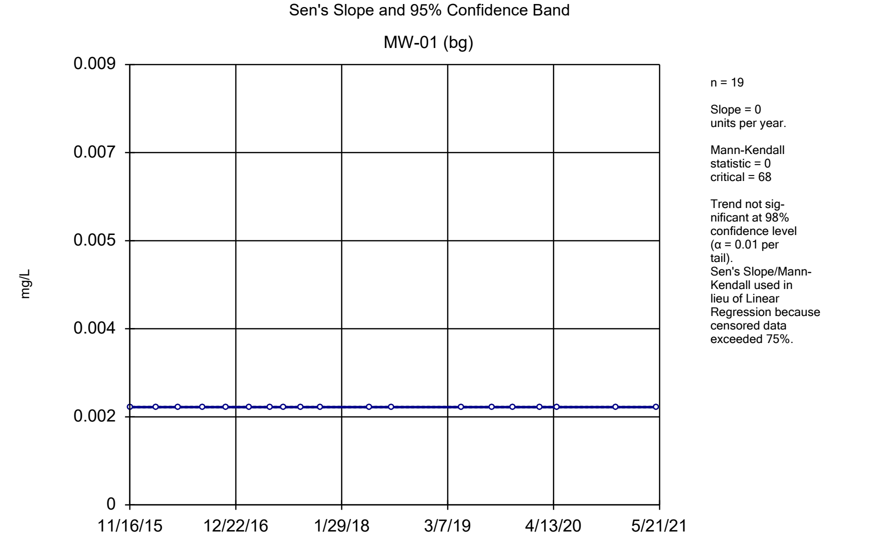
Constituent: Sulfate Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



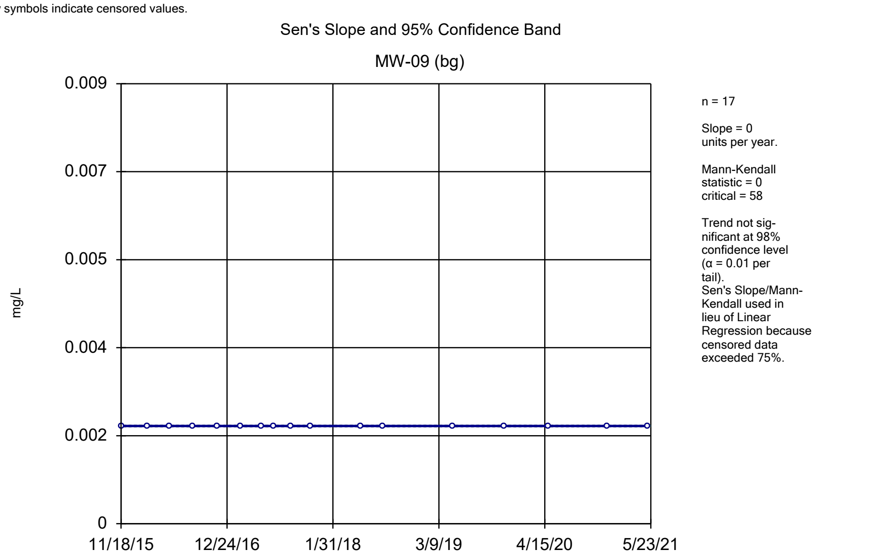
Constituent: Sulfate Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.



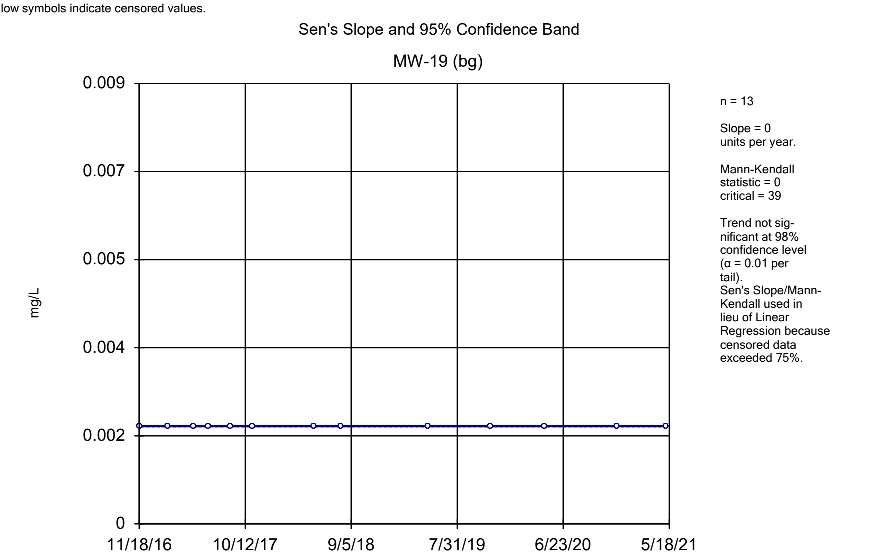
Constituent: Thallium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.



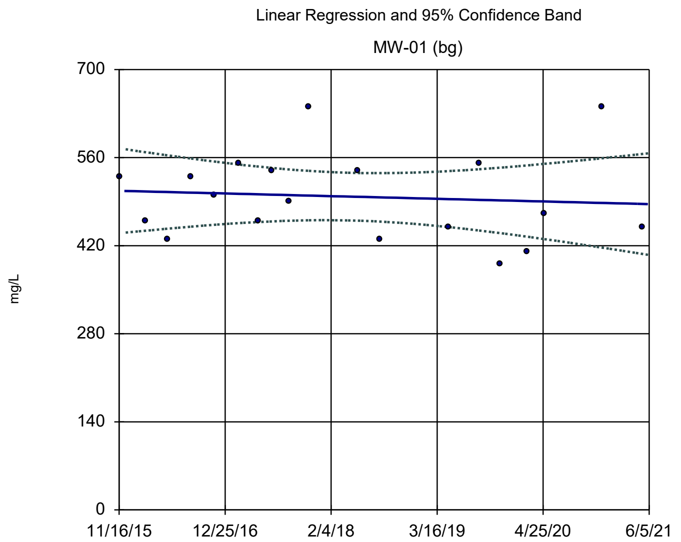
Constituent: Thallium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.



Constituent: Thallium Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



n = 19

Slope = -3.804 units/year.

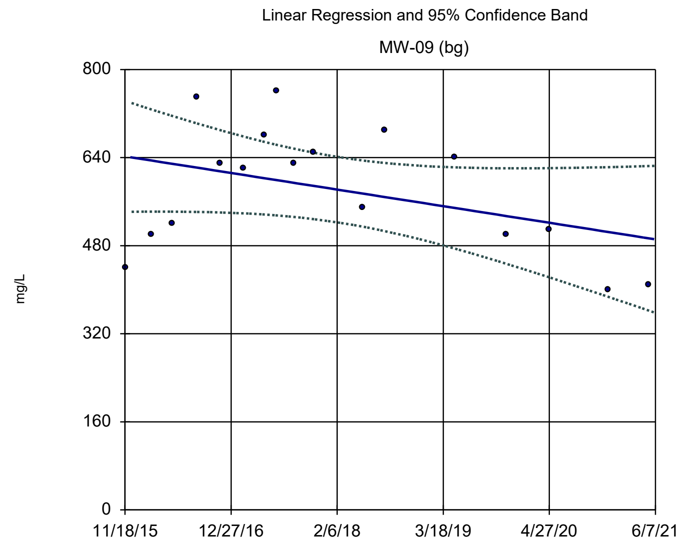
alpha = 0.02
t = -0.3814
critical = 2.224

No significant trend.

Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.938, critical = 0.901.

Constituent: Total Dissolved Solids Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



n = 17

Slope = -27.14 units/year.

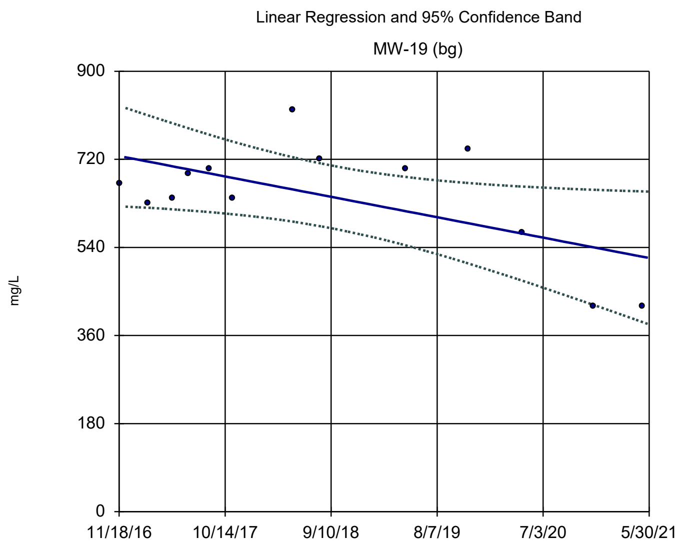
alpha = 0.02
t = -1.743
critical = 2.249

No significant trend.

Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.9759, critical = 0.892.

Constituent: Total Dissolved Solids Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



n = 13

Slope = -46.02 units/year.

alpha = 0.02
t = -2.495
critical = -2.328

Significant decreasing trend.

Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.9292, critical = 0.866.

Constituent: Total Dissolved Solids Analysis Run 8/10/2021 9:38 AM
Powerton Generating Station Client: NRG Data: Powerton

Powerton FAB Trend Test

Powerton Generating Station   Client: NRG   Data: Powerton FAB   Printed 8/12/2021, 11:52 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Antimony (mg/L)	MW-01 (bg)	0	0	53	No	16	100	n/a	n/a	0.02	NP (NDs)
Antimony (mg/L)	MW-10 (bg)	0	0	31	No	11	100	n/a	n/a	0.02	NP (NDs)
Arsenic (mg/L)	**MW-01 (bg)**	**-0.00...**	**-2.343**	**-2.235**	**Yes**	**18**	**61.11**	**Yes**	**cube root**	**0.02**	**Param.**
Arsenic (mg/L)	MW-10 (bg)	-0.00...	-2	-39	No	13	7.692	n/a	n/a	0.02	NP (Nor...
Barium (mg/L)	MW-01 (bg)	-0.00...	-1.098	2.235	No	18	0	Yes	square...	0.02	Param.
Barium (mg/L)	MW-10 (bg)	0.01021	16	39	No	13	0	n/a	n/a	0.02	NP (Nor...
Beryllium (mg/L)	MW-01 (bg)	0	0	53	No	16	100	n/a	n/a	0.02	NP (NDs)
Beryllium (mg/L)	MW-10 (bg)	0	2	31	No	11	100	n/a	n/a	0.02	NP (NDs)
Boron (mg/L)	MW-01 (bg)	-0.00692	-0.2524	2.235	No	18	0	Yes	square...	0.02	Param.
Boron (mg/L)	**MW-10 (bg)**	**0.3052**	**2.62**	**2.328**	**Yes**	**13**	**0**	**Yes**	**no**	**0.02**	**Param.**
Cadmium (mg/L)	MW-01 (bg)	0	0	63	No	18	100	n/a	n/a	0.02	NP (NDs)
Cadmium (mg/L)	MW-10 (bg)	0	3	31	No	11	81.82	n/a	n/a	0.02	NP (NDs)
Calcium (mg/L)	MW-01 (bg)	-1.226	-0.5871	2.235	No	18	0	Yes	no	0.02	Param.
Calcium (mg/L)	MW-10 (bg)	0.04912	0.8838	2.328	No	13	0	Yes	cube root	0.02	Param.
Chloride (mg/L)	MW-01 (bg)	1.164	1.044	2.235	No	18	0	Yes	no	0.02	Param.
Chloride (mg/L)	MW-10 (bg)	-0.8939	-0.8886	2.328	No	13	0	Yes	no	0.02	Param.
Chromium (mg/L)	MW-01 (bg)	0	-13	-63	No	18	94.44	n/a	n/a	0.02	NP (NDs)
Chromium (mg/L)	MW-10 (bg)	0	3	39	No	13	76.92	n/a	n/a	0.02	NP (NDs)
Cobalt (mg/L)	MW-01 (bg)	-0.00...	-2.017	2.235	No	18	72.22	Yes	no	0.02	Param.
Cobalt (mg/L)	MW-10 (bg)	-0.0169	-0.08084	2.328	No	13	0	Yes	natura...	0.02	Param.
Combined Radium 226 + 228 (pCi/L)	MW-01 (bg)	-0.02977	-1.285	2.235	No	18	55.56	Yes	no	0.02	Param.
Combined Radium 226 + 228 (pCi/L)	MW-10 (bg)	0.08318	0.8868	2.328	No	13	7.692	Yes	square...	0.02	Param.
Fluoride (mg/L)	MW-01 (bg)	0.004756	0.8497	2.235	No	18	0	Yes	no	0.02	Param.
Fluoride (mg/L)	**MW-10 (bg)**	**0.01859**	**6.036**	**2.328**	**Yes**	**13**	**0**	**Yes**	**no**	**0.02**	**Param.**
Lead (mg/L)	MW-01 (bg)	-0.00...	-2.129	2.235	No	18	50	Yes	no	0.02	Param.
Lead (mg/L)	MW-10 (bg)	-0.00...	-0.01643	2.328	No	13	7.692	Yes	natura...	0.02	Param.
Lithium (mg/L)	MW-01 (bg)	0	0	63	No	18	100	n/a	n/a	0.02	NP (NDs)
Lithium (mg/L)	MW-10 (bg)	0	1	35	No	12	83.33	n/a	n/a	0.02	NP (NDs)
Mercury (mg/L)	MW-01 (bg)	0	0	63	No	18	100	n/a	n/a	0.02	NP (NDs)
Mercury (mg/L)	MW-10 (bg)	0	0	35	No	12	100	n/a	n/a	0.02	NP (NDs)
Molybdenum (mg/L)	MW-01 (bg)	0	5	63	No	18	61.11	n/a	n/a	0.02	NP (Nor...
Molybdenum (mg/L)	MW-10 (bg)	0	0	39	No	13	92.31	n/a	n/a	0.02	NP (NDs)
pH (n/a)	MW-01 (bg)	0.01803	0.487	2.235	No	18	0	Yes	no	0.02	Param.
pH (n/a)	MW-10 (bg)	-0.00...	-3	-39	No	13	0	n/a	n/a	0.02	NP (Nor...
Selenium (mg/L)	MW-01 (bg)	0	-15	-63	No	18	94.44	n/a	n/a	0.02	NP (NDs)
Selenium (mg/L)	MW-10 (bg)	0.000...	0.3664	2.328	No	13	0	Yes	no	0.02	Param.
Sulfate (mg/L)	MW-01 (bg)	-4.134	-1.958	2.235	No	18	0	Yes	no	0.02	Param.
Sulfate (mg/L)	MW-10 (bg)	0.09615	0.02609	2.328	No	13	0	Yes	no	0.02	Param.
Thallium (mg/L)	MW-01 (bg)	0	0	63	No	18	100	n/a	n/a	0.02	NP (NDs)
Thallium (mg/L)	MW-10 (bg)	0	0	31	No	11	100	n/a	n/a	0.02	NP (NDs)
Total Dissolved Solids (mg/L)	MW-01 (bg)	-0.4106	-0.0418	2.235	No	18	0	Yes	no	0.02	Param.
Total Dissolved Solids (mg/L)	MW-10 (bg)	3.701	0.3647	2.328	No	13	0	Yes	no	0.02	Param.

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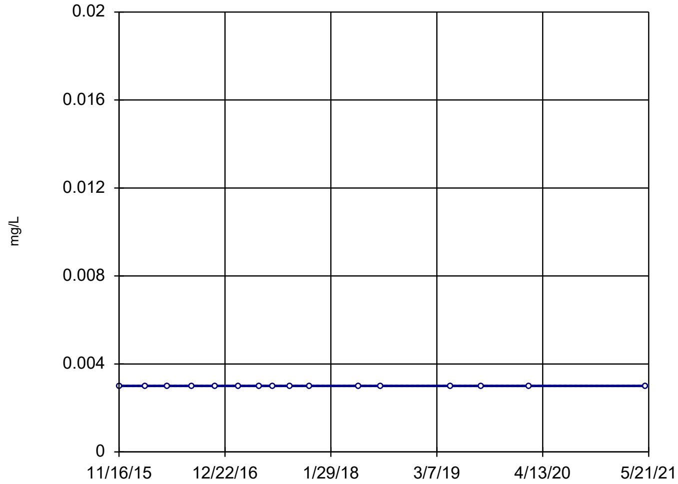
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)



n = 16

Slope = 0
units per year.

Mann-Kendall
statistic = 0
critical = 53

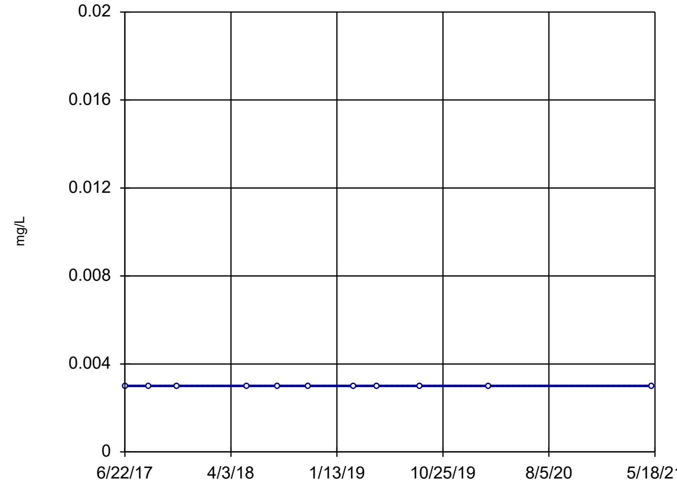
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.

Constituent: Antimony Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-10 (bg)



n = 11

Slope = 0
units per year.

Mann-Kendall
statistic = 0
critical = 31

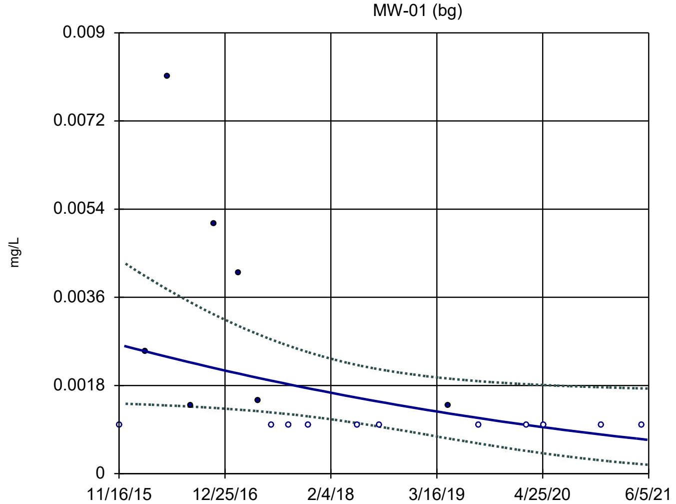
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.

Constituent: Antimony Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 18
61.11% NDs

Slope = -0.008968
cube root units/year.

alpha = 0.02
t = -2.343
critical = -2.235

Significant decreasing trend.

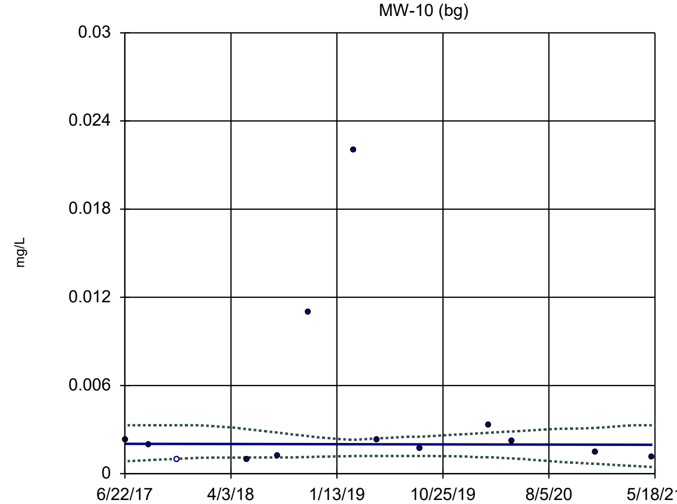
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.9068 after cube root transformation, critical = 0.897.

Constituent: Arsenic Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-10 (bg)



n = 13

Slope = -0.00001753
units per year.

Mann-Kendall
statistic = -2
critical = -39

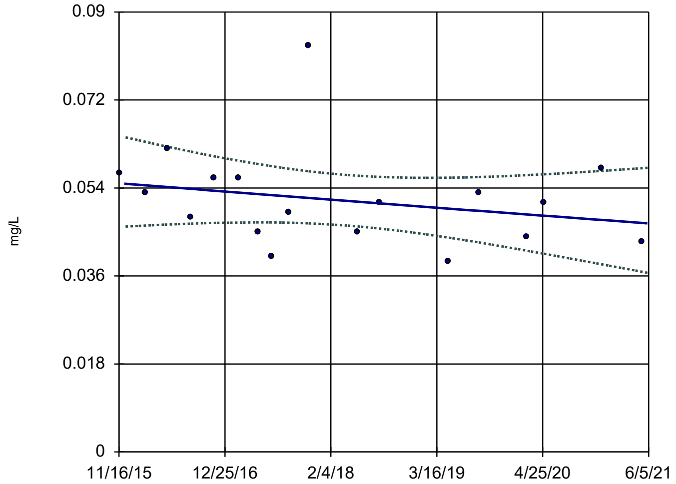
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.05 alpha level, calculated = 0.3284, critical = 0.866.

Constituent: Arsenic Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 18

Slope = -0.003283
square root units/year.

alpha = 0.02
t = -1.098
critical = 2.235

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.8973 after square
root transformation,
critical = 0.897.

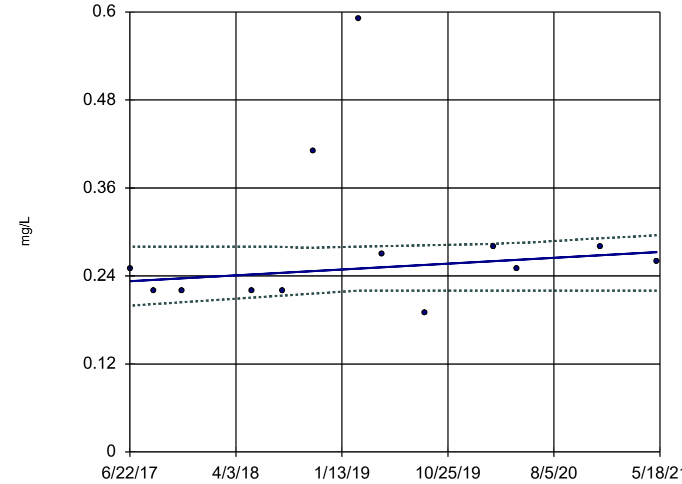
Constituent: Barium   Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Sen's Slope and 95% Confidence Band

MW-10 (bg)



n = 13

Slope = 0.01021
units per year.

Mann-Kendall
statistic = 16
critical = 39

Trend not significant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-Kendall used in
lieu of Linear
Regression because
the Shapiro Wilk
normality test
showed the residuals
to be non-normal
at the 0.05 alpha
level, calculated
= 0.3753, critical
= 0.866.

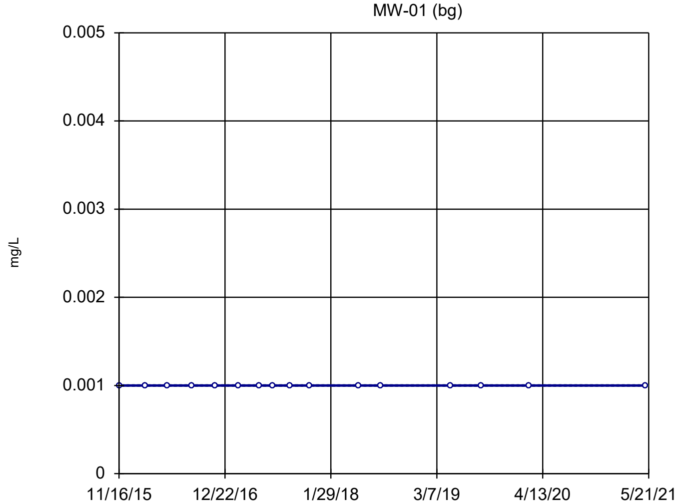
Constituent: Barium   Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)



n = 16

Slope = 0
units per year.

Mann-Kendall
statistic = 0
critical = 53

Trend not significant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.

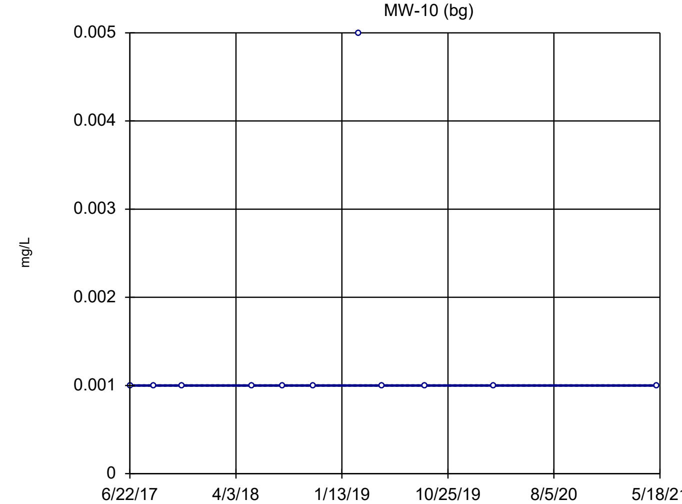
Constituent: Beryllium   Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-10 (bg)



n = 11

Slope = 0
units per year.

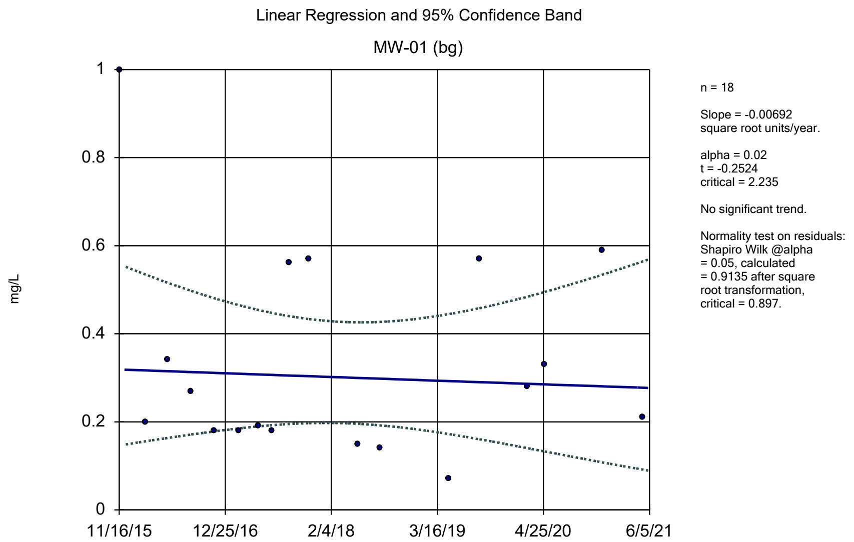
Mann-Kendall
statistic = 2
critical = 31

Trend not significant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.

Constituent: Beryllium   Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

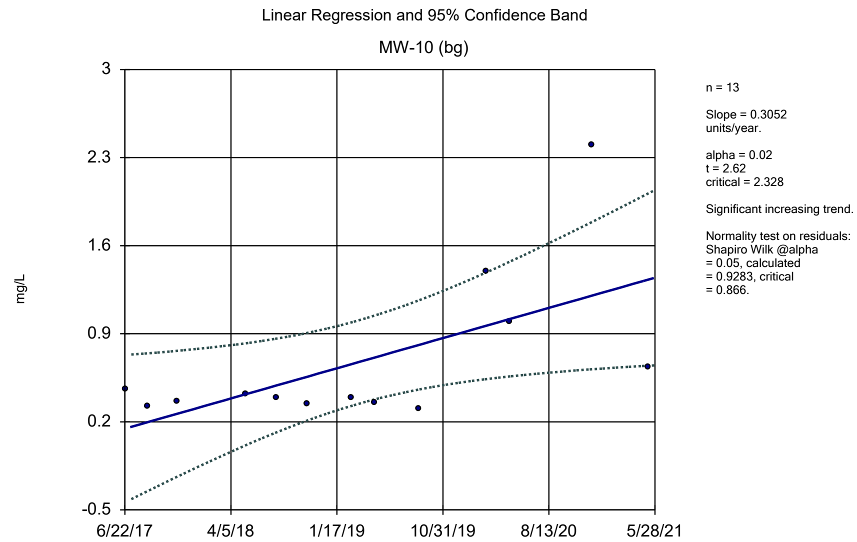
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



Constituent: Boron   Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

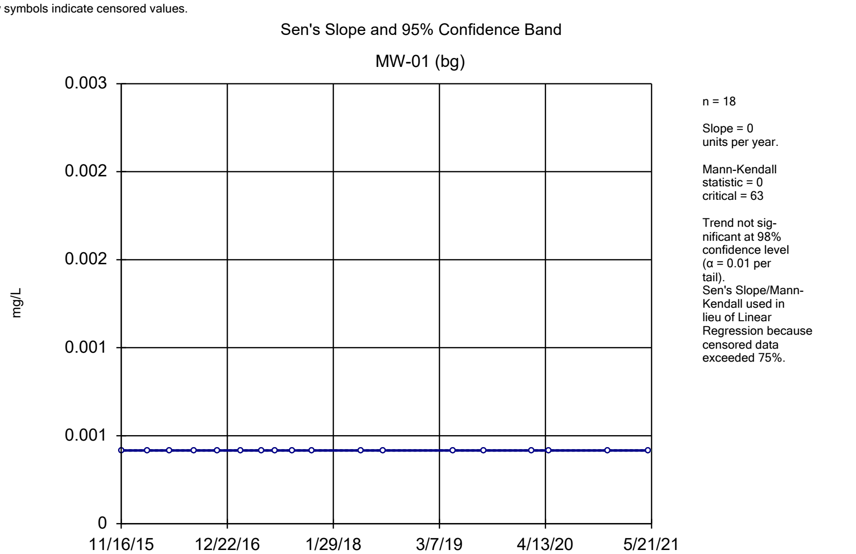
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG



Constituent: Boron   Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

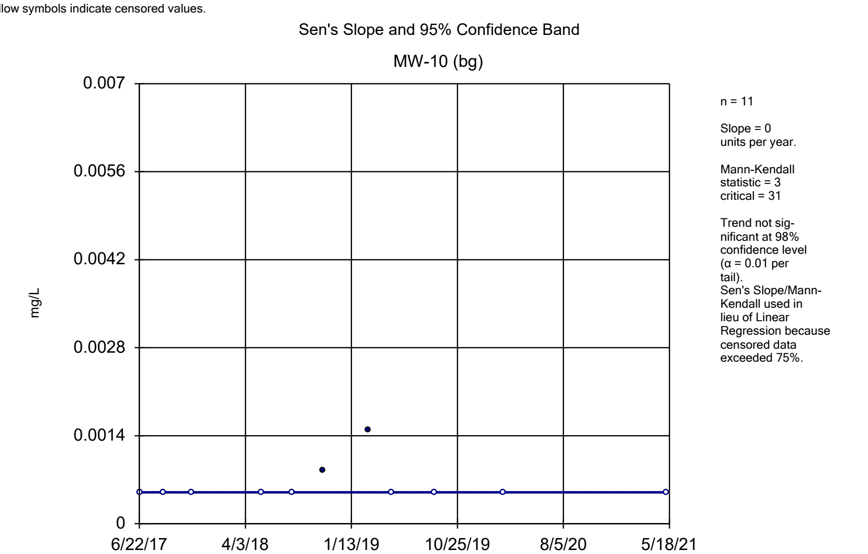
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.



Constituent: Cadmium   Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.



Constituent: Cadmium   Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

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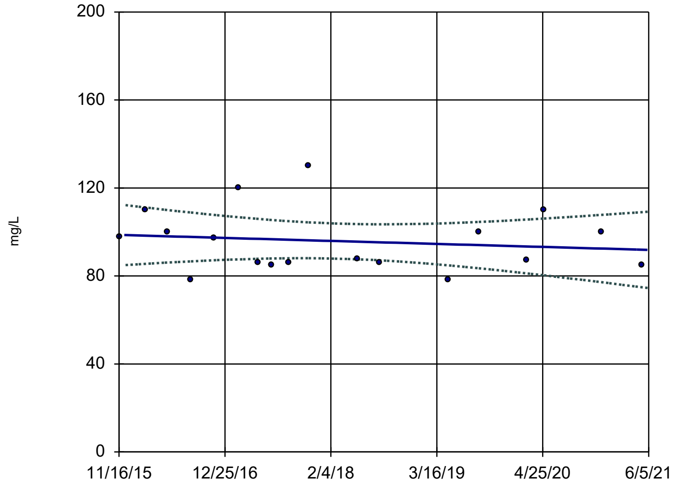
Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 18

Slope = -1.226
units/year.

alpha = 0.02
t = -0.5871
critical = 2.235

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9347, critical
= 0.897.

Constituent: Calcium Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station Client: NRG Data: Powerton FAB

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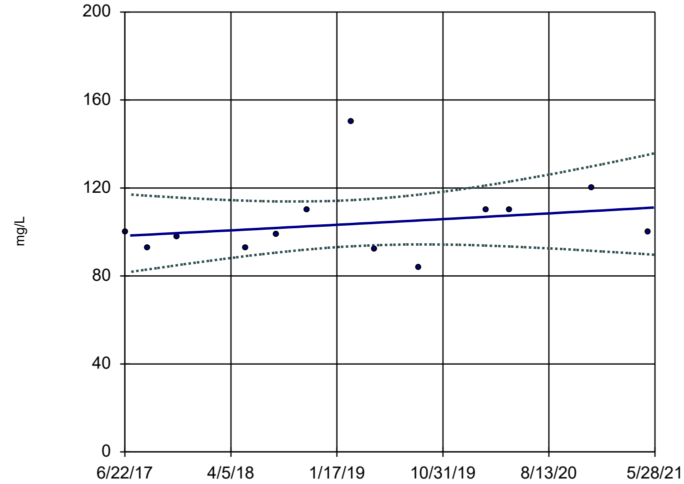
Linear Regression and 95% Confidence Band

MW-10 (bg)



n = 13

Slope = 0.04912
cube root units/year.

alpha = 0.02
t = 0.8838
critical = 2.328

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.8752 after cube
root transformation,
critical = 0.866.

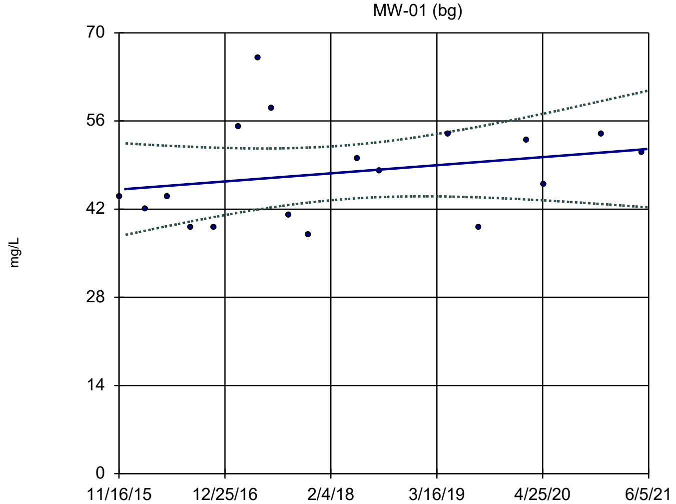
Constituent: Calcium Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 18

Slope = 1.164
units/year.

alpha = 0.02
t = 1.044
critical = 2.235

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9449, critical
= 0.897.

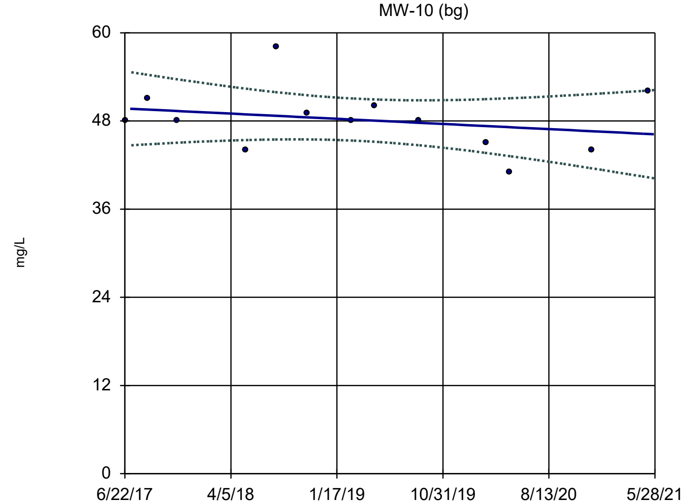
Constituent: Chloride Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-10 (bg)



n = 13

Slope = -0.8939
units/year.

alpha = 0.02
t = -0.8886
critical = 2.328

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9434, critical
= 0.866.

Constituent: Chloride Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station Client: NRG Data: Powerton FAB

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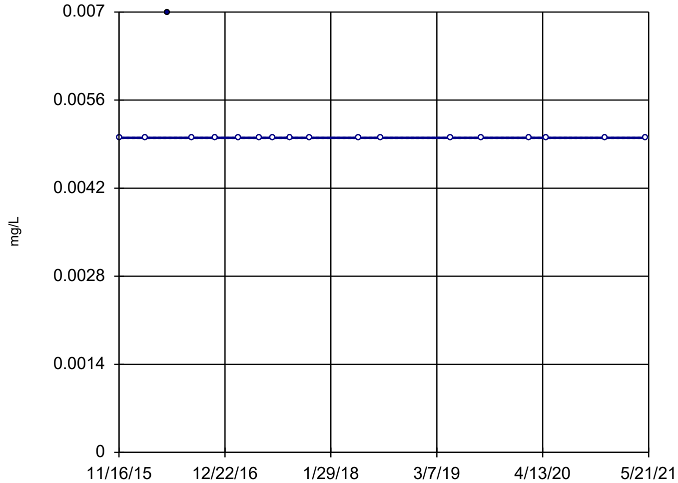
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)



n = 18

Slope = 0
units per year.

Mann-Kendall
statistic = -13
critical = -63

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.

Constituent: Chromium   Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

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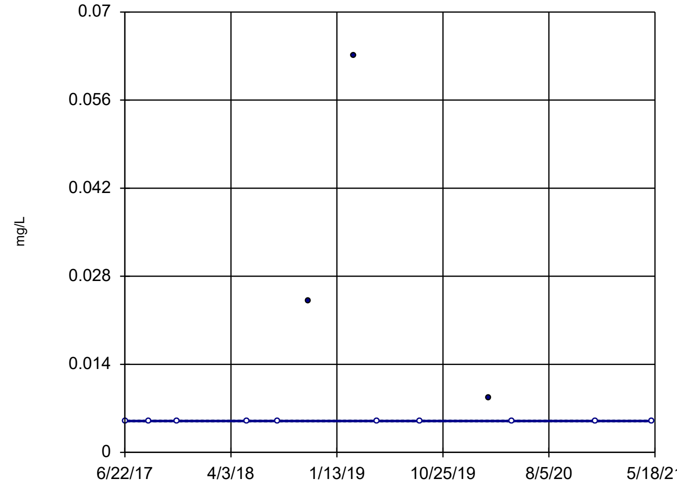
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-10 (bg)



n = 13

Slope = 0
units per year.

Mann-Kendall
statistic = 3
critical = 39

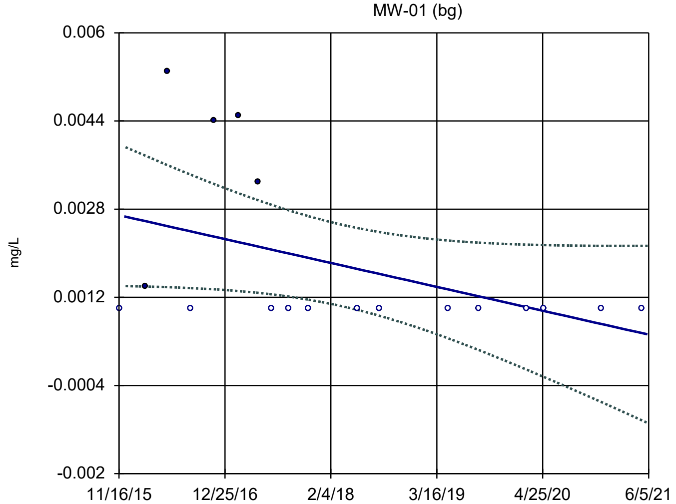
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.

Constituent: Chromium   Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 18
72.22% NDs

Slope = -0.0003903
units/year.

alpha = 0.02
t = -2.017
critical = 2.235

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9034, critical
= 0.897.

Constituent: Cobalt   Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

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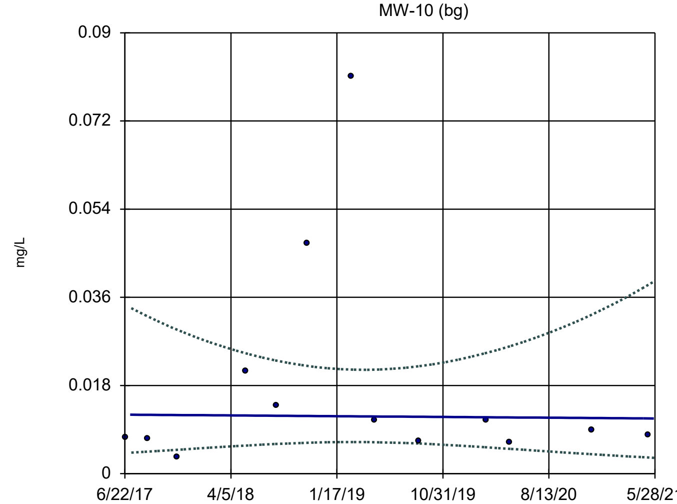
Linear Regression and 95% Confidence Band

MW-10 (bg)



n = 13

Slope = -0.0169
natural log units/year.

alpha = 0.02
t = -0.08084
critical = 2.328

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.8857 after natural
log transformation,
critical = 0.866.

Constituent: Cobalt   Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

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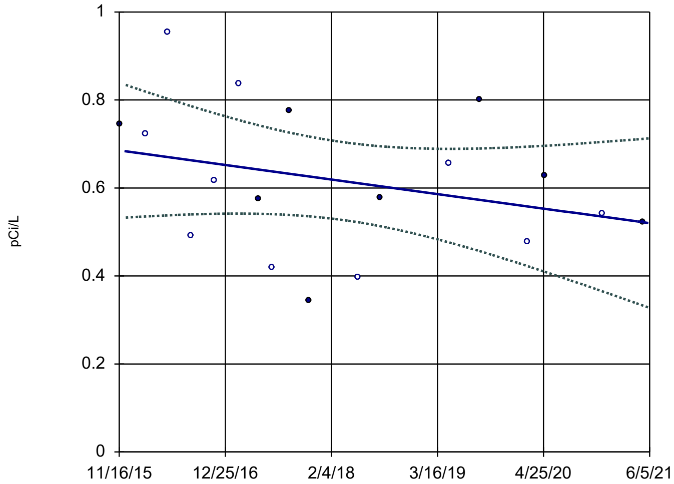
Hollow symbols indicate censored values.

Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 18
55.56% NDs

Slope = -0.02977
units/year.

alpha = 0.02
t = -1.285
critical = 2.235

No significant trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9779, critical
= 0.897.

Constituent: Combined Radium 226 + 228 Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB

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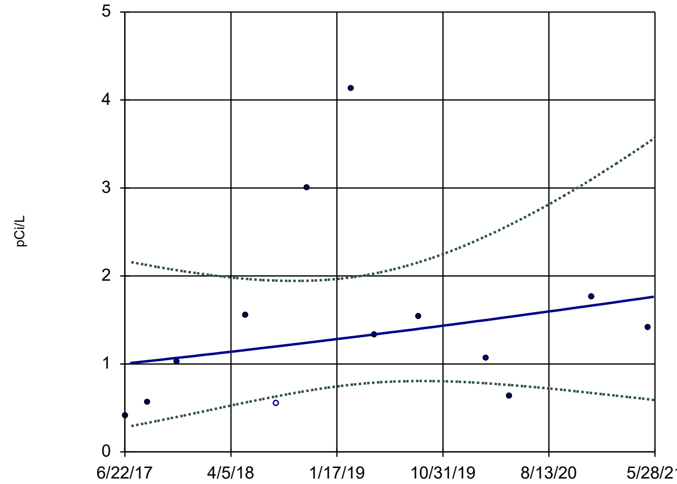
Hollow symbols indicate censored values.

Linear Regression and 95% Confidence Band

MW-10 (bg)



n = 13
7.692% NDs

Slope = 0.08318
square root units/year.

alpha = 0.02
t = 0.8868
critical = 2.328

No significant trend.

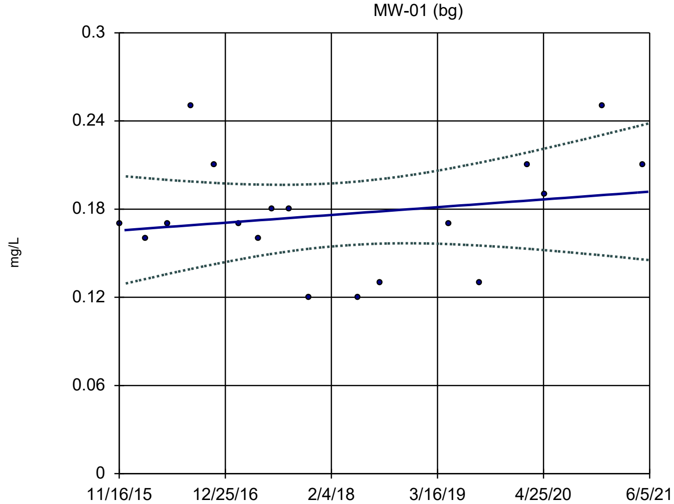
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.8793 after square
root transformation,
critical = 0.866.

Constituent: Combined Radium 226 + 228 Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 18

Slope = 0.004756
units/year.

alpha = 0.02
t = 0.8497
critical = 2.235

No significant trend.

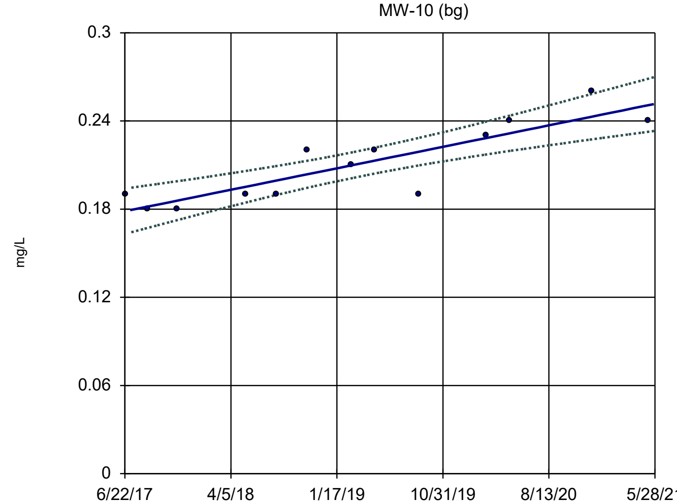
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.938, critical =
0.897.

Constituent: Fluoride Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-10 (bg)



n = 13

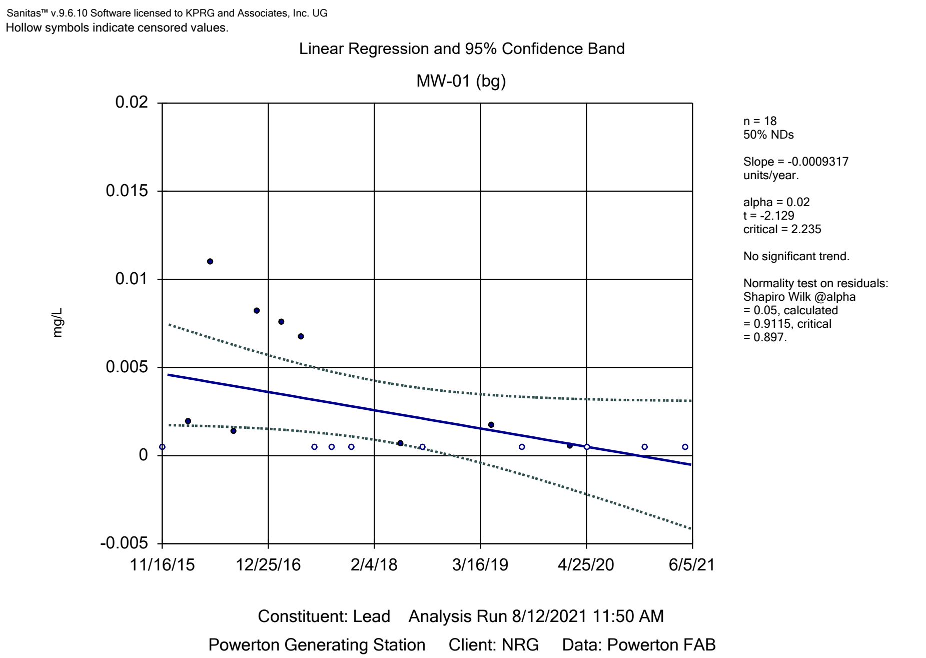
Slope = 0.01859
units/year.

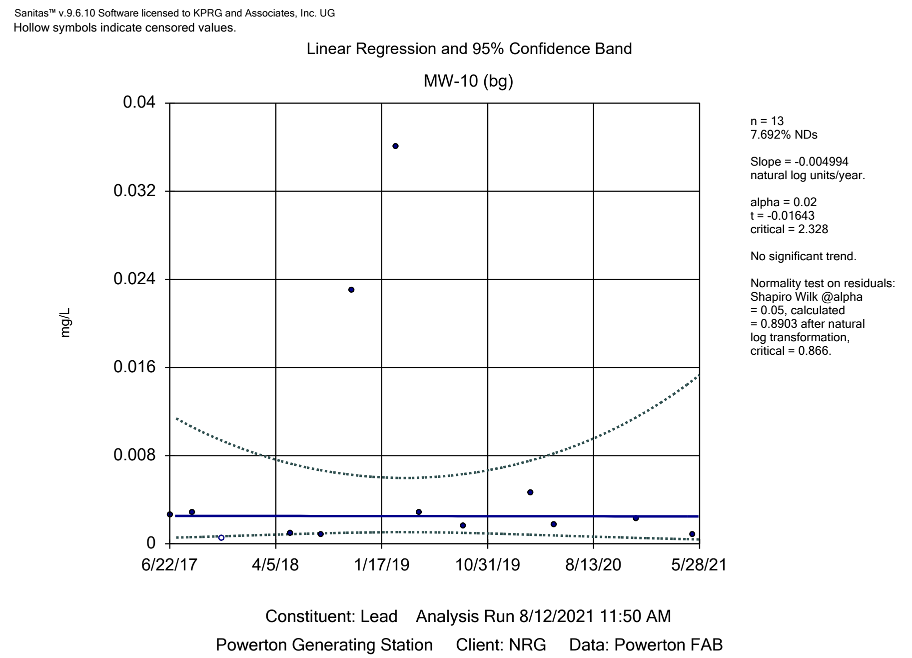
alpha = 0.02
t = 6.036
critical = 2.328

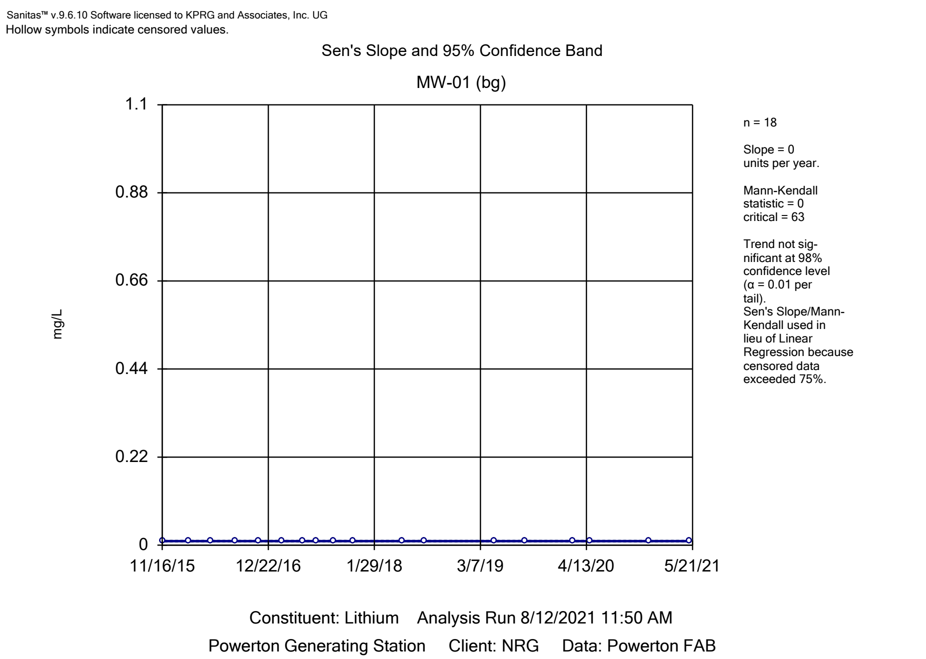
Significant increasing trend.

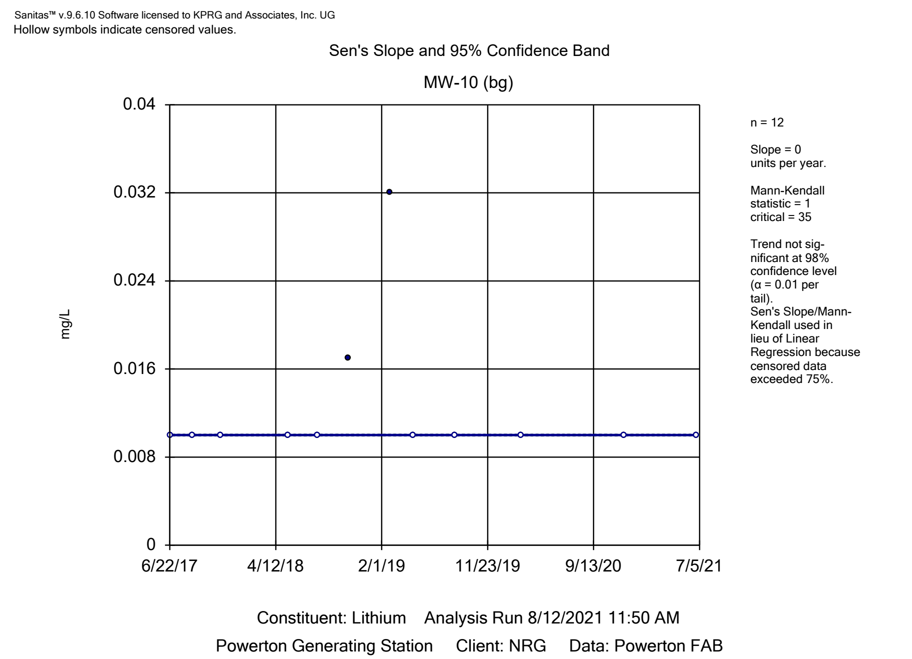
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9484, critical
= 0.866.

Constituent: Fluoride Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Linear Regression and 95% Confidence Band
MW-01 (bg)
mg/L
0.02
0.015
0.01
0.005
0
-0.005
11/16/15
12/25/16
2/4/18
3/16/19
4/25/20
6/5/21
n = 18
50% NDs
Slope = -0.0009317
units/year.
alpha = 0.02
t = -2.129
critical = 2.235
No significant trend.
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.9115, critical
= 0.897.
Constituent: Lead Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Linear Regression and 95% Confidence Band
MW-10 (bg)
mg/L
0.04
0.032
0.024
0.016
0.008
0
6/22/17
4/5/18
1/17/19
10/31/19
8/13/20
5/28/21
n = 13
7.692% NDs
Slope = -0.004994
natural log units/year.
alpha = 0.02
t = -0.01643
critical = 2.328
No significant trend.
Normality test on residuals:
Shapiro Wilk @alpha
= 0.05, calculated
= 0.8903 after natural
log transformation,
critical = 0.866.
Constituent: Lead Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-01 (bg)
mg/L
1.1
0.88
0.66
0.44
0.22
0
11/16/15
12/22/16
1/29/18
3/7/19
4/13/20
5/21/21
n = 18
Slope = 0
units per year.
Mann-Kendall
statistic = 0
critical = 63
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.
Constituent: Lithium Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB


Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-10 (bg)
mg/L
0.04
0.032
0.024
0.016
0.008
0
6/22/17
4/12/18
2/1/19
11/23/19
9/13/20
7/5/21
n = 12
Slope = 0
units per year.
Mann-Kendall
statistic = 1
critical = 35
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).
Sen's Slope/Mann-
Kendall used in
lieu of Linear
Regression because
censored data
exceeded 75%.
Constituent: Lithium Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB

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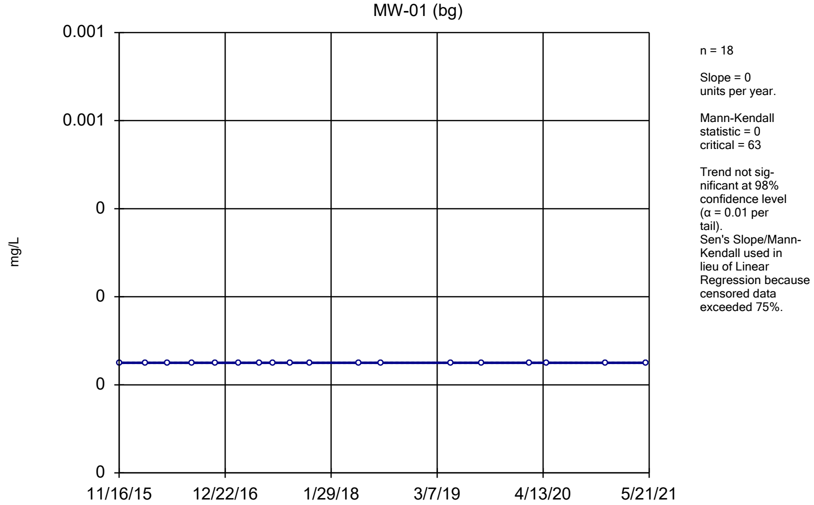
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)

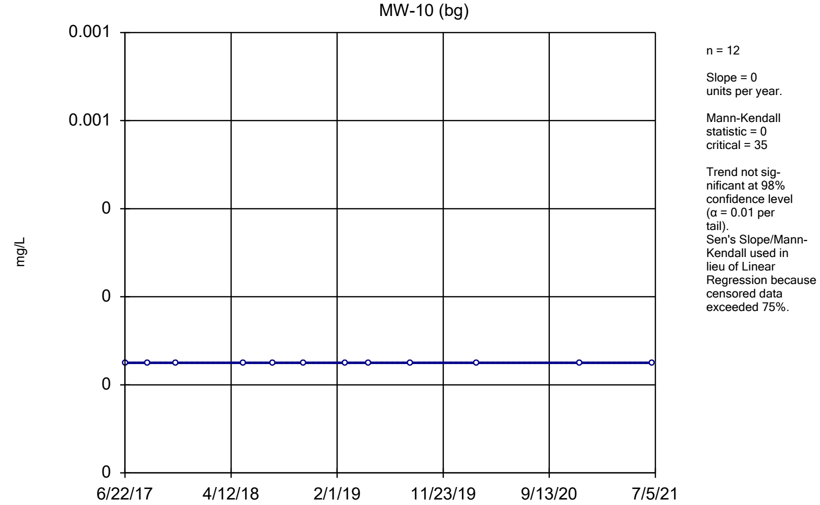


Constituent: Mercury   Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-10 (bg)

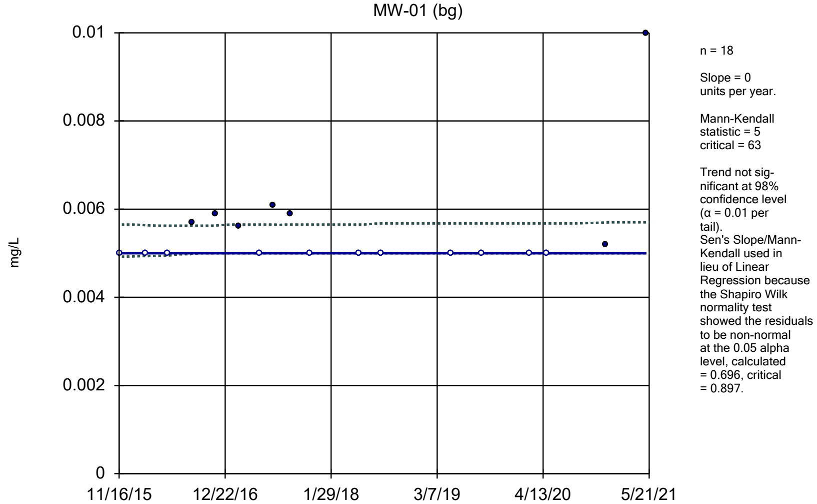


Constituent: Mercury   Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)

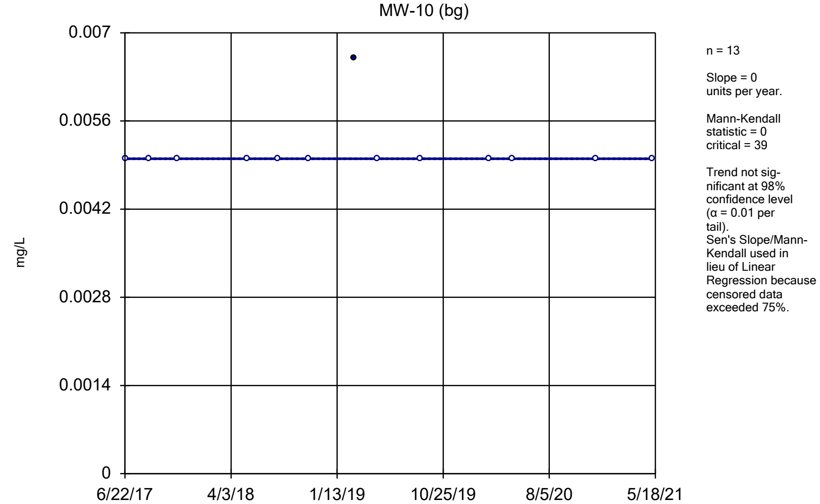


Constituent: Molybdenum   Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-10 (bg)

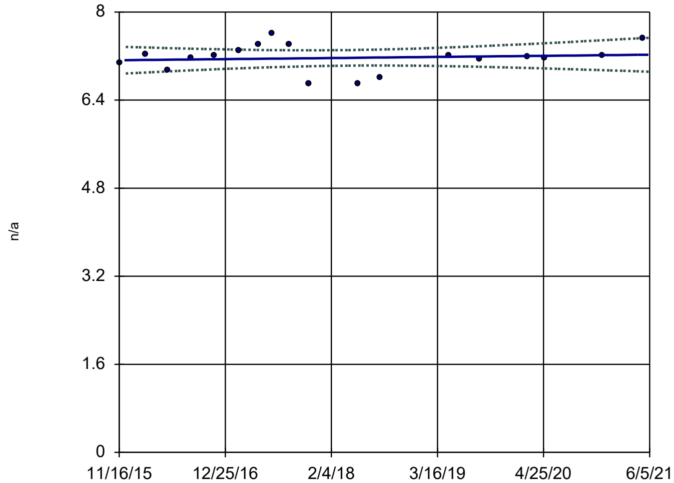


Constituent: Molybdenum   Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-01 (bg)



n = 18

Slope = 0.01803 units/year.

alpha = 0.02
t = 0.487
critical = 2.235

No significant trend.

Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.9419, critical = 0.897.

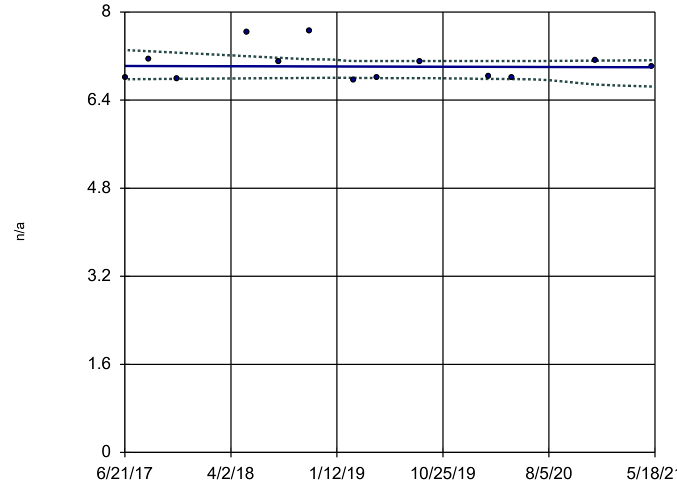
Constituent: pH Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Sen's Slope and 95% Confidence Band

MW-10 (bg)



n = 13

Slope = -0.005602 units per year.

Mann-Kendall statistic = -3
critical = -39

Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because the Shapiro Wilk normality test showed the residuals to be non-normal at the 0.05 alpha level, calculated = 0.8103, critical = 0.866.

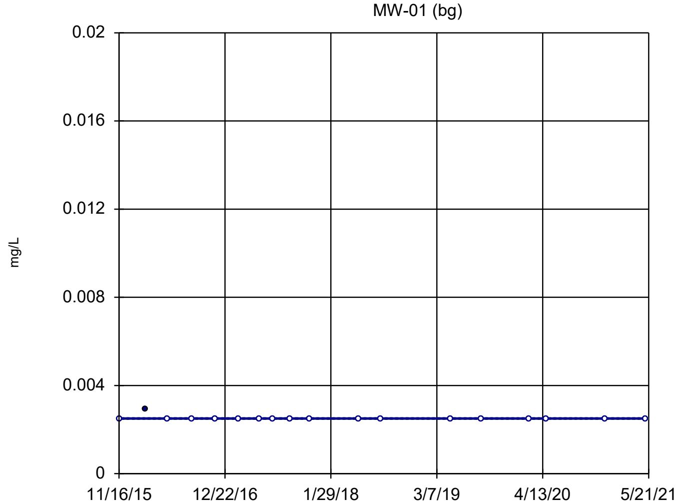
Constituent: pH Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.

Sen's Slope and 95% Confidence Band

MW-01 (bg)



n = 18

Slope = 0 units per year.

Mann-Kendall statistic = -15
critical = -63

Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.

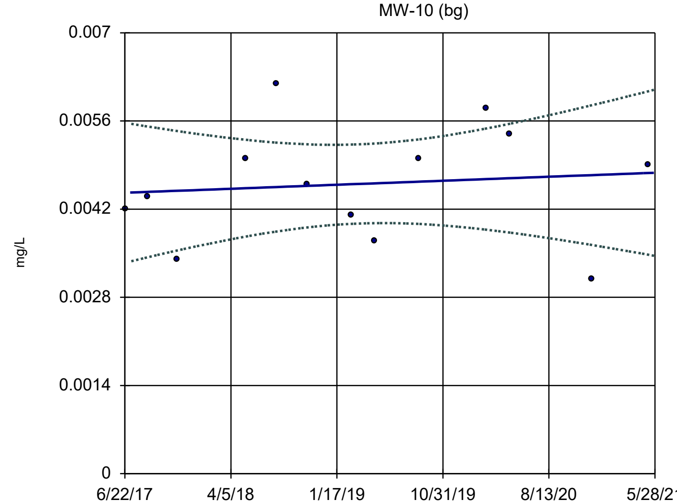
Constituent: Selenium Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Linear Regression and 95% Confidence Band

MW-10 (bg)



n = 13

Slope = 0.00008092 units/year.

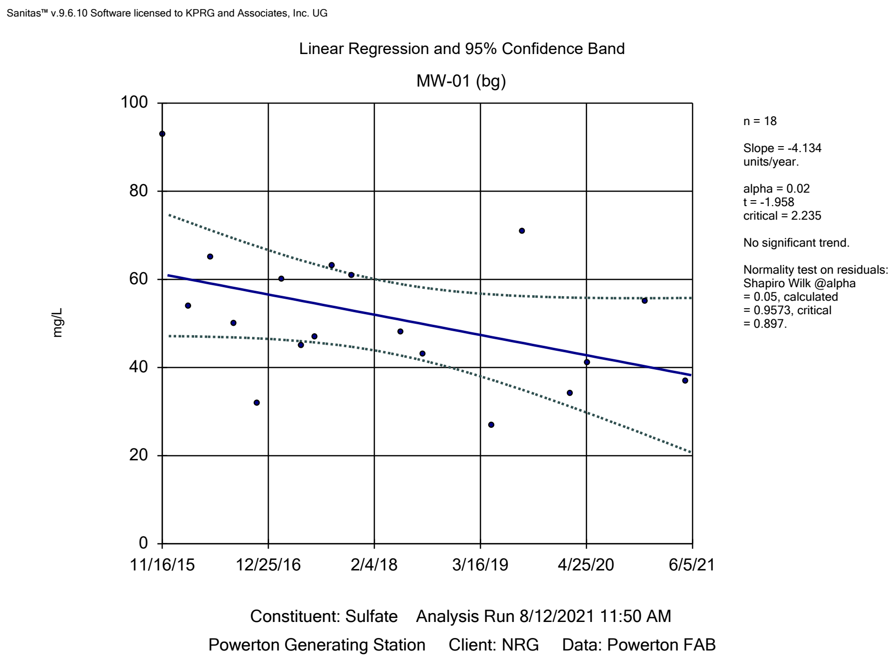
alpha = 0.02
t = 0.3664
critical = 2.328

No significant trend.

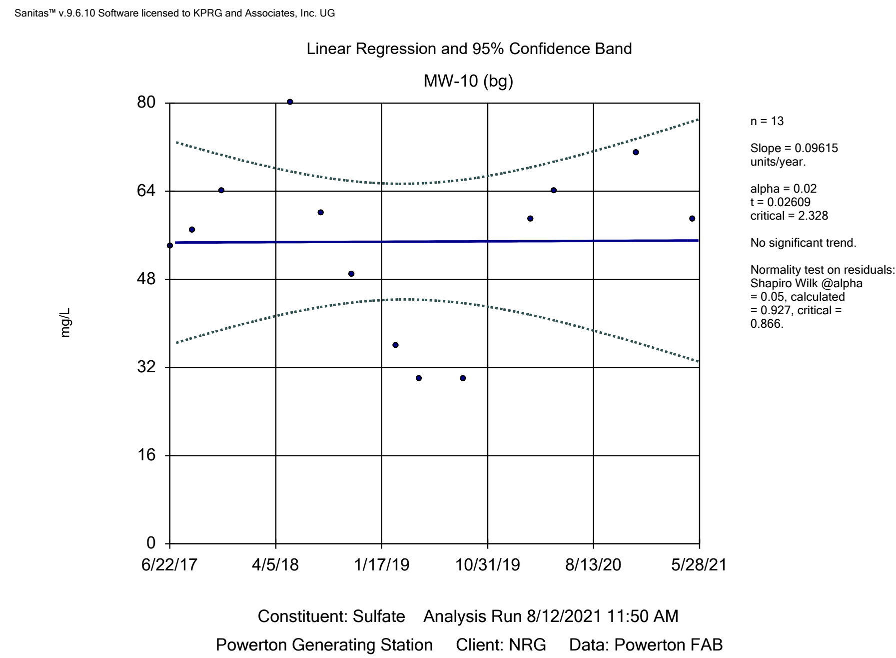
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.9937, critical = 0.866.

Constituent: Selenium Analysis Run 8/12/2021 11:50 AM

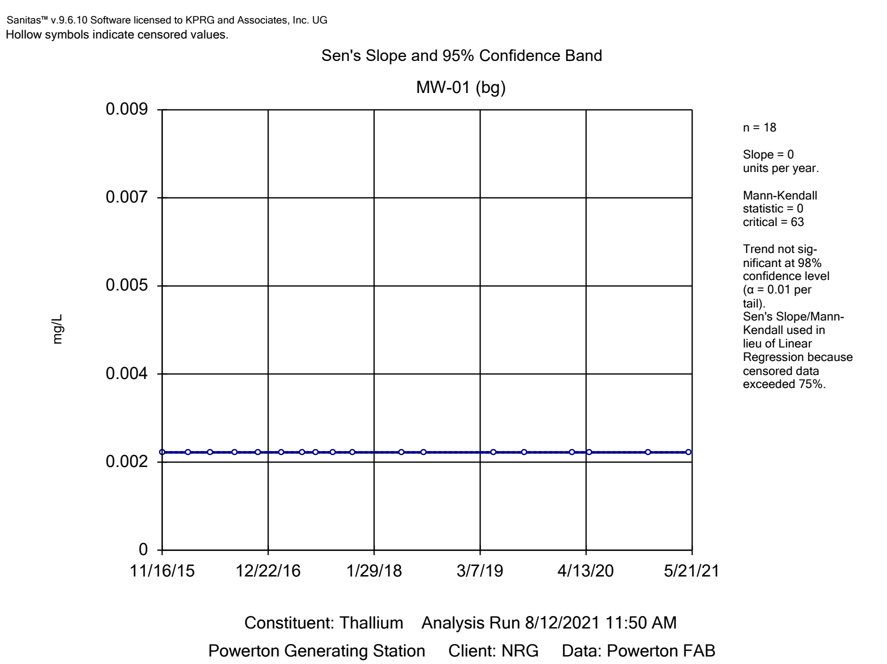
Powerton Generating Station Client: NRG Data: Powerton FAB



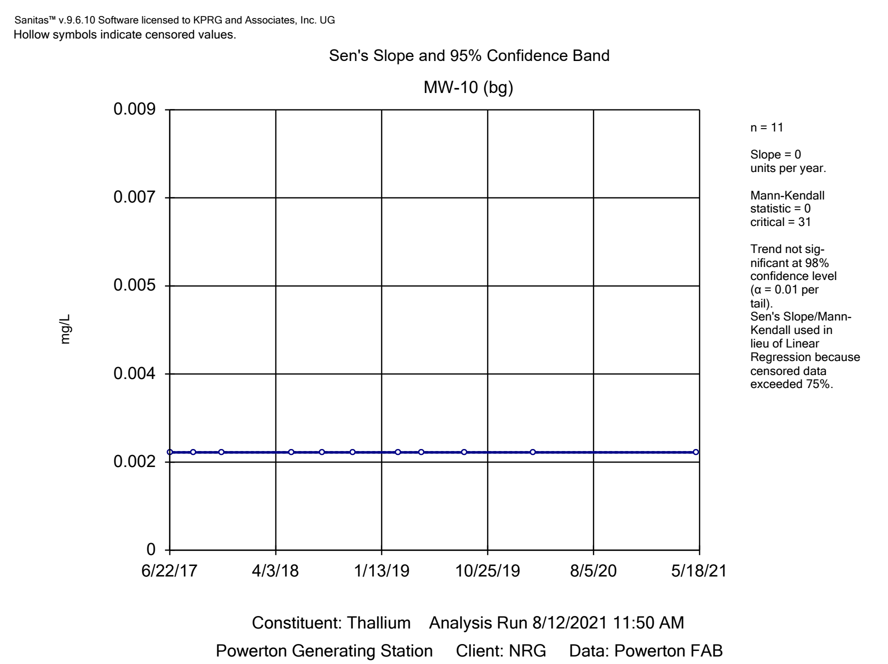
Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-01 (bg)
mg/L
100
80
60
40
20
0
11/16/15
12/25/16
2/4/18
3/16/19
4/25/20
6/5/21
n = 18
Slope = -4.134 units/year.
alpha = 0.02
t = -1.958
critical = 2.235
No significant trend.
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.9573, critical = 0.897.
Constituent: Sulfate Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB



Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Linear Regression and 95% Confidence Band
MW-10 (bg)
mg/L
80
64
48
32
16
0
6/22/17
4/5/18
1/17/19
10/31/19
8/13/20
5/28/21
n = 13
Slope = 0.09615 units/year.
alpha = 0.02
t = 0.02609
critical = 2.328
No significant trend.
Normality test on residuals: Shapiro Wilk @alpha = 0.05, calculated = 0.927, critical = 0.866.
Constituent: Sulfate Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB



Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG
Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-01 (bg)
mg/L
0.009
0.007
0.005
0.004
0.002
0
11/16/15
12/22/16
1/29/18
3/7/19
4/13/20
5/21/21
n = 18
Slope = 0 units per year.
Mann-Kendall statistic = 0
critical = 63
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.
Constituent: Thallium Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB



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Hollow symbols indicate censored values.
Sen's Slope and 95% Confidence Band
MW-10 (bg)
mg/L
0.009
0.007
0.005
0.004
0.002
0
6/22/17
4/3/18
1/13/19
10/25/19
8/5/20
5/18/21
n = 11
Slope = 0 units per year.
Mann-Kendall statistic = 0
critical = 31
Trend not significant at 98% confidence level (α = 0.01 per tail).
Sen's Slope/Mann-Kendall used in lieu of Linear Regression because censored data exceeded 75%.
Constituent: Thallium Analysis Run 8/12/2021 11:50 AM
Powerton Generating Station Client: NRG Data: Powerton FAB

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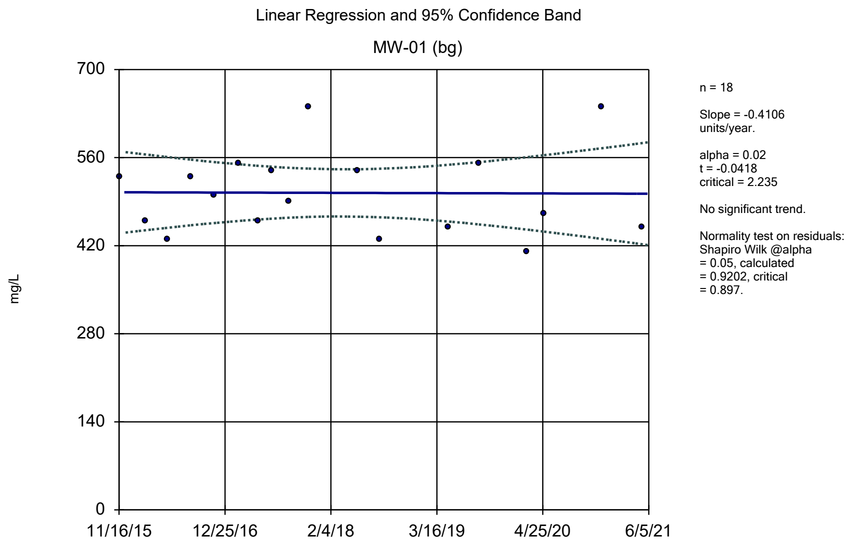

Constituent: Total Dissolved Solids Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station Client: NRG Data: Powerton FAB

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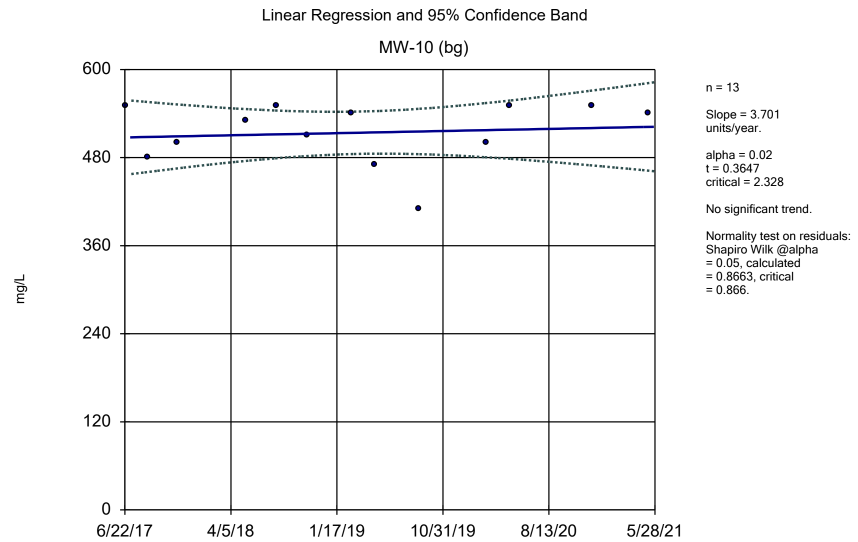


Constituent: Total Dissolved Solids Analysis Run 8/12/2021 11:50 AM

Powerton Generating Station Client: NRG Data: Powerton FAB

Shapiro-Wilk Normality Test

Constituent: Arsenic   Analysis Run 8/12/2021 3:01 PM
Powerton Generating Station   Client: NRG   Data: Powerton

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 17, alpha = 0.05)				
	no	0.4462	0.892	No
	square root	0.5854	0.892	No
	square	0.3068	0.892	No
	cube root	0.6329	0.892	No
	cube	0.2729	0.892	No
	natural log	0.7088	0.892	No
	x^4	0.2649	0.892	No
	x^5	0.2629	0.892	No
	x^6	0.2624	0.892	No
MW-09 (bg) (n = 17, alpha = 0.05)				
	no	0.6283	0.892	No
	square root	0.6473	0.892	No
	square	0.5802	0.892	No
	cube root	0.6532	0.892	No
	cube	0.5189	0.892	No
	natural log	0.6648	0.892	No
	x^4	0.4571	0.892	No
	x^5	0.4053	0.892	No
	x^6	0.3658	0.892	No
MW-19 (bg) (n = 13, alpha = 0.05)				
	no	0.3111	0.866	No
	square root	0.3111	0.866	No
	square	0.3111	0.866	No
	cube root	0.3111	0.866	No
	cube	0.3111	0.866	No
	natural log	0.3111	0.866	No
	x^4	0.3111	0.866	No
	x^5	0.3111	0.866	No
	x^6	0.3111	0.866	No
Pooled Background (bg) (n = 47, alpha = 0.05)				
	no	0.3354	0.946	No
	square root	0.4843	0.946	No
	square	0.1872	0.946	No
	cube root	0.5305	0.946	No
	cube	0.1564	0.946	No
	natural log	0.5972	0.946	No
	x^4	0.15	0.946	No
	x^5	0.1486	0.946	No
	x^6	0.1483	0.946	No

Shapiro-Wilk Normality Test

Constituent: Barium Analysis Run 8/12/2021 3:01 PM
Powerton Generating Station Client: NRG Data: Powerton

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 17, alpha = 0.05)				
	no	0.83	0.892	No
	square root	0.8727	0.892	No
	square	0.738	0.892	No
	cube root	0.8859	0.892	No
	cube	0.6509	0.892	No
	natural log	0.91	0.892	Yes
	x^4	0.5783	0.892	No
	x^5	0.5219	0.892	No
	x^6	0.4798	0.892	No
MW-09 (bg) (n = 17, alpha = 0.05)				
	no	0.9437	0.892	Yes
	square root	0.9654	0.892	Yes
	square	0.8809	0.892	No
	cube root	0.9709	0.892	Yes
	cube	0.8008	0.892	No
	natural log	0.9795	0.892	Yes
	x^4	0.7152	0.892	No
	x^5	0.6337	0.892	No
	x^6	0.5621	0.892	No
MW-19 (bg) (n = 13, alpha = 0.05)				
	no	0.9654	0.866	Yes
	square root	0.9668	0.866	Yes
	square	0.9509	0.866	Yes
	cube root	0.9664	0.866	Yes
	cube	0.9223	0.866	Yes
	natural log	0.9642	0.866	Yes
	x^4	0.8829	0.866	Yes
	x^5	0.8368	0.866	No
	x^6	0.7875	0.866	No
Pooled Background (bg) (n = 47, alpha = 0.05)				
	no	0.9242	0.946	No
	square root	0.9447	0.946	No
	square	0.8671	0.946	No
	cube root	0.9498	0.946	Yes
	cube	0.8009	0.946	No
	natural log	0.957	0.946	Yes
	x^4	0.7346	0.946	No
	x^5	0.6719	0.946	No
	x^6	0.6138	0.946	No

Shapiro-Wilk Normality Test

Constituent: Molybdenum   Analysis Run 8/12/2021 3:01 PM
Powerton Generating Station   Client: NRG   Data: Powerton

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 17, alpha = 0.05)				
	no	0.6121	0.892	No
	square root	0.6406	0.892	No
	square	0.5533	0.892	No
	cube root	0.6498	0.892	No
	cube	0.4969	0.892	No
	natural log	0.6675	0.892	No
	x^4	0.4471	0.892	No
	x^5	0.4058	0.892	No
	x^6	0.3729	0.892	No
MW-09 (bg) (n = 17, alpha = 0.05)				
	no	0.8912	0.892	No
	square root	0.9179	0.892	Yes
	square	0.8207	0.892	No
	cube root	0.9253	0.892	Yes
	cube	0.7366	0.892	No
	natural log	0.9379	0.892	Yes
	x^4	0.6508	0.892	No
	x^5	0.5725	0.892	No
	x^6	0.5062	0.892	No
MW-19 (bg) (n = 13, alpha = 0.05)				
	no	0.9817	0.866	Yes
	square root	0.9742	0.866	Yes
	square	0.9753	0.866	Yes
	cube root	0.97	0.866	Yes
	cube	0.9459	0.866	Yes
	natural log	0.959	0.866	Yes
	x^4	0.9011	0.866	Yes
	x^5	0.8478	0.866	No
	x^6	0.7914	0.866	No
Pooled Background (bg) (n = 47, alpha = 0.05)				
	no	0.8579	0.946	No
	square root	0.8165	0.946	No
	square	0.8772	0.946	No
	cube root	0.8004	0.946	No
	cube	0.8174	0.946	No
	natural log	0.768	0.946	No
	x^4	0.7292	0.946	No
	x^5	0.6429	0.946	No
	x^6	0.568	0.946	No

Shapiro-Wilk Normality Test

Constituent: Selenium Analysis Run 8/12/2021 3:01 PM

Powerton Generating Station Client: NRG Data: Powerton

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 17, alpha = 0.05)				
	no	0.2622	0.892	No
	square root	0.2622	0.892	No
	square	0.2622	0.892	No
	cube root	0.2622	0.892	No
	cube	0.2622	0.892	No
	natural log	0.2622	0.892	No
	x^4	0.2622	0.892	No
	x^5	0.2622	0.892	No
	x^6	0.2622	0.892	No
MW-09 (bg) (n = 17, alpha = 0.05)				
	no	0.7404	0.892	No
	square root	0.7646	0.892	No
	square	0.6553	0.892	No
	cube root	0.7696	0.892	No
	cube	0.5494	0.892	No
	natural log	0.7758	0.892	No
	x^4	0.4581	0.892	No
	x^5	0.3924	0.892	No
	x^6	0.3485	0.892	No
MW-19 (bg) (n = 13, alpha = 0.05)				
	no	0.832	0.866	No
	square root	0.847	0.866	No
	square	0.785	0.866	No
	cube root	0.8505	0.866	No
	cube	0.7262	0.866	No
	natural log	0.855	0.866	No
	x^4	0.6688	0.866	No
	x^5	0.6195	0.866	No
	x^6	0.5799	0.866	No
Pooled Background (bg) (n = 47, alpha = 0.05)				
	no	0.6219	0.946	No
	square root	0.6509	0.946	No
	square	0.5291	0.946	No
	cube root	0.6578	0.946	No
	cube	0.4161	0.946	No
	natural log	0.6683	0.946	No
	x^4	0.3213	0.946	No
	x^5	0.2569	0.946	No
	x^6	0.2167	0.946	No

Shapiro-Wilk Normality Test

Constituent: Sulfate   Analysis Run 8/12/2021 3:01 PM

Powerton Generating Station   Client: NRG   Data: Powerton

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 17, alpha = 0.05)				
	no	0.9274	0.892	Yes
	square root	0.9662	0.892	Yes
	square	0.8018	0.892	No
	cube root	0.9743	0.892	Yes
	cube	0.6581	0.892	No
	natural log	0.9824	0.892	Yes
	x^4	0.5357	0.892	No
	x^5	0.4458	0.892	No
	x^6	0.3843	0.892	No
MW-09 (bg) (n = 17, alpha = 0.05)				
	no	0.9361	0.892	Yes
	square root	0.9278	0.892	Yes
	square	0.93	0.892	Yes
	cube root	0.9226	0.892	Yes
	cube	0.9091	0.892	Yes
	natural log	0.9084	0.892	Yes
	x^4	0.8848	0.892	No
	x^5	0.8613	0.892	No
	x^6	0.8397	0.892	No
MW-19 (bg) (n = 13, alpha = 0.05)				
	no	0.9049	0.866	Yes
	square root	0.8837	0.866	Yes
	square	0.9315	0.866	Yes
	cube root	0.8753	0.866	Yes
	cube	0.9422	0.866	Yes
	natural log	0.8564	0.866	No
	x^4	0.9421	0.866	Yes
	x^5	0.9343	0.866	Yes
	x^6	0.9206	0.866	Yes
Pooled Background (bg) (n = 47, alpha = 0.05)				
	no	0.8903	0.946	No
	square root	0.8965	0.946	No
	square	0.8603	0.946	No
	cube root	0.8964	0.946	No
	cube	0.8232	0.946	No
	natural log	0.8921	0.946	No
	x^4	0.7884	0.946	No
	x^5	0.7581	0.946	No
	x^6	0.7317	0.946	No

Shapiro-Wilk Normality Test

Constituent: Total Dissolved Solids   Analysis Run 8/12/2021 3:01 PM

Powerton Generating Station   Client: NRG   Data: Powerton

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 17, alpha = 0.05)				
	no	0.9296	0.892	Yes
	square root	0.9426	0.892	Yes
	square	0.8968	0.892	Yes
	cube root	0.9464	0.892	Yes
	cube	0.8568	0.892	No
	natural log	0.953	0.892	Yes
	x^4	0.8126	0.892	No
	x^5	0.7666	0.892	No
	x^6	0.7212	0.892	No
MW-09 (bg) (n = 17, alpha = 0.05)				
	no	0.9497	0.892	Yes
	square root	0.9461	0.892	Yes
	square	0.9474	0.892	Yes
	cube root	0.9442	0.892	Yes
	cube	0.9335	0.892	Yes
	natural log	0.9393	0.892	Yes
	x^4	0.91	0.892	Yes
	x^5	0.8796	0.892	No
	x^6	0.8447	0.892	No
MW-19 (bg) (n = 13, alpha = 0.05)				
	no	0.8879	0.866	Yes
	square root	0.8598	0.866	No
	square	0.931	0.866	Yes
	cube root	0.8497	0.866	No
	cube	0.9514	0.866	Yes
	natural log	0.8288	0.866	No
	x^4	0.9476	0.866	Yes
	x^5	0.9229	0.866	Yes
	x^6	0.8834	0.866	Yes
Pooled Background (bg) (n = 47, alpha = 0.05)				
	no	0.9441	0.946	No
	square root	0.9457	0.946	No
	square	0.9327	0.946	No
	cube root	0.9457	0.946	No
	cube	0.9107	0.946	No
	natural log	0.9447	0.946	No
	x^4	0.879	0.946	No
	x^5	0.839	0.946	No
	x^6	0.7929	0.946	No

Shapiro-Wilk Normality Test

Constituent: Arsenic Analysis Run 8/12/2021 3:41 PM
Powerton Generating Station Client: NRG Data: Powerton FAB

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 18, alpha = 0.05)				
	no	0.579	0.897	No
	square root	0.6302	0.897	No
	square	0.4685	0.897	No
	cube root	0.645	0.897	No
	cube	0.3833	0.897	No
	natural log	0.6698	0.897	No
	x^4	0.3302	0.897	No
	x^5	0.2989	0.897	No
	x^6	0.2805	0.897	No
MW-10 (bg) (n = 13, alpha = 0.05)				
	no	0.5495	0.866	No
	square root	0.6674	0.866	No
	square	0.4205	0.866	No
	cube root	0.7142	0.866	No
	cube	0.365	0.866	No
	natural log	0.8093	0.866	No
	x^4	0.3382	0.866	No
	x^5	0.3247	0.866	No
	x^6	0.3179	0.866	No
Pooled Background (bg) (n = 31, alpha = 0.05)				
	no	0.4933	0.929	No
	square root	0.6392	0.929	No
	square	0.3041	0.929	No
	cube root	0.6861	0.929	No
	cube	0.233	0.929	No
	natural log	0.7629	0.929	No
	x^4	0.2057	0.929	No
	x^5	0.1941	0.929	No
	x^6	0.1888	0.929	No

Shapiro-Wilk Normality Test

Constituent: Barium   Analysis Run 8/12/2021 3:41 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 18, alpha = 0.05)				
	no	0.8659	0.897	No
	square root	0.9058	0.897	Yes
	square	0.7676	0.897	No
	cube root	0.9173	0.897	Yes
	cube	0.6604	0.897	No
	natural log	0.9373	0.897	Yes
	x^4	0.5612	0.897	No
	x^5	0.4793	0.897	No
	x^6	0.4162	0.897	No
MW-10 (bg) (n = 13, alpha = 0.05)				
	no	0.6898	0.866	No
	square root	0.7487	0.866	No
	square	0.5807	0.866	No
	cube root	0.7682	0.866	No
	cube	0.495	0.866	No
	natural log	0.8059	0.866	No
	x^4	0.4342	0.866	No
	x^5	0.3932	0.866	No
	x^6	0.3661	0.866	No
Pooled Background (bg) (n = 31, alpha = 0.05)				
	no	0.7694	0.929	No
	square root	0.8102	0.929	No
	square	0.5784	0.929	No
	cube root	0.816	0.929	No
	cube	0.3976	0.929	No
	natural log	0.8213	0.929	No
	x^4	0.2991	0.929	No
	x^5	0.2498	0.929	No
	x^6	0.2238	0.929	No

Shapiro-Wilk Normality Test

Constituent: Boron   Analysis Run 8/12/2021 3:41 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 18, alpha = 0.05)				
	no	0.8254	0.897	No
	square root	0.9095	0.897	Yes
	square	0.6332	0.897	No
	cube root	0.9306	0.897	Yes
	cube	0.4787	0.897	No
	natural log	0.9549	0.897	Yes
	x^4	0.381	0.897	No
	x^5	0.325	0.897	No
	x^6	0.2937	0.897	No
MW-10 (bg) (n = 13, alpha = 0.05)				
	no	0.6516	0.866	No
	square root	0.7274	0.866	No
	square	0.5131	0.866	No
	cube root	0.7514	0.866	No
	cube	0.4223	0.866	No
	natural log	0.7958	0.866	No
	x^4	0.3719	0.866	No
	x^5	0.3448	0.866	No
	x^6	0.3301	0.866	No
Pooled Background (bg) (n = 31, alpha = 0.05)				
	no	0.6786	0.929	No
	square root	0.8599	0.929	No
	square	0.4011	0.929	No
	cube root	0.9106	0.929	No
	cube	0.2804	0.929	No
	natural log	0.9747	0.929	Yes
	x^4	0.2306	0.929	No
	x^5	0.208	0.929	No
	x^6	0.1969	0.929	No

Shapiro-Wilk Normality Test

Constituent: Cobalt Analysis Run 8/12/2021 3:41 PM
Powerton Generating Station Client: NRG Data: Powerton FAB

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 18, alpha = 0.05)				
	no	0.5809	0.897	No
	square root	0.5851	0.897	No
	square	0.5673	0.897	No
	cube root	0.5862	0.897	No
	cube	0.5461	0.897	No
	natural log	0.588	0.897	No
	x^4	0.5196	0.897	No
	x^5	0.4907	0.897	No
	x^6	0.4619	0.897	No
MW-10 (bg) (n = 13, alpha = 0.05)				
	no	0.6229	0.866	No
	square root	0.7486	0.866	No
	square	0.4693	0.866	No
	cube root	0.7951	0.866	No
	cube	0.3977	0.866	No
	natural log	0.8826	0.866	Yes
	x^4	0.3606	0.866	No
	x^5	0.3398	0.866	No
	x^6	0.3278	0.866	No
Pooled Background (bg) (n = 31, alpha = 0.05)				
	no	0.5027	0.929	No
	square root	0.7259	0.929	No
	square	0.2954	0.929	No
	cube root	0.7905	0.929	No
	cube	0.2385	0.929	No
	natural log	0.8473	0.929	No
	x^4	0.2144	0.929	No
	x^5	0.2015	0.929	No
	x^6	0.1942	0.929	No

Shapiro-Wilk Normality Test

Constituent: Combined Radium 226 + 228   Analysis Run 8/12/2021 3:41 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 18, alpha = 0.05)				
	no	0.9828	0.897	Yes
	square root	0.9883	0.897	Yes
	square	0.947	0.897	Yes
	cube root	0.988	0.897	Yes
	cube	0.8882	0.897	No
	natural log	0.9842	0.897	Yes
	x^4	0.8182	0.897	No
	x^5	0.746	0.897	No
	x^6	0.6771	0.897	No
MW-10 (bg) (n = 13, alpha = 0.05)				
	no	0.8283	0.866	No
	square root	0.9187	0.866	Yes
	square	0.6332	0.866	No
	cube root	0.9396	0.866	Yes
	cube	0.5098	0.866	No
	natural log	0.9618	0.866	Yes
	x^4	0.4417	0.866	No
	x^5	0.4015	0.866	No
	x^6	0.3754	0.866	No
Pooled Background (bg) (n = 31, alpha = 0.05)				
	no	0.6731	0.929	No
	square root	0.8077	0.929	No
	square	0.4452	0.929	No
	cube root	0.848	0.929	No
	cube	0.3262	0.929	No
	natural log	0.9147	0.929	No
	x^4	0.2704	0.929	No
	x^5	0.2413	0.929	No
	x^6	0.2239	0.929	No

Shapiro-Wilk Normality Test

Constituent: Fluoride   Analysis Run 8/12/2021 3:41 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 18, alpha = 0.05)				
	no	0.9349	0.897	Yes
	square root	0.9408	0.897	Yes
	square	0.9032	0.897	Yes
	cube root	0.9412	0.897	Yes
	cube	0.8516	0.897	No
	natural log	0.9395	0.897	Yes
	x^4	0.7905	0.897	No
	x^5	0.7287	0.897	No
	x^6	0.6716	0.897	No
MW-10 (bg) (n = 13, alpha = 0.05)				
	no	0.9049	0.866	Yes
	square root	0.9067	0.866	Yes
	square	0.8988	0.866	Yes
	cube root	0.9071	0.866	Yes
	cube	0.889	0.866	Yes
	natural log	0.9077	0.866	Yes
	x^4	0.8756	0.866	Yes
	x^5	0.8586	0.866	No
	x^6	0.8382	0.866	No
Pooled Background (bg) (n = 31, alpha = 0.05)				
	no	0.959	0.929	Yes
	square root	0.9517	0.929	Yes
	square	0.9539	0.929	Yes
	cube root	0.9477	0.929	Yes
	cube	0.9284	0.929	No
	natural log	0.9374	0.929	Yes
	x^4	0.8909	0.929	No
	x^5	0.8485	0.929	No
	x^6	0.8057	0.929	No

Shapiro-Wilk Normality Test

Constituent: Lead   Analysis Run 8/12/2021 3:41 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 18, alpha = 0.05)				
	no	0.6428	0.897	No
	square root	0.6889	0.897	No
	square	0.5722	0.897	No
	cube root	0.7041	0.897	No
	cube	0.5116	0.897	No
	natural log	0.7293	0.897	No
	x^4	0.4515	0.897	No
	x^5	0.3995	0.897	No
	x^6	0.359	0.897	No
MW-10 (bg) (n = 13, alpha = 0.05)				
	no	0.5589	0.866	No
	square root	0.6956	0.866	No
	square	0.4557	0.866	No
	cube root	0.7595	0.866	No
	cube	0.411	0.866	No
	natural log	0.8897	0.866	Yes
	x^4	0.3789	0.866	No
	x^5	0.3559	0.866	No
	x^6	0.3402	0.866	No
Pooled Background (bg) (n = 31, alpha = 0.05)				
	no	0.5255	0.929	No
	square root	0.7179	0.929	No
	square	0.3236	0.929	No
	cube root	0.7793	0.929	No
	cube	0.2579	0.929	No
	natural log	0.8608	0.929	No
	x^4	0.2286	0.929	No
	x^5	0.2122	0.929	No
	x^6	0.202	0.929	No

Shapiro-Wilk Normality Test

Constituent: Selenium   Analysis Run 8/12/2021 3:41 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 18, alpha = 0.05)				
	no	0.2528	0.897	No
	square root	0.2528	0.897	No
	square	0.2528	0.897	No
	cube root	0.2528	0.897	No
	cube	0.2528	0.897	No
	natural log	0.2528	0.897	No
	x^4	0.2528	0.897	No
	x^5	0.2528	0.897	No
	x^6	0.2528	0.897	No
MW-10 (bg) (n = 13, alpha = 0.05)				
	no	0.9846	0.866	Yes
	square root	0.9837	0.866	Yes
	square	0.9719	0.866	Yes
	cube root	0.9822	0.866	Yes
	cube	0.9426	0.866	Yes
	natural log	0.9777	0.866	Yes
	x^4	0.9018	0.866	Yes
	x^5	0.8551	0.866	No
	x^6	0.8068	0.866	No
Pooled Background (bg) (n = 31, alpha = 0.05)				
	no	0.7556	0.929	No
	square root	0.7573	0.929	No
	square	0.7413	0.929	No
	cube root	0.7571	0.929	No
	cube	0.7118	0.929	No
	natural log	0.7559	0.929	No
	x^4	0.6704	0.929	No
	x^5	0.6226	0.929	No
	x^6	0.5739	0.929	No

ANOVA - Powerton ABB ASB UG Wells All Data

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/10/2021, 9:04 AM

Constituent	Well	Calc.	Crit.	Sig.	Alpha	Transform	ANOVA Sig.	Alpha	Method
Arsenic (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (normality)
Barium (mg/L)	n/a	n/a	n/a	n/a	n/a	x^(1/3)	Yes	0.05	Param.
Boron (mg/L)	n/a	n/a	n/a	n/a	n/a	x^(1/3)	Yes	0.05	Param.
Cadmium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Calcium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Chloride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (eq. var.)
Chromium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Cobalt (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Combined Radium 226 + 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Fluoride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Lead (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Lithium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Mercury (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Molybdenum (mg/L)	n/a	n/a	n/a	n/a	n/a	ln(x)	Yes	0.05	Param.
pH (n/a)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Selenium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Sulfate (mg/L)	n/a	n/a	n/a	n/a	n/a	sqrt(x)	Yes	0.05	Param.
Total Dissolved Solids (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.

Non-Parametric ANOVA

Constituent: Arsenic   Analysis Run 8/10/2021 9:04 AM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 5.642

Tabulated Chi-Squared value = 5.991 with 2 degrees of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 4.069
Adjusted Kruskal-Wallis statistic (H') = 5.642

Parametric ANOVA

Constituent: Barium   Analysis Run 8/10/2021 9:04 AM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test (after cube root transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 53.55

Tabulated F statistic = 3.206 with 2 and 46 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	169251	2	84626	8.632
Error Within Groups	450969	46	9804	
Total	620220	48		

The Shapiro Wilk normality test on the residuals passed after cube root transformation. Alpha = 0.01, calculated = 0.9325, critical = 0.929. Levene's Equality of Variance test passed. Calculated = 0.5837, tabulated = 3.206.

Parametric ANOVA

Constituent: Boron   Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test (after cube root transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 179.4

Tabulated F statistic = 3.206 with 2 and 46 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	169251	2	84626	8.632
Error Within Groups	450969	46	9804	
Total	620220	48		

The Shapiro Wilk normality test on the residuals passed after cube root transformation. Alpha = 0.01, calculated = 0.9492, critical = 0.929. Levene's Equality of Variance test passed. Calculated = 1.023, tabulated = 3.206.

Non-Parametric ANOVA

Constituent: Cadmium Analysis Run 8/10/2021 9:04 AM

Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 1.579

Tabulated Chi-Squared value = 5.991 with 2 degrees of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.09474
Adjusted Kruskal-Wallis statistic (H') = 1.579

Parametric ANOVA

Constituent: Calcium   Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 8.733

Tabulated F statistic = 3.206 with 2 and 46 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	169251	2	84626	8.632
Error Within Groups	450969	46	9804	
Total	620220	48		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9529, critical = 0.929. Levene's Equality of Variance test passed. Calculated = 1.684, tabulated = 3.206.

Non-Parametric ANOVA

Constituent: Chloride   Analysis Run 8/10/2021 9:04 AM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 27.75

Tabulated Chi-Squared value = 5.991 with 2 degrees of freedom at the 5% significance level.

There were 10 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 27.52
Adjusted Kruskal-Wallis statistic (H') = 27.75

Non-Parametric ANOVA

Constituent: Chromium   Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 2.799

Tabulated Chi-Squared value = 5.991 with 2 degrees of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.357
Adjusted Kruskal-Wallis statistic (H') = 2.799

Non-Parametric ANOVA

Constituent: Cobalt   Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 5.672

Tabulated Chi-Squared value = 5.991 with 2 degrees of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 2.768
Adjusted Kruskal-Wallis statistic (H') = 5.672

Parametric ANOVA

Constituent: Combined Radium 226 + 228 Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 4.311

Tabulated F statistic = 3.206 with 2 and 46 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	169251	2	84626	8.632
Error Within Groups	450969	46	9804	
Total	620220	48		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9598, critical = 0.929. Levene's Equality of Variance test passed. Calculated = 0.6873, tabulated = 3.206.

Parametric ANOVA

Constituent: Fluoride Analysis Run 8/10/2021 9:04 AM

Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 2.808

Tabulated F statistic = 3.206 with 2 and 46 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	169251	2	84626	8.632
Error Within Groups	450969	46	9804	
Total	620220	48		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9717, critical = 0.929. Levene's Equality of Variance test passed. Calculated = 1.034, tabulated = 3.206.

Non-Parametric ANOVA

Constituent: Lead   Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 11.82

Tabulated Chi-Squared value = 5.991 with 2 degrees of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 8.101
Adjusted Kruskal-Wallis statistic (H') = 11.82

Non-Parametric ANOVA

Constituent: Lithium   Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 1.579

Tabulated Chi-Squared value = 5.991 with 2 degrees of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.09474
Adjusted Kruskal-Wallis statistic (H') = 1.579

Non-Parametric ANOVA

Constituent: Mercury   Analysis Run 8/10/2021 9:04 AM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 1.882

Tabulated Chi-Squared value = 5.991 with 2 degrees of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.1129
Adjusted Kruskal-Wallis statistic (H') = 1.882

Parametric ANOVA

Constituent: Molybdenum Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test (after natural log transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 493.3

Tabulated F statistic = 3.206 with 2 and 46 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	169251	2	84626	8.632
Error Within Groups	450969	46	9804	
Total	620220	48		

The Shapiro Wilk normality test on the residuals passed after natural log transformation. Alpha = 0.01, calculated = 0.947, critical = 0.929. Levene's Equality of Variance test passed. Calculated = 0.5329, tabulated = 3.206.

Parametric ANOVA

Constituent: pH   Analysis Run 8/10/2021 9:04 AM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 1.896

Tabulated F statistic = 3.206 with 2 and 46 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	169251	2	84626	8.632
Error Within Groups	450969	46	9804	
Total	620220	48		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9518, critical = 0.929. Levene's Equality of Variance test passed. Calculated = 0.3074, tabulated = 3.206.

Non-Parametric ANOVA

Constituent: Selenium   Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 12.3

Tabulated Chi-Squared value = 5.991 with 2 degrees of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 8.873
Adjusted Kruskal-Wallis statistic (H') = 12.3

Parametric ANOVA

Constituent: Sulfate Analysis Run 8/10/2021 9:04 AM

Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test (after square root transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 64.91

Tabulated F statistic = 3.206 with 2 and 46 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	169251	2	84626	8.632
Error Within Groups	450969	46	9804	
Total	620220	48		

The Shapiro Wilk normality test on the residuals passed after square root transformation. Alpha = 0.01, calculated = 0.9657, critical = 0.929. Levene's Equality of Variance test passed. Calculated = 2.905, tabulated = 3.206.

Parametric ANOVA

Constituent: Total Dissolved Solids   Analysis Run 8/10/2021 9:04 AM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 8.632

Tabulated F statistic = 3.206 with 2 and 46 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	169251	2	84626	8.632
Error Within Groups	450969	46	9804	
Total	620220	48		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9653, critical = 0.929. Levene's Equality of Variance test passed. Calculated = 2.361, tabulated = 3.206.

ANOVA ABBASB MW-1 & 9 All data

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/12/2021, 12:56 PM

Constituent	Well	Calc.	Crit.	Sig.	Alpha	Transform	ANOVA Sig.	Alpha	Method
Arsenic (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (normality)
Barium (mg/L)	n/a	n/a	n/a	n/a	n/a	sqrt(x)	Yes	0.05	Param.
Boron (mg/L)	n/a	n/a	n/a	n/a	n/a	x^(1/3)	Yes	0.05	Param.
Cadmium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Calcium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Chloride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (eq. var.)
Chromium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Cobalt (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (eq. var.)
Combined Radium 226 + 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Fluoride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Lead (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Lithium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Mercury (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Molybdenum (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
pH (n/a)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Selenium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Sulfate (mg/L)	n/a	n/a	n/a	n/a	n/a	x^(1/3)	Yes	0.05	Param.
Total Dissolved Solids (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (eq. var.)

Non-Parametric ANOVA

Constituent: Arsenic   Analysis Run 8/12/2021 12:56 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.2355

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.2005
Adjusted Kruskal-Wallis statistic (H') = 0.2355

Parametric ANOVA

Constituent: Barium   Analysis Run 8/12/2021 12:56 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test (after square root transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 21.79

Tabulated F statistic = 4.152 with 1 and 32 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	1.8e22	1	1.8e22	10.41
Error Within Groups	5.5e22	32	1.7e21	
Total	7.3e22	33		

The Shapiro Wilk normality test on the residuals passed after square root transformation. Alpha = 0.01, calculated = 0.9109, critical = 0.908. Levene's Equality of Variance test passed. Calculated = 1.33, tabulated = 4.152.

Parametric ANOVA

Constituent: Boron   Analysis Run 8/12/2021 12:56 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test (after cube root transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 231.2

Tabulated F statistic = 4.152 with 1 and 32 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	1.8e22	1	1.8e22	10.41
Error Within Groups	5.5e22	32	1.7e21	
Total	7.3e22	33		

The Shapiro Wilk normality test on the residuals passed after cube root transformation. Alpha = 0.01, calculated = 0.9417, critical = 0.908. Levene's Equality of Variance test passed. Calculated = 0.3902, tabulated = 4.152.

Non-Parametric ANOVA

Constituent: Cadmium Analysis Run 8/12/2021 12:56 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 1

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.08571
Adjusted Kruskal-Wallis statistic (H') = 1

Parametric ANOVA

Constituent: Calcium   Analysis Run 8/12/2021 12:56 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 17.1

Tabulated F statistic = 4.152 with 1 and 32 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	1.8e22	1	1.8e22	10.41
Error Within Groups	5.5e22	32	1.7e21	
Total	7.3e22	33		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9506, critical = 0.908. Levene's Equality of Variance test passed. Calculated = 4.137, tabulated = 4.152.

Non-Parametric ANOVA

Constituent: Chloride   Analysis Run 8/12/2021 12:56 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 22.8

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 7 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 22.59
Adjusted Kruskal-Wallis statistic (H') = 22.8

Non-Parametric ANOVA

Constituent: Chromium   Analysis Run 8/12/2021 12:56 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 1.822

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.3209
Adjusted Kruskal-Wallis statistic (H') = 1.822

Non-Parametric ANOVA

Constituent: Cobalt   Analysis Run 8/12/2021 12:56 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 3.99

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 2.355
Adjusted Kruskal-Wallis statistic (H') = 3.99

Parametric ANOVA

Constituent: Combined Radium 226 + 228 Analysis Run 8/12/2021 12:56 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 8.547

Tabulated F statistic = 4.152 with 1 and 32 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	1.8e22	1	1.8e22	10.41
Error Within Groups	5.5e22	32	1.7e21	
Total	7.3e22	33		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9704, critical = 0.908. Levene's Equality of Variance test passed. Calculated = 1.213, tabulated = 4.152.

Parametric ANOVA

Constituent: Fluoride Analysis Run 8/12/2021 12:56 PM

Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 1.187

Tabulated F statistic = 4.152 with 1 and 32 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	1.8e22	1	1.8e22	10.41
Error Within Groups	5.5e22	32	1.7e21	
Total	7.3e22	33		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9658, critical = 0.908. Levene's Equality of Variance test passed. Calculated = 0.07263, tabulated = 4.152.

Non-Parametric ANOVA

Constituent: Lead Analysis Run 8/12/2021 12:56 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 10.28

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 6.972
Adjusted Kruskal-Wallis statistic (H') = 10.28

Non-Parametric ANOVA

Constituent: Lithium   Analysis Run 8/12/2021 12:56 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 1

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.08571
Adjusted Kruskal-Wallis statistic (H') = 1

Non-Parametric ANOVA

Constituent: Mercury   Analysis Run 8/12/2021 12:56 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 1

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.08571
Adjusted Kruskal-Wallis statistic (H') = 1

Non-Parametric ANOVA

Constituent: Molybdenum   Analysis Run 8/12/2021 12:56 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 25.26

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 7 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 24.77
Adjusted Kruskal-Wallis statistic (H') = 25.26

Parametric ANOVA

Constituent: pH   Analysis Run 8/12/2021 12:56 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 2.138

Tabulated F statistic = 4.152 with 1 and 32 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	1.8e22	1	1.8e22	10.41
Error Within Groups	5.5e22	32	1.7e21	
Total	7.3e22	33		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9606, critical = 0.908. Levene's Equality of Variance test passed. Calculated = 0.9151, tabulated = 4.152.

Non-Parametric ANOVA

Constituent: Selenium   Analysis Run 8/12/2021 12:56 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 7.936

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 4.784
Adjusted Kruskal-Wallis statistic (H') = 7.936

Parametric ANOVA

Constituent: Sulfate   Analysis Run 8/12/2021 12:56 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021 the parametric analysis of variance test (after cube root transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 91.98

Tabulated F statistic = 4.152 with 1 and 32 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	1.8e22	1	1.8e22	10.41
Error Within Groups	5.5e22	32	1.7e21	
Total	7.3e22	33		

The Shapiro Wilk normality test on the residuals passed after cube root transformation. Alpha = 0.01, calculated = 0.9826, critical = 0.908. Levene's Equality of Variance test passed. Calculated = 3.474, tabulated = 4.152.

Non-Parametric ANOVA

Constituent: Total Dissolved Solids   Analysis Run 8/12/2021 12:56 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 4.281

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 9 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 4.271
Adjusted Kruskal-Wallis statistic (H') = 4.281

ANOVA ABBASB MW-1 & 19 All data

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/12/2021, 12:59 PM

Constituent	Well	Calc.	Crit.	Sig.	Alpha	Transform	ANOVA Sig.	Alpha	Method
Arsenic (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (eq. var.)
Barium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Boron (mg/L)	n/a	n/a	n/a	n/a	n/a	sqrt(x)	Yes	0.05	Param.
Cadmium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Calcium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Chloride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Chromium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Cobalt (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Combined Radium 226 + 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Fluoride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Lead (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Lithium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Molybdenum (mg/L)	n/a	n/a	n/a	n/a	n/a	ln(x)	Yes	0.05	Param.
pH (n/a)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Selenium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Sulfate (mg/L)	n/a	n/a	n/a	n/a	n/a	sqrt(x)	Yes	0.05	Param.
Total Dissolved Solids (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.

Non-Parametric ANOVA

Constituent: Arsenic Analysis Run 8/12/2021 12:59 PM

Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 5.769

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.787
Adjusted Kruskal-Wallis statistic (H') = 5.769

Parametric ANOVA

Constituent: Barium   Analysis Run 8/12/2021 12:59 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 25.13

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9046, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.3107, tabulated = 4.2.

Parametric ANOVA

Constituent: Boron Analysis Run 8/12/2021 12:59 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test (after square root transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 278.9

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed after square root transformation. Alpha = 0.01, calculated = 0.9659, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.582, tabulated = 4.2.

Non-Parametric ANOVA

Constituent: Cadmium   Analysis Run 8/12/2021 12:59 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.7647

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.074
Adjusted Kruskal-Wallis statistic (H') = 0.7647

Parametric ANOVA

Constituent: Calcium Analysis Run 8/12/2021 12:59 PM

Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.0867

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9487, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.005625, tabulated = 4.2.

Parametric ANOVA

Constituent: Chloride   Analysis Run 8/12/2021 12:59 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 16.71

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9326, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 3.807, tabulated = 4.2.

Non-Parametric ANOVA

Constituent: Chromium   Analysis Run 8/12/2021 12:59 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 1.342

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.2677
Adjusted Kruskal-Wallis statistic (H') = 1.342

Non-Parametric ANOVA

Constituent: Cobalt   Analysis Run 8/12/2021 12:59 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 4.332

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 2.564
Adjusted Kruskal-Wallis statistic (H') = 4.332

Parametric ANOVA

Constituent: Combined Radium 226 + 228   Analysis Run 8/12/2021 12:59 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 2.649

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9592, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.0186, tabulated = 4.2.

Parametric ANOVA

Constituent: Fluoride   Analysis Run 8/12/2021 12:59 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 5.481

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9509, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 1.114, tabulated = 4.2.

Non-Parametric ANOVA

Constituent: Lead   Analysis Run 8/12/2021 12:59 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 4.329

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.616
Adjusted Kruskal-Wallis statistic (H') = 4.329

Non-Parametric ANOVA

Constituent: Lithium   Analysis Run 8/12/2021 12:59 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.7647

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.074
Adjusted Kruskal-Wallis statistic (H') = 0.7647

Parametric ANOVA

Constituent: Molybdenum   Analysis Run 8/12/2021 12:59 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test (after natural log transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 678.1

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed after natural log transformation. Alpha = 0.01, calculated = 0.9164, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.5944, tabulated = 4.2.

Parametric ANOVA

Constituent: pH   Analysis Run 8/12/2021 12:59 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 2.453

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9497, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.01538, tabulated = 4.2.

Non-Parametric ANOVA

Constituent: Selenium   Analysis Run 8/12/2021 12:59 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 11.09

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 7.287
Adjusted Kruskal-Wallis statistic (H') = 11.09

Parametric ANOVA

Constituent: Sulfate Analysis Run 8/12/2021 12:59 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test (after square root transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 118.1

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed after square root transformation. Alpha = 0.01, calculated = 0.9771, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 2.828, tabulated = 4.2.

Parametric ANOVA

Constituent: Total Dissolved Solids   Analysis Run 8/12/2021 12:59 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 17.68

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	150803	1	150803	17.68
Error Within Groups	238877	28	8531	
Total	389680	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9507, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 1.602, tabulated = 4.2.

ANOVA ABBASB MW-9 & 19 All data

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/12/2021, 1:00 PM

Constituent	Well	Calc.	Crit.	Sig.	Alpha	Transform	ANOVA Sig.	Alpha	Method
Arsenic (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Barium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Boron (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Calcium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Chloride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (normality)
Cobalt (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Combined Radium 226 + 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Fluoride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Lead (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Mercury (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Molybdenum (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
pH (n/a)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Selenium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (normality)
Sulfate (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Total Dissolved Solids (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.

Non-Parametric ANOVA

Constituent: Arsenic   Analysis Run 8/12/2021 1:00 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 5.049

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.314
Adjusted Kruskal-Wallis statistic (H') = 5.049

Parametric ANOVA

Constituent: Barium   Analysis Run 8/12/2021 1:00 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 144.5

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	28227	1	28227	2.179
Error Within Groups	362653	28	12952	
Total	390880	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9639, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 1.239, tabulated = 4.2.

Parametric ANOVA

Constituent: Boron   Analysis Run 8/12/2021 1:00 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.3445

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	28227	1	28227	2.179
Error Within Groups	362653	28	12952	
Total	390880	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.902, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 1.914, tabulated = 4.2.

Parametric ANOVA

Constituent: Calcium   Analysis Run 8/12/2021 1:00 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 11.98

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	28227	1	28227	2.179
Error Within Groups	362653	28	12952	
Total	390880	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9372, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 2.668, tabulated = 4.2.

Non-Parametric ANOVA

Constituent: Chloride Analysis Run 8/12/2021 1:00 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/18/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.04478

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 7 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.04379
Adjusted Kruskal-Wallis statistic (H') = 0.04478

Non-Parametric ANOVA

Constituent: Cobalt Analysis Run 8/12/2021 1:00 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/18/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.1308

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.03547
Adjusted Kruskal-Wallis statistic (H') = 0.1308

Parametric ANOVA

Constituent: Combined Radium 226 + 228   Analysis Run 8/12/2021 1:00 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.6835

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	28227	1	28227	2.179
Error Within Groups	362653	28	12952	
Total	390880	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9045, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.6608, tabulated = 4.2.

Parametric ANOVA

Constituent: Fluoride   Analysis Run 8/12/2021 1:00 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 2.395

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	28227	1	28227	2.179
Error Within Groups	362653	28	12952	
Total	390880	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.938, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 1.815, tabulated = 4.2.

Non-Parametric ANOVA

Constituent: Lead Analysis Run 8/12/2021 1:00 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/18/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 2.918

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 1.23
Adjusted Kruskal-Wallis statistic (H') = 2.918

Non-Parametric ANOVA

Constituent: Mercury   Analysis Run 8/12/2021 1:00 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.7647

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.074
Adjusted Kruskal-Wallis statistic (H') = 0.7647

Parametric ANOVA

Constituent: Molybdenum Analysis Run 8/12/2021 1:00 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 11/18/2015 and 5/13/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 4.333

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	28227	1	28227	2.179
Error Within Groups	362653	28	12952	
Total	390880	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9685, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.23, tabulated = 4.2.

Parametric ANOVA

Constituent: pH   Analysis Run 8/12/2021 1:00 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.1385

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	28227	1	28227	2.179
Error Within Groups	362653	28	12952	
Total	390880	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.951, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.5229, tabulated = 4.2.

Non-Parametric ANOVA

Constituent: Selenium   Analysis Run 8/12/2021 1:00 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.03948

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.03547
Adjusted Kruskal-Wallis statistic (H') = 0.03948

Parametric ANOVA

Constituent: Sulfate   Analysis Run 8/12/2021 1:00 PM

Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.5729

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	28227	1	28227	2.179
Error Within Groups	362653	28	12952	
Total	390880	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9309, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.4422, tabulated = 4.2.

Parametric ANOVA

Constituent: Total Dissolved Solids   Analysis Run 8/12/2021 1:00 PM
Powerton Generating Station   Client: NRG   Data: Powerton

For observations made between 11/18/2015 and 5/13/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 2.179

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	28227	1	28227	2.179
Error Within Groups	362653	28	12952	
Total	390880	29		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9463, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 0.3286, tabulated = 4.2.

Analysis of Variance FAB

Powerton Generating Station   Client: NRG   Data: Powerton FAB   Printed 8/13/2021, 12:34 PM

Constituent	Well	Calc.	Crit.	Sig.	Alpha	Transform	ANOVA Sig.	Alpha	Method
Arsenic (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Barium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Beryllium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Boron (mg/L)	n/a	n/a	n/a	n/a	n/a	ln(x)	Yes	0.05	Param.
Cadmium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Calcium (mg/L)	n/a	n/a	n/a	n/a	n/a	sqrt(x)	No	0.05	Param.
Chloride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (eq. var.)
Chromium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Cobalt (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (eq. var.)
Combined Radium 226 + 228 (pCi/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (eq. var.)
Fluoride (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Lead (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Lithium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Molybdenum (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (normality)
pH (n/a)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Selenium (mg/L)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Sulfate (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.
Total Dissolved Solids (mg/L)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	Param.

Non-Parametric ANOVA

Constituent: Arsenic   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 4.414

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 4.087
Adjusted Kruskal-Wallis statistic (H') = 4.414

Non-Parametric ANOVA

Constituent: Barium   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 22.01

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 7 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 21.94
Adjusted Kruskal-Wallis statistic (H') = 22.01

Non-Parametric ANOVA

Constituent: Beryllium   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 1.455

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.1558
Adjusted Kruskal-Wallis statistic (H') = 1.455

Parametric ANOVA

Constituent: Boron   Analysis Run 8/13/2021 12:34 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test (after natural log transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 7.898

Tabulated F statistic = 4.18 with 1 and 29 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	748.4	1	748.4	0.2234
Error Within Groups	97135	29	3349	
Total	97884	30		

The Shapiro Wilk normality test on the residuals passed after natural log transformation. Alpha = 0.01, calculated = 0.9207, critical = 0.902. Levene's Equality of Variance test passed. Calculated = 0.02023, tabulated = 4.18.

Non-Parametric ANOVA

Constituent: Cadmium   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 3.39

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.6545
Adjusted Kruskal-Wallis statistic (H') = 3.39

Parametric ANOVA

Constituent: Calcium   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test (after square root transformation) indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 2.585

Tabulated F statistic = 4.18 with 1 and 29 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	748.4	1	748.4	0.2234
Error Within Groups	97135	29	3349	
Total	97884	30		

The Shapiro Wilk normality test on the residuals passed after square root transformation. Alpha = 0.01, calculated = 0.909, critical = 0.902. Levene's Equality of Variance test passed. Calculated = 0.007497, tabulated = 4.18.

Non-Parametric ANOVA

Constituent: Chloride   Analysis Run 8/13/2021 12:34 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.1034

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.1026
Adjusted Kruskal-Wallis statistic (H') = 0.1034

Non-Parametric ANOVA

Constituent: Chromium   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 2.285

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.7756
Adjusted Kruskal-Wallis statistic (H') = 2.285

Non-Parametric ANOVA

Constituent: Cobalt   Analysis Run 8/13/2021 12:34 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 22.48

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 20.83
Adjusted Kruskal-Wallis statistic (H') = 22.48

Non-Parametric ANOVA

Constituent: Combined Radium 226 + 228   Analysis Run 8/13/2021 12:34 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 8.308

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.

Parametric ANOVA

Constituent: Fluoride   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 7.467

Tabulated F statistic = 4.18 with 1 and 29 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	748.4	1	748.4	0.2234
Error Within Groups	97135	29	3349	
Total	97884	30		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9632, critical = 0.902. Levene's Equality of Variance test passed. Calculated = 0.9797, tabulated = 4.18.

Non-Parametric ANOVA

Constituent: Lead   Analysis Run 8/13/2021 12:34 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 4.314

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 4.168
Adjusted Kruskal-Wallis statistic (H') = 4.314

Non-Parametric ANOVA

Constituent: Lithium   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 6/28/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 3.103

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.5806
Adjusted Kruskal-Wallis statistic (H') = 3.103

Non-Parametric ANOVA

Constituent: Molybdenum   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 3.131

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 1.853
Adjusted Kruskal-Wallis statistic (H') = 3.131

Parametric ANOVA

Constituent: pH   Analysis Run 8/13/2021 12:34 PM

Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 1.561

Tabulated F statistic = 4.18 with 1 and 29 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	748.4	1	748.4	0.2234
Error Within Groups	97135	29	3349	
Total	97884	30		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9495, critical = 0.902. Levene's Equality of Variance test passed. Calculated = 0.5011, tabulated = 4.18.

Non-Parametric ANOVA

Constituent: Selenium   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 26.26

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 21.94
Adjusted Kruskal-Wallis statistic (H') = 26.26

Parametric ANOVA

Constituent: Sulfate   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.3565

Tabulated F statistic = 4.18 with 1 and 29 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	748.4	1	748.4	0.2234
Error Within Groups	97135	29	3349	
Total	97884	30		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9676, critical = 0.902. Levene's Equality of Variance test passed. Calculated = 0.04014, tabulated = 4.18.

Parametric ANOVA

Constituent: Total Dissolved Solids   Analysis Run 8/13/2021 12:34 PM
Powerton Generating Station   Client: NRG   Data: Powerton FAB

For observations made between 11/16/2015 and 5/11/2021 the parametric analysis of variance test indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.2234

Tabulated F statistic = 4.18 with 1 and 29 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	748.4	1	748.4	0.2234
Error Within Groups	97135	29	3349	
Total	97884	30		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9373, critical = 0.902. Levene's Equality of Variance test passed. Calculated = 3.38, tabulated = 4.18.

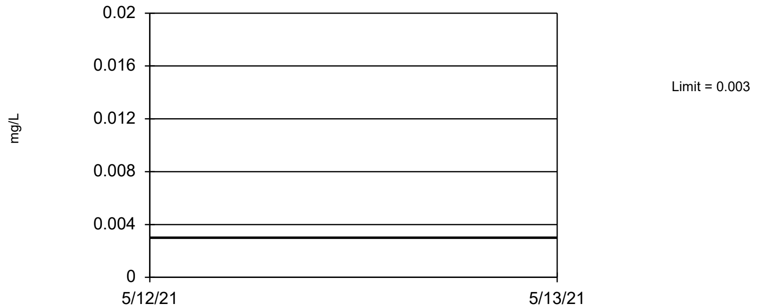
Interwell Prediction Limit - ABBASB UG Wells

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/10/2021, 3:25 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Antimony (mg/L)	n/a	0.003	n/a	n/a	6 future	n/a	41	100	n/a	0.001061	NP (NDs) 1 of 2
Beryllium (mg/L)	n/a	0.001	n/a	n/a	6 future	n/a	41	100	n/a	0.001061	NP (NDs) 1 of 2
Cadmium (mg/L)	n/a	0.00085	n/a	n/a	6 future	n/a	47	97.87	n/a	0.000...	NP (NDs) 1 of 2
Chromium (mg/L)	n/a	0.025	n/a	n/a	6 future	n/a	43	95.35	n/a	0.000986	NP (NDs) 1 of 2
Cobalt (mg/L)	n/a	0.016	n/a	n/a	6 future	n/a	48	77.08	n/a	0.000...	NP (NDs) 1 of 2
Lithium (mg/L)	n/a	0.012	n/a	n/a	6 future	n/a	47	97.87	n/a	0.000...	NP (NDs) 1 of 2
Mercury (mg/L)	n/a	0.00029	n/a	n/a	6 future	n/a	47	97.87	n/a	0.000...	NP (NDs) 1 of 2
pH (n/a)	n/a	7.902	6.649	n/a	6 future	n/a	47	0	No	0.000...	Param 1 of 2
Thallium (mg/L)	n/a	0.002	n/a	n/a	6 future	n/a	47	100	n/a	0.000...	NP (NDs) 1 of 2

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 41) were censored; limit is most recent reporting limit. Annual per-constituent alpha = 0.02515. Individual comparison alpha = 0.001061 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Antimony Analysis Run 8/10/2021 3:22 PM

Powerton Generating Station Client: NRG Data: Powerton

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Prediction Limit

Interwell Non-parametric

Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 41) were censored; limit is most recent reporting limit. Annual per-constituent alpha = 0.02515. Individual comparison alpha = 0.001061 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Beryllium Analysis Run 8/10/2021 3:22 PM

Powerton Generating Station Client: NRG Data: Powerton

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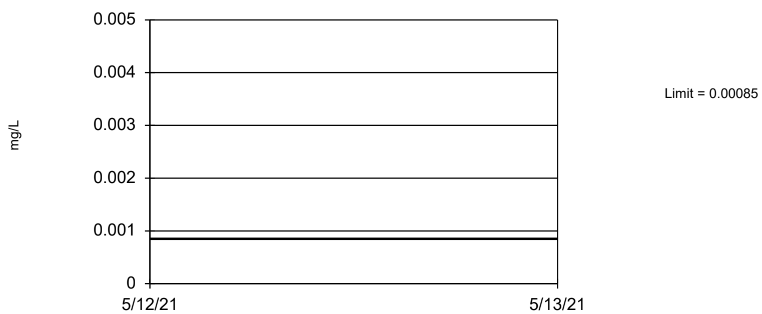
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 47 background values. 97.87% NDs. Annual per-constituent alpha = 0.0199. Individual comparison alpha = 0.0008372 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Cadmium Analysis Run 8/10/2021 3:22 PM

Powerton Generating Station Client: NRG Data: Powerton

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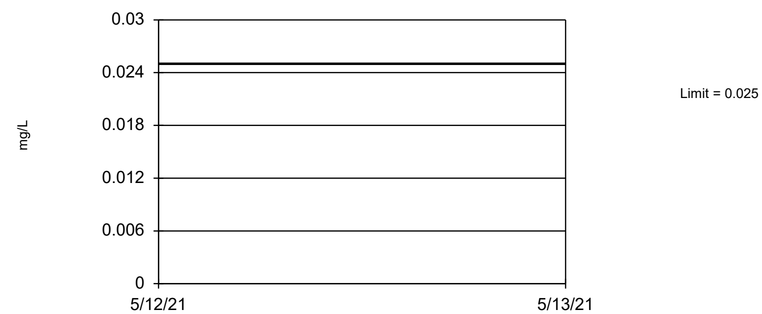
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 43 background values. 95.35% NDs. Annual per-constituent alpha = 0.0234. Individual comparison alpha = 0.000986 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Chromium Analysis Run 8/10/2021 3:22 PM

Powerton Generating Station Client: NRG Data: Powerton

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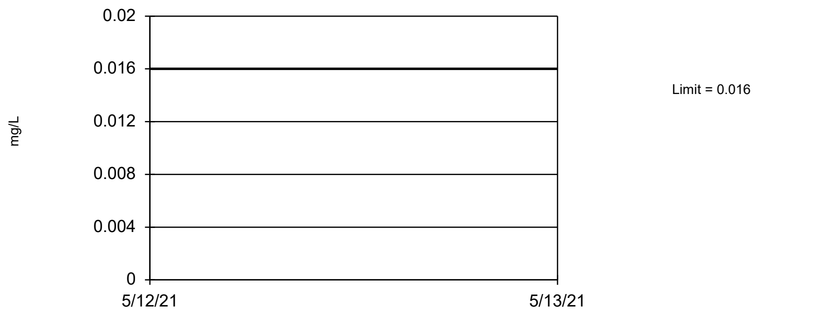
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 48 background values. 77.08% NDs. Annual per-constituent alpha = 0.01903. Individual comparison alpha = 0.0008001 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Cobalt Analysis Run 8/10/2021 3:22 PM

Powerton Generating Station Client: NRG Data: Powerton

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Prediction Limit

Interwell Non-parametric

Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 47 background values. 97.87% NDs. Annual per-constituent alpha = 0.0199. Individual comparison alpha = 0.0008372 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Lithium Analysis Run 8/10/2021 3:22 PM

Powerton Generating Station Client: NRG Data: Powerton

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Prediction Limit

Interwell Non-parametric

Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 47 background values. 97.87% NDs. Annual per-constituent alpha = 0.0199. Individual comparison alpha = 0.0008372 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Mercury Analysis Run 8/10/2021 3:22 PM

Powerton Generating Station Client: NRG Data: Powerton

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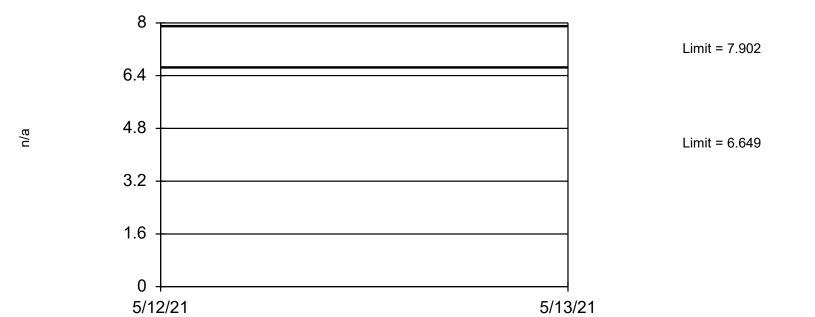
Prediction Limit

Interwell Parametric



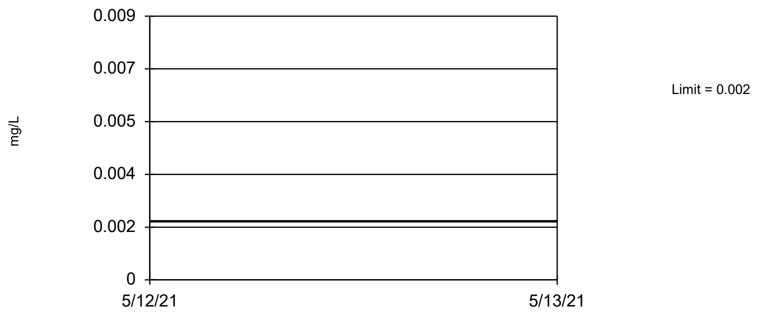
Background Data Summary: Mean=7.276, Std. Dev.=0.2634, n=47. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9677, critical = 0.946. Kappa = 2.379 (c=22, w=6, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.00009976. Assumes 6 future values.

Constituent: pH Analysis Run 8/10/2021 3:22 PM

Powerton Generating Station Client: NRG Data: Powerton

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 47) were censored; limit is most recent reporting limit. Annual per-constituent alpha = 0.0199. Individual comparison alpha = 0.0008372 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Thallium Analysis Run 8/10/2021 3:22 PM

Powerton Generating Station Client: NRG Data: Powerton

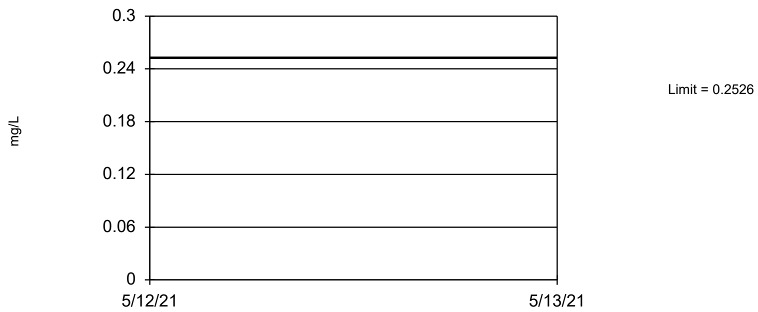
Interwell Prediction Limit - ABBASB MW-01 & 9

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/10/2021, 3:26 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Fluoride (mg/L)	n/a	0.2526	n/a	n/a	6 future	n/a	34	0	No	0.000...	Param 1 of 2

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=0.1709, Std. Dev.=0.03315, n=34. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9449, critical = 0.933. Kappa = 2.463 (c=22, w=6, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0001995. Assumes 6 future values.

Constituent: Fluoride Analysis Run 8/10/2021 3:26 PM

Powerton Generating Station Client: NRG Data: Powerton

Interwell Prediction Limit - ABBASB MW-01 & 19

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/10/2021, 3:28 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Calcium (mg/L)	n/a	132.3	n/a	n/a	6 future	n/a	30	0	No	0.000...	Param 1 of 2
Combined Radium 226 + 228 (pCi/L)	n/a	0.953	n/a	n/a	6 future	n/a	30	53.33	n/a	0.001842	NP (NDs) 1 of 2

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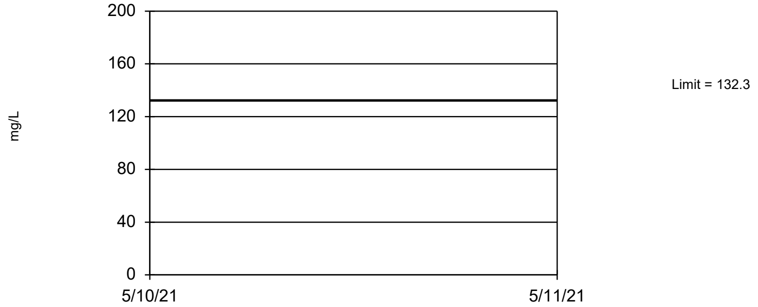
Prediction Limit

Interwell Parametric



Background Data Summary: Mean=95.23, Std. Dev.=14.82, n=30. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9401, critical = 0.927. Kappa = 2.501 (c=22, w=6, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0001995. Assumes 6 future values.

Constituent: Calcium Analysis Run 8/10/2021 3:27 PM

Powerton Generating Station Client: NRG Data: Powerton

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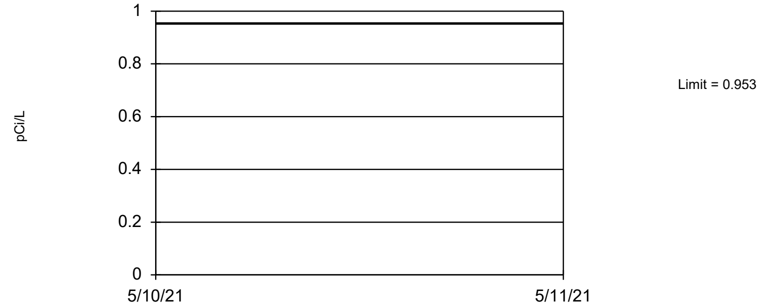
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 30 background values. 53.33% NDs. Annual per-constituent alpha = 0.04327. Individual comparison alpha = 0.001842 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Combined Radium 226 + 228 Analysis Run 8/10/2021 3:27 PM

Powerton Generating Station Client: NRG Data: Powerton

Interwell Prediction Limit - ABBASB MW-09 & 19

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/10/2021, 3:29 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron (mg/L)	n/a	4.7	n/a	n/a	6 future	n/a	30	0	n/a	0.001842	NP (normality) 1 of 2
Chloride (mg/L)	n/a	53	n/a	n/a	6 future	n/a	30	0	n/a	0.001842	NP (normality) 1 of 2
Lead (mg/L)	n/a	0.0012	n/a	n/a	6 future	n/a	30	83.33	n/a	0.001842	NP (NDs) 1 of 2

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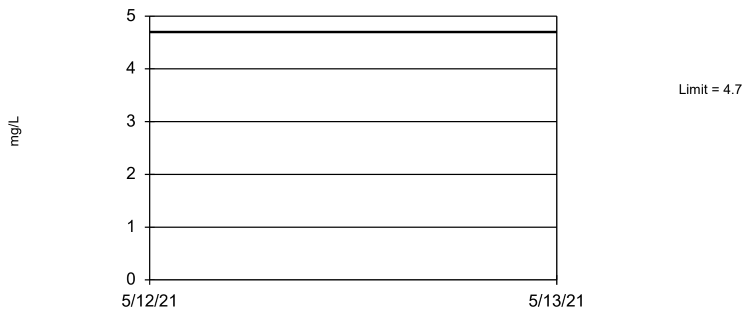
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 30 background values. Annual per-constituent alpha = 0.04327. Individual comparison alpha = 0.001842 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Boron Analysis Run 8/10/2021 3:29 PM

Powerton Generating Station Client: NRG Data: Powerton

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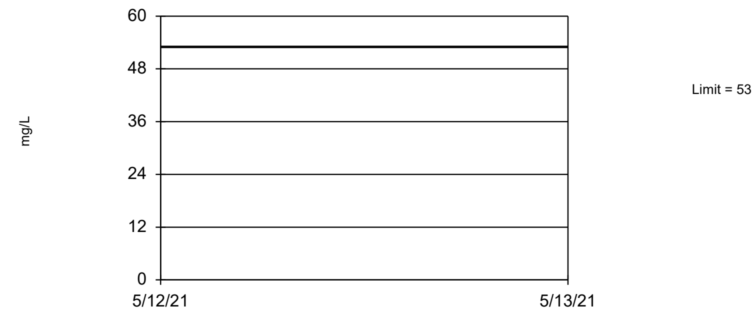
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.05 alpha level. Limit is highest of 30 background values. Annual per-constituent alpha = 0.04327. Individual comparison alpha = 0.001842 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

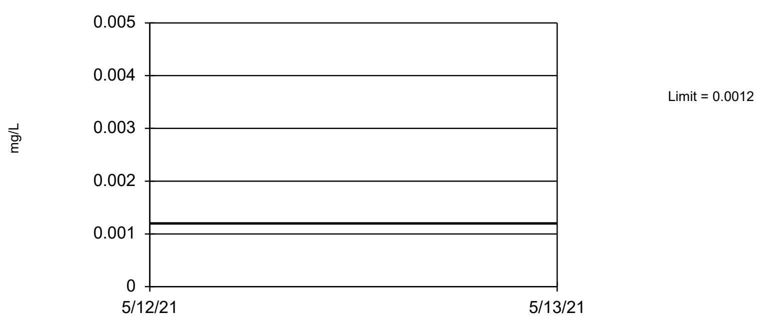
Constituent: Chloride Analysis Run 8/10/2021 3:29 PM

Powerton Generating Station Client: NRG Data: Powerton

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 30 background values. 83.33% NDs. Annual per-constituent alpha = 0.04327. Individual comparison alpha = 0.001842 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Lead Analysis Run 8/10/2021 3:29 PM

Powerton Generating Station Client: NRG Data: Powerton

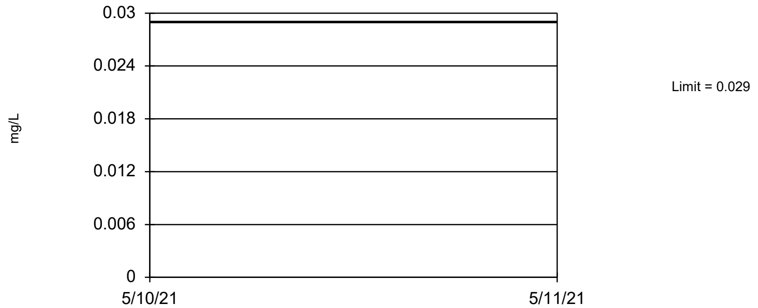
Interwell Prediction Limit - ABBASB MW-01

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/10/2021, 3:35 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Arsenic (mg/L)	n/a	0.029	n/a	n/a	6 future	n/a	17	52.94	n/a	0.004808	NP (NDs) 1 of 2
Barium (mg/L)	n/a	0.08244	n/a	n/a	6 future	n/a	17	0	No	0.000...	Param 1 of 2 Deseas
Selenium (mg/L)	n/a	0.0029	n/a	n/a	6 future	n/a	17	94.12	n/a	0.004808	NP (NDs) 1 of 2
Sulfate (mg/L)	n/a	93.67	n/a	n/a	6 future	n/a	17	0	No	0.000...	Param 1 of 2
Total Dissolved Solids (mg/L)	n/a	695.7	n/a	n/a	6 future	n/a	17	0	No	0.000...	Param 1 of 2

Prediction Limit

Interwell Non-parametric



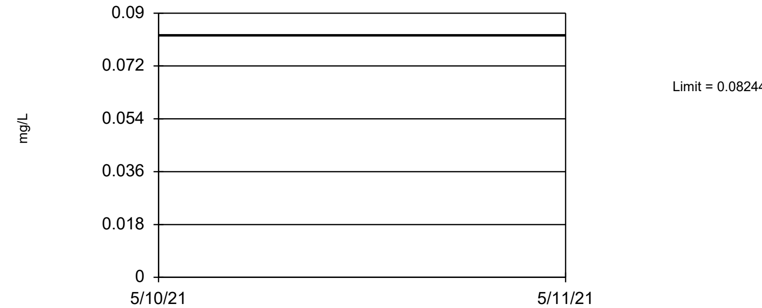
Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 17 background values. 52.94% NDs. Annual per-constituent alpha = 0.1092. Individual comparison alpha = 0.004808 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Arsenic Analysis Run 8/10/2021 3:33 PM

Powerton Generating Station Client: NRG Data: Powerton

Prediction Limit

Interwell Parametric



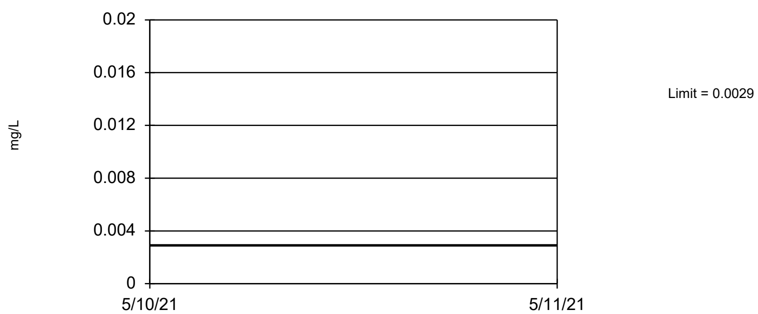
Background Data Summary: Mean=0.05453, Std. Dev.=0.009948, n=17. Seasonality was detected with 95% confidence and data were deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9332, critical = 0.892. Kappa = 2.806 (c=22, w=6, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0001995. Assumes 6 future values.

Constituent: Barium Analysis Run 8/10/2021 3:33 PM

Powerton Generating Station Client: NRG Data: Powerton

Prediction Limit

Interwell Non-parametric



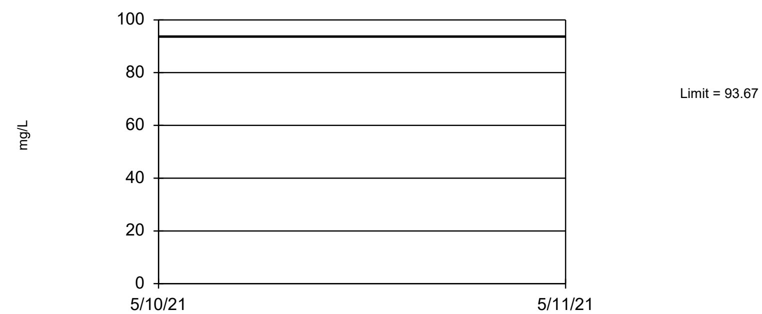
Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 17 background values. 94.12% NDs. Annual per-constituent alpha = 0.1092. Individual comparison alpha = 0.004808 (1 of 2). Assumes 6 future values. Seasonality was not detected with 95% confidence.

Constituent: Selenium Analysis Run 8/10/2021 3:33 PM

Powerton Generating Station Client: NRG Data: Powerton

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=50.76, Std. Dev.=15.29, n=17. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9274, critical = 0.892. Kappa = 2.806 (c=22, w=6, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0001995. Assumes 6 future values.

Constituent: Sulfate Analysis Run 8/10/2021 3:33 PM

Powerton Generating Station Client: NRG Data: Powerton

Prediction Limit

Interwell Parametric

Background Data Summary: Mean=500, Std. Dev.=69.73, n=17. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9296, critical = 0.892. Kappa = 2.806 (c=22, w=6, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0001995. Assumes 6 future values.

Constituent: Total Dissolved Solids Analysis Run 8/10/2021 3:33 PM

Powerton Generating Station Client: NRG Data: Powerton

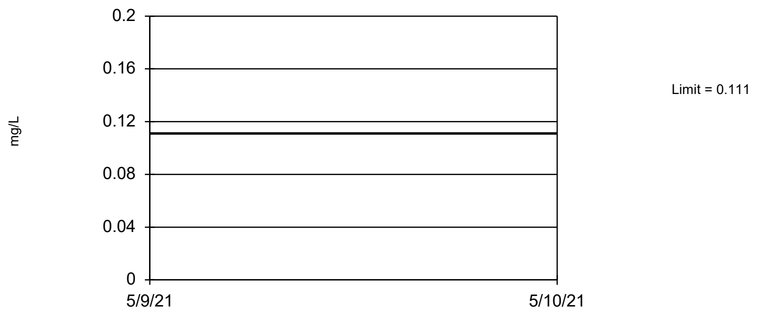
Interwell Prediction Limit - ABBASB MW-19

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 8/10/2021, 4:58 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Barium (mg/L)	n/a	0.111	n/a	n/a	6 future	n/a	13	0	No	0.000...	Param 1 of 2
Molybdenum (mg/L)	n/a	0.06276	n/a	n/a	6 future	n/a	13	0	No	0.000...	Param 1 of 2

Prediction Limit

Interwell Parametric



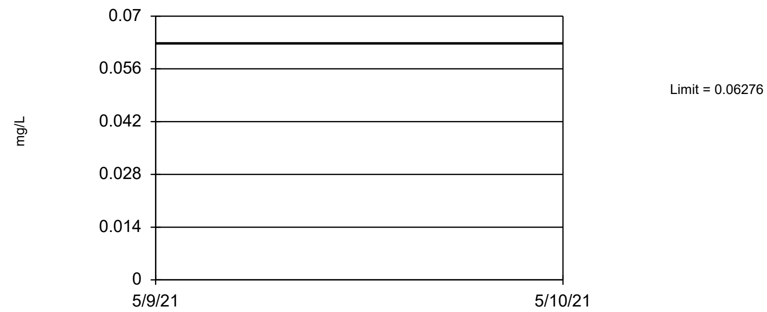
Background Data Summary: Mean=0.07792, Std. Dev.=0.01082, n=13. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9654, critical = 0.866. Kappa = 3.055 (c=22, w=6, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0001995. Assumes 6 future values.

Constituent: Barium Analysis Run 8/10/2021 4:58 PM

Powerton Generating Station Client: NRG Data: Powerton

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=0.039, Std. Dev.=0.007778, n=13. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9817, critical = 0.866. Kappa = 3.055 (c=22, w=6, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0001995. Assumes 6 future values.

Constituent: Molybdenum Analysis Run 8/10/2021 4:58 PM

Powerton Generating Station Client: NRG Data: Powerton

Prediction Limit - UG Wells All Data

Powerton Generating Station   Client: NRG   Data: Powerton FAB   Printed 8/10/2021, 12:58 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Antimony (mg/L)	n/a	0.003	n/a	n/a	4 future	n/a	27	100	n/a	0.00233	NP Inter (NDs) 1 of 2
Beryllium (mg/L)	n/a	0.001	n/a	n/a	4 future	n/a	27	100	n/a	0.00233	NP Inter (NDs) 1 of 2
Cadmium (mg/L)	n/a	0.0015	n/a	n/a	4 future	n/a	29	93.1	n/a	0.00204	NP Inter (NDs) 1 of 2
Calcium (mg/L)	n/a	139	n/a	n/a	4 future	n/a	31	0	x^(1/3)	0.000...	Param Inter 1 of 2
Chloride (mg/L)	n/a	63.49	n/a	n/a	4 future	n/a	31	0	No	0.000...	Param Inter 1 of 2
Chromium (mg/L)	n/a	0.063	n/a	n/a	4 future	n/a	31	87.1	n/a	0.001802	NP Inter (NDs) 1 of 2
Lithium (mg/L)	n/a	0.032	n/a	n/a	4 future	n/a	30	93.33	n/a	0.001895	NP Inter (NDs) 1 of 2
Mercury (mg/L)	n/a	0.0002	n/a	n/a	4 future	n/a	30	100	n/a	0.001895	NP Inter (NDs) 1 of 2
Molybdenum (mg/L)	n/a	0.01	n/a	n/a	4 future	n/a	31	74.19	n/a	0.001802	NP Inter (NDs) 1 of 2
pH (n/a)	n/a	7.778	6.449	n/a	4 future	n/a	31	0	No	0.000...	Param Inter 1 of 2
Sulfate (mg/L)	n/a	89.86	n/a	n/a	4 future	n/a	31	0	No	0.000...	Param Inter 1 of 2
Thallium (mg/L)	n/a	0.002	n/a	n/a	4 future	n/a	29	100	n/a	0.00204	NP Inter (NDs) 1 of 2
Total Dissolved Solids (mg/L)	n/a	644.5	n/a	n/a	4 future	n/a	31	0	No	0.000...	Param Inter 1 of 2

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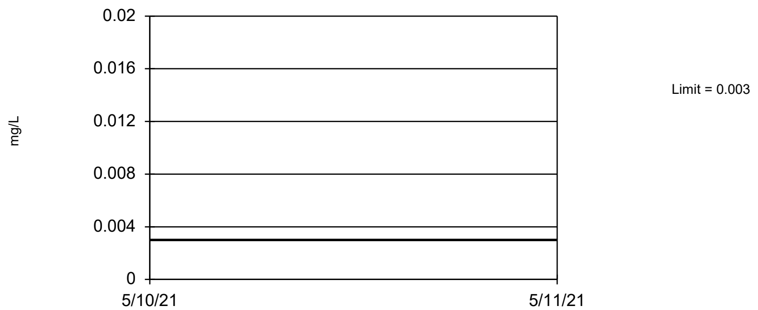
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 27) were censored; limit is most recent reporting limit. Annual per-constituent alpha = 0.03664. Individual comparison alpha = 0.00233 (1 of 2). Assumes 4 future values. Seasonality was not detected with 95% confidence.

Constituent: Antimony Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

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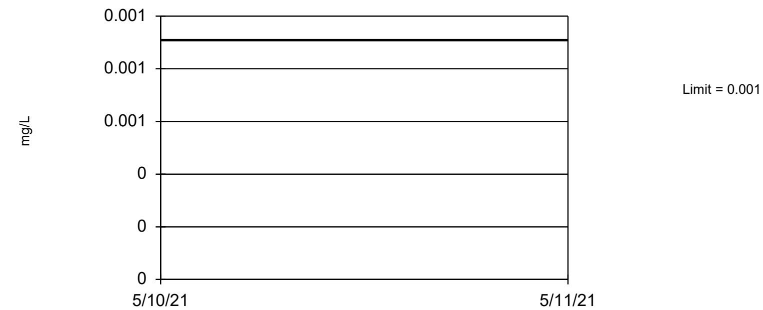
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 27) were censored; limit is most recent reporting limit. Annual per-constituent alpha = 0.03664. Individual comparison alpha = 0.00233 (1 of 2). Assumes 4 future values. Seasonality was not detected with 95% confidence.

Constituent: Beryllium Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

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Prediction Limit

Interwell Non-parametric

Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 29 background values. 93.1% NDs. Annual per-constituent alpha = 0.03214. Individual comparison alpha = 0.00204 (1 of 2). Assumes 4 future values. Seasonality was not detected with 95% confidence.

Constituent: Cadmium Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

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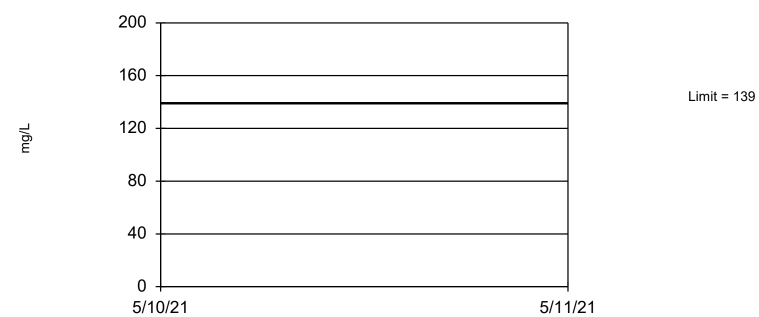
Prediction Limit

Interwell Parametric



Background Data Summary (based on cube root transformation): Mean=4.621, Std. Dev.=0.234, n=31. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9321, critical = 0.929. Kappa = 2.389 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

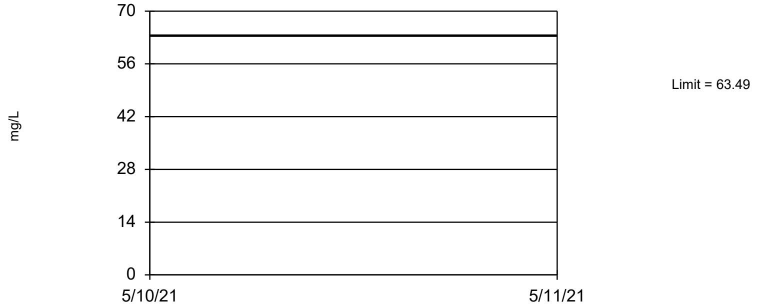
Constituent: Calcium Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=47.97, Std. Dev.=6.499, n=31. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9604, critical = 0.929. Kappa = 2.389 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

Constituent: Chloride Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

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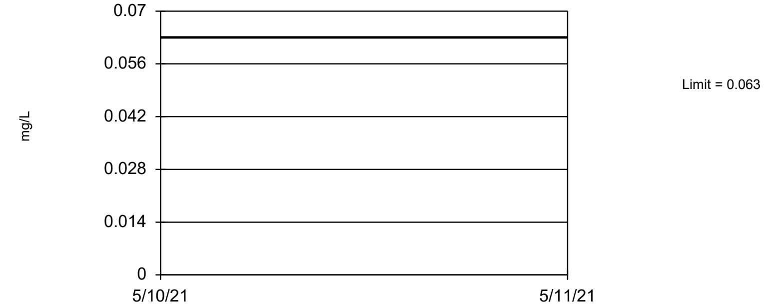
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 31 background values. 87.1% NDs. Annual per-constituent alpha = 0.02845. Individual comparison alpha = 0.001802 (1 of 2). Assumes 4 future values. Seasonality was not detected with 95% confidence.

Constituent: Chromium Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

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Prediction Limit

Interwell Non-parametric

Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 30 background values. 93.33% NDs. Annual per-constituent alpha = 0.0299. Individual comparison alpha = 0.001895 (1 of 2). Assumes 4 future values. Seasonality was not detected with 95% confidence.

Constituent: Lithium Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

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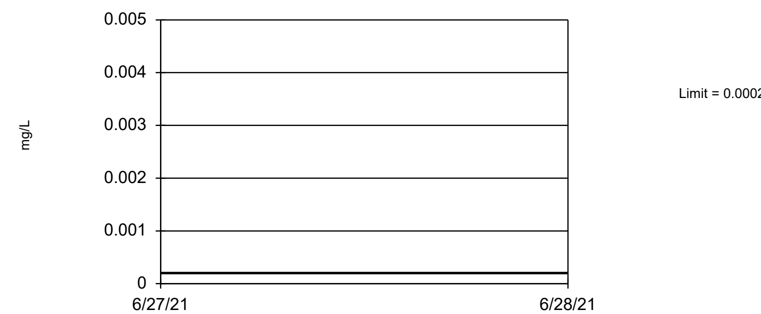
Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 30) were censored; limit is most recent reporting limit. Annual per-constituent alpha = 0.0299. Individual comparison alpha = 0.001895 (1 of 2). Assumes 4 future values. Seasonality was not detected with 95% confidence.

Constituent: Mercury Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Prediction Limit

Interwell Non-parametric

Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 31 background values. 74.19% NDs. Annual per-constituent alpha = 0.02845. Individual comparison alpha = 0.001802 (1 of 2). Assumes 4 future values. Seasonality was not detected with 95% confidence.

Constituent: Molybdenum Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

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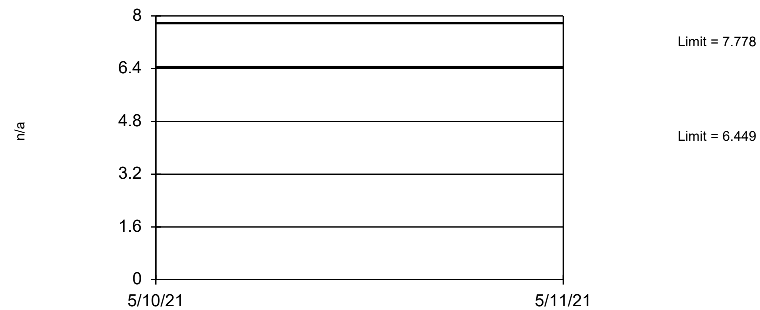
Prediction Limit

Interwell Parametric



Background Data Summary: Mean=7.114, Std. Dev.=0.2782, n=31. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9366, critical = 0.929. Kappa = 2.389 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0001496. Assumes 4 future values.

Constituent: pH Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

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Prediction Limit

Interwell Parametric

Background Data Summary: Mean=52.87, Std. Dev.=15.48, n=31. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9693, critical = 0.929. Kappa = 2.389 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

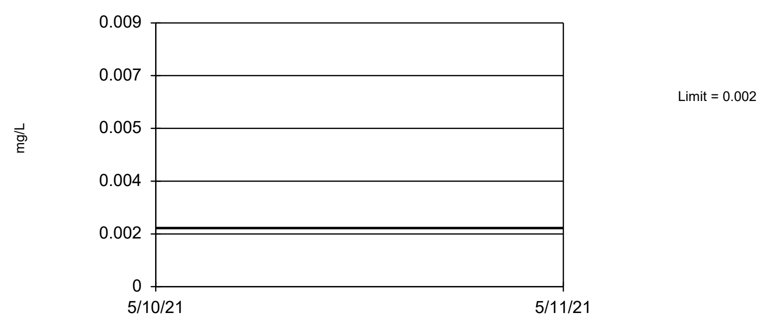
Constituent: Sulfate Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Prediction Limit

Interwell Non-parametric



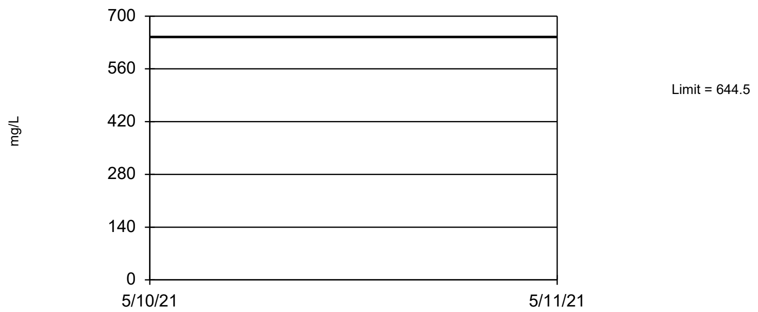
Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 29) were censored; limit is most recent reporting limit. Annual per-constituent alpha = 0.03214. Individual comparison alpha = 0.00204 (1 of 2). Assumes 4 future values. Seasonality was not detected with 95% confidence.

Constituent: Thallium Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=508.1, Std. Dev.=57.12, n=31. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9357, critical = 0.929. Kappa = 2.389 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

Constituent: Total Dissolved Solids Analysis Run 8/10/2021 12:57 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Interwell Prediction Limit - MW-01 All Data

Powerton Generating Station Client: NRG Data: Powerton FAB Printed 8/10/2021, 1:01 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Barium (mg/L)	n/a	0.07976	n/a	n/a	4 future	n/a	18	0	sqrt(x)	0.000...	Param Inter 1 of 2
Boron (mg/L)	n/a	1.086	n/a	n/a	4 future	n/a	18	0	sqrt(x)	0.000...	Param Inter 1 of 2
Combined Radium 226 + 228 (pCi/L)	n/a	0.953	n/a	n/a	4 future	n/a	18	55.56	n/a	0.004697	NP Inter (NDs) 1 of 2
Fluoride (mg/L)	n/a	0.2794	n/a	n/a	4 future	n/a	18	0	No	0.000...	Param Inter 1 of 2

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Prediction Limit

Interwell Parametric

Background Data Summary (based on square root transformation): Mean=0.2267, Std. Dev.=0.02111, n=18. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9058, critical = 0.897. Kappa = 2.638 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

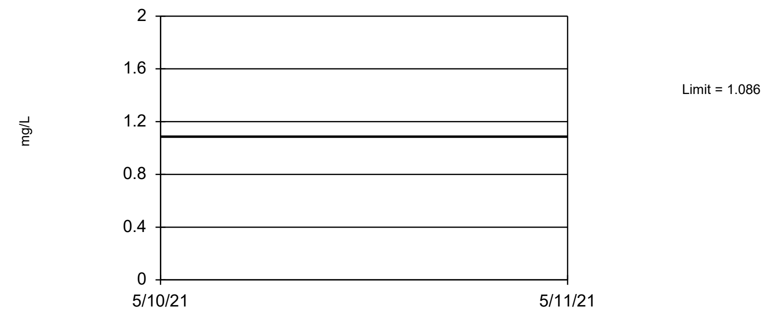
Constituent: Barium Analysis Run 8/10/2021 1:00 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Prediction Limit

Interwell Parametric



Background Data Summary (based on square root transformation): Mean=0.5485, Std. Dev.=0.187, n=18. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9095, critical = 0.897. Kappa = 2.638 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

Constituent: Boron Analysis Run 8/10/2021 1:00 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

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Prediction Limit

Interwell Non-parametric

Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 18 background values. 55.56% NDs. Annual per-constituent alpha = 0.07256. Individual comparison alpha = 0.004697 (1 of 2). Assumes 4 future values. Seasonality was not detected with 95% confidence.

Constituent: Combined Radium 226 + 228 Analysis Run 8/10/2021 1:00 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Sanitas™ v.9.6.10 Software licensed to KPRG and Associates, Inc. UG

Prediction Limit

Interwell Parametric

Background Data Summary: Mean=0.1767, Std. Dev.=0.03896, n=18. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9349, critical = 0.897. Kappa = 2.638 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

Constituent: Fluoride Analysis Run 8/10/2021 1:00 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Interwell Prediction Limit - MW-10 All Data

Powerton Generating Station   Client: NRG   Data: Powerton FAB   Printed 8/10/2021, 1:00 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Arsenic (mg/L)	n/a	0.04049	n/a	n/a	4 future	n/a	13	7.692	ln(x)	0.000...	Param Inter 1 of 2
Cobalt (mg/L)	n/a	0.1427	n/a	n/a	4 future	n/a	13	0	ln(x)	0.000...	Param Inter 1 of 2
Lead (mg/L)	n/a	0.1164	n/a	n/a	4 future	n/a	13	7.692	ln(x)	0.000...	Param Inter 1 of 2
Selenium (mg/L)	n/a	0.007258	n/a	n/a	4 future	n/a	13	0	No	0.000...	Param Inter 1 of 2

Prediction Limit

Interwell Parametric

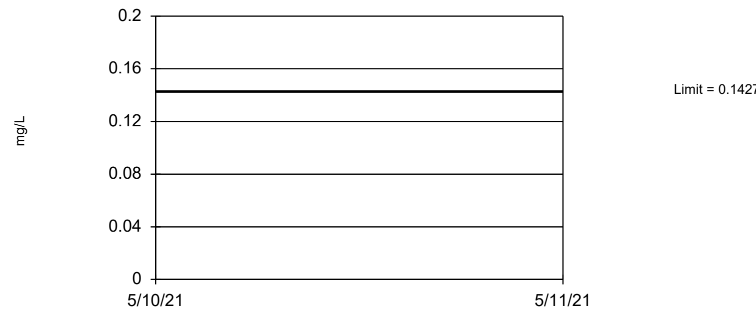
Background Data Summary (based on natural log transformation): Mean=-6.112, Std. Dev.=0.9978, n=13, 7.692% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8908, critical = 0.866. Kappa = 2.911 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

Constituent: Arsenic Analysis Run 8/10/2021 12:59 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Prediction Limit

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=-4.448, Std. Dev.=0.859, n=13. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8826, critical = 0.866. Kappa = 2.911 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

Constituent: Cobalt Analysis Run 8/10/2021 12:59 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Prediction Limit

Interwell Parametric

Background Data Summary (based on natural log transformation): Mean=-6.038, Std. Dev.=1.335, n=13, 7.692% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9262, critical = 0.866. Kappa = 2.911 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

Constituent: Lead Analysis Run 8/10/2021 12:59 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

Prediction Limit

Interwell Parametric

Background Data Summary: Mean=0.0046, Std. Dev.=0.0009129, n=13. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.9846, critical = 0.866. Kappa = 2.911 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

Constituent: Selenium Analysis Run 8/10/2021 12:59 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

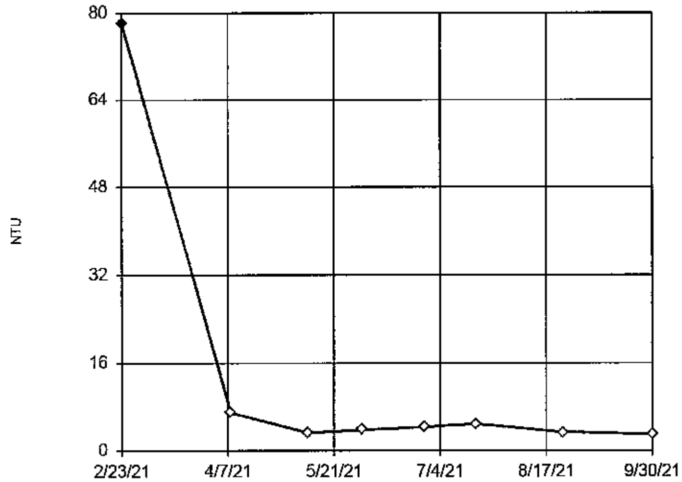
Outlier Analysis - Powerton ABB/ASB - UG Wells - Turbidity

Powerton Generating Station Client: NRG Data: Powerton Printed 10/5/2021, 12:49 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Turbidity (NTU)	**MW-01 (bg)**	**Yes**	**78.2**	**2/23/2021**	**Dixon`s**	**0.05**	**8**	**13.47**	**26.19**	**normal**	**ShapiroWilk**
Turbidity (NTU)	MW-09 (bg)	No	n/a	n/a	EPA 1989	0.05	8	6.999	6.301	ln(x)	ShapiroWilk
Turbidity (NTU)	MW-19 (bg)	No	n/a	n/a	EPA 1989	0.05	8	7.788	9.741	ln(x)	ShapiroWilk

Dixon's Outlier Test

MW-01 (bg)



n = 8

Statistical outlier is drawn as solid.
Testing for 1 high outlier.
Mean = 13.47.
Std. Dev. = 26.19.
78.2: c = 0.9504
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8402
Critical = 0.838
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Turbidity Analysis Run 10/5/2021 12:47 PM
Powerton Generating Station Client: NRG Data: Powerton

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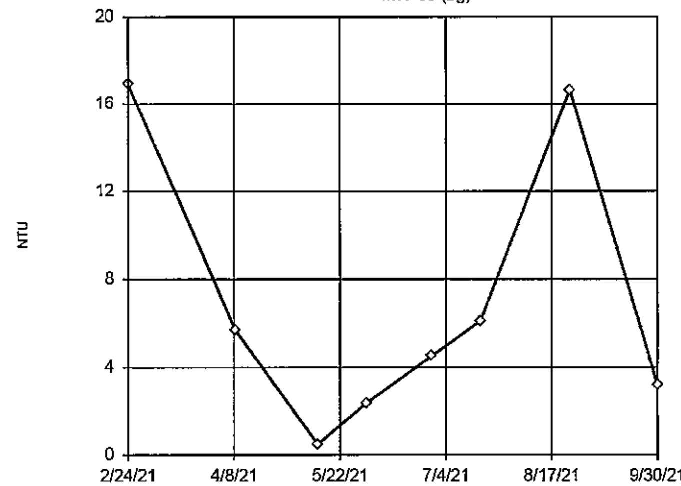
EPA Screening (suspected outliers for Dixon's Test)

MW-09 (bg)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 6.999, std. dev. 6.301, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.9192
Critical = 0.851 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Turbidity Analysis Run 10/5/2021 12:47 PM
Powerton Generating Station Client: NRG Data: Powerton

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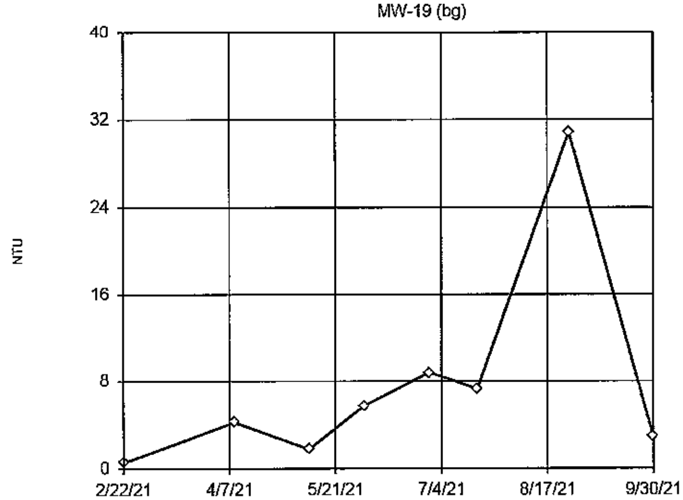
EPA Screening (suspected outliers for Dixon's Test)

MW-19 (bg)



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 7.788, std. dev. 9.741, critical Tn 2.032

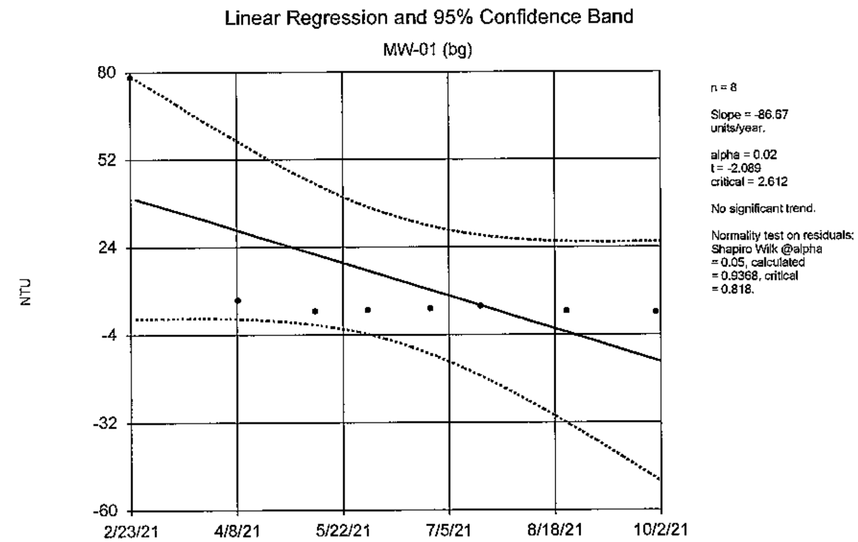
Normality test used:
Shapiro Wilk@alpha = 0.1
Calculated = 0.8817
Critical = 0.851 (after natural log transformation)
The distribution was found to be log-normal.

Constituent: Turbidity Analysis Run 10/5/2021 12:47 PM
Powerton Generating Station Client: NRG Data: Powerton

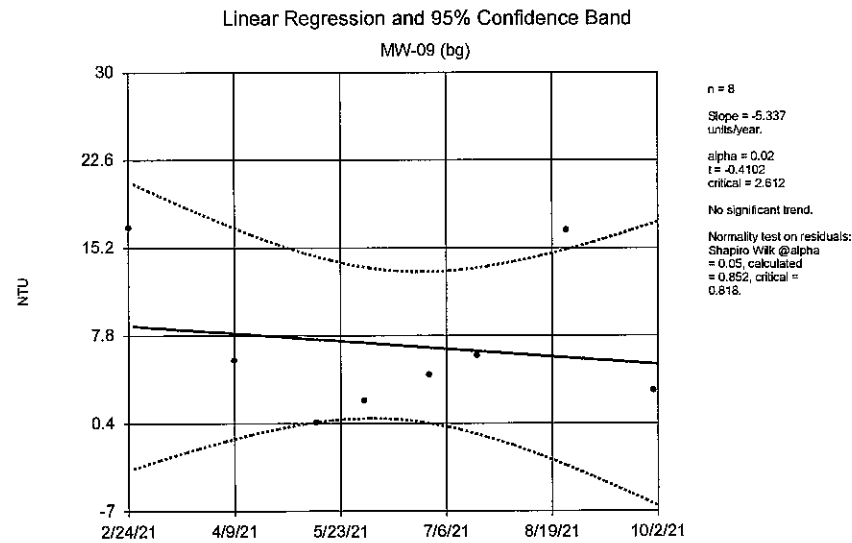
Trend Test Powerton ABB/ASB UG Wells Turbidity

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 10/5/2021, 12:55 PM

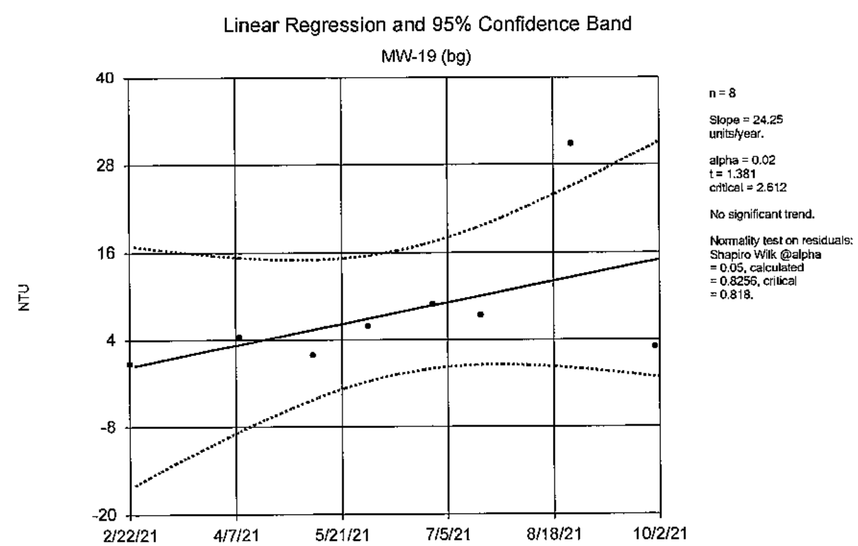
Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Turbidity (NTU)	MW-01 (bg)	-86.67	-2.089	2.612	No	8	0	Yes	no	0.02	Param.
Turbidity (NTU)	MW-09 (bg)	-5.337	-0.4102	2.612	No	8	0	Yes	no	0.02	Param.
Turbidity (NTU)	MW-19 (bg)	24.25	1.381	2.612	No	8	0	Yes	no	0.02	Param.



Constituent: Turbidity Analysis Run 10/5/2021 12:54 PM
Powerton Generating Station Client: NRG Data: Powerton



Constituent: Turbidity Analysis Run 10/5/2021 12:54 PM
Powerton Generating Station Client: NRG Data: Powerton



Constituent: Turbidity Analysis Run 10/5/2021 12:54 PM
Powerton Generating Station Client: NRG Data: Powerton

ANOVA Powerton ABB/ASB UG Wells

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 10/5/2021, 12:59 PM

Constituent	Well	Calc.	Crit.	Sig.	Alpha	Transform	ANOVA Sig.	Alpha	Method
Turbidity (NTU)	n/a	n/a	n/a	n/a	n/a	ln(x)	No	0.05	Param.

Parametric ANOVA

Constituent: Turbidity Analysis Run 10/5/2021 12:59 PM
Powerton Generating Station Client: NRG Data: Powerton

For observations made between 2/22/2021 and 9/30/2021 the parametric analysis of variance test (after natural log transformation) indicates NO VARIATION at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.1608

Tabulated F statistic = 3.47 with 2 and 21 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	0.4141	2	0.2071	0.1608
Error Within Groups	27.04	21	1.288	
Total	27.46	23		

The Shapiro Wilk normality test on the residuals passed after natural log transformation. Alpha = 0.01, calculated = 0.9488, critical = 0.884. Levene's Equality of Variance test passed. Calculated = 0.0943, tabulated = 3.47.

Shapiro-Wilk Normality Test

Constituent: Turbidity   Analysis Run 10/5/2021 1:04 PM
Powerton Generating Station   Client: NRG   Data: Powerton

Well	Transformation	Calculated	Critical	Normal
MW-01 (bg) (n = 8, alpha = 0.05)				
	no	0.4595	0.818	No
	square root	0.5222	0.818	No
	square	0.4233	0.818	No
	cube root	0.5547	0.818	No
	cube	0.419	0.818	No
	natural log	0.6374	0.818	No
	x^4	0.4186	0.818	No
	x^5	0.4186	0.818	No
	x^6	0.4186	0.818	No
MW-09 (bg) (n = 8, alpha = 0.05)				
	no	0.8125	0.818	No
	square root	0.9167	0.818	Yes
	square	0.6617	0.818	No
	cube root	0.937	0.818	Yes
	cube	0.6058	0.818	No
	natural log	0.9192	0.818	Yes
	x^4	0.5875	0.818	No
	x^5	0.5825	0.818	No
	x^6	0.5821	0.818	No
MW-19 (bg) (n = 8, alpha = 0.05)				
	no	0.6912	0.818	No
	square root	0.8828	0.818	Yes
	square	0.4911	0.818	No
	cube root	0.9393	0.818	Yes
	cube	0.4375	0.818	No
	natural log	0.9817	0.818	Yes
	x^4	0.4236	0.818	No
	x^5	0.4199	0.818	No
	x^6	0.419	0.818	No
Pooled Background (bg) (n = 24, alpha = 0.05)				
	no	0.491	0.916	No
	square root	0.7357	0.916	No
	square	0.2868	0.916	No
	cube root	0.8274	0.916	No
	cube	0.2349	0.916	No
	natural log	0.937	0.916	Yes
	x^4	0.2192	0.916	No
	x^5	0.2138	0.916	No
	x^6	0.2119	0.916	No

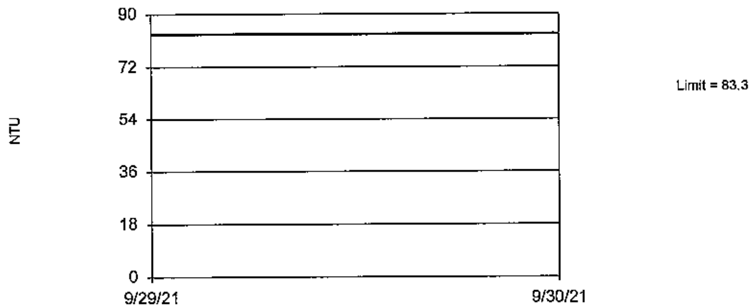
Interwell Prediction Limit Powerton ABB/ASB Turbidity

Powerton Generating Station   Client: NRG   Data: Powerton   Printed 10/5/2021, 1:06 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Turbidity (NTU)	n/a	83.3	n/a	n/a	6 future	n/a	24	0	ln(x)	0.000...	Param 1 of 2

Prediction Limit

Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=1.586, Std. Dev.=1.093, n=24. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.937, critical = 0.916. Kappa = 2.596 (c=22, w=6, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0001995. Assumes 6 future values.

Constituent: Turbidity Analysis Run 10/5/2021 1:05 PM

Powerton Generating Station Client: NRG Data: Powerton

Interwell Prediction Limit Powerton FAB MW-10 UG Turbidity

Powerton Generating Station Client: NRG Data: Powerton FAB Printed 10/5/2021, 2:00 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Turbidity (NTU)	n/a	581.2	n/a	n/a	4 future	n/a	8	0	x^(1/3)	0.000...	Param Inter 1 of 2

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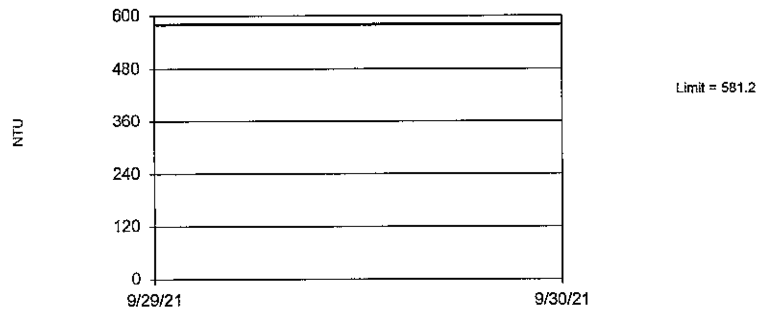
Prediction Limit

Interwell Parametric



Background Data Summary (based on cube root transformation): Mean=3.244, Std. Dev.=1.403, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.8198, critical = 0.818. Kappa = 3.636 (c=22, w=4, 1 of 2, event alpha = 0.026). Report alpha = 0.001197. Individual comparison alpha = 0.0002993. Assumes 4 future values.

Constituent: Turbidity Analysis Run 10/5/2021 1:58 PM

Powerton Generating Station Client: NRG Data: Powerton FAB

ATTACHMENT 10
PE CERTIFICATION

Attachment 10 – No Attachment

ATTACHMENT 11
OWNER CERTIFICATION

Attachment 11 – Owner Certification

I, TODD MUNDORF, as an authorized representative of Midwest Generation, certify that the public notification and public meeting requirements were completed in accordance with 35 Ill. Adm. Code 845.240.

Signature: [signature]

Title: PLANT MANAGER

Midwest Generation, LLC
Powerton Generating Station
Bypass Basin Retrofit and Former Ash Basin Closure
Public Meeting General Summary

INTRODUCTION

In accordance with Title 35 of the Illinois Administrative Code ("35 IAC") Section 845.240, Midwest Generation, LLC (MWG) posted the public meeting notice for closure of the Powerton Generating Station's Former Ash Basin and the Retrofit Plan for the Bypass Basin on its publicly available website and provided a copy of such notice to the Illinois Environmental Protection Agency (Illinois EPA or Agency) to email to its listserv for this facility. The public meeting notice was also mailed to all residents within at least 1 mile of the facility on April 14, 2022, which totaled 986 residential mailing addresses. The notice was also posted in 31 public locations within 10 miles of the facility boundary.

The public meetings for Powerton Generating Station's Bypass Basin and Former Ash Basin (FAB) were held on May 18, 2022 from 6:00 p.m. to 8:00 p.m. and on May 19, 2022 from 10:00 a.m. to 12:00 p.m. The meetings were held in a hybrid format – in person and via Zoom or telephone. Seven members of the public attended the May 18th meeting in person; four attended via Zoom. Seven members of the public attended the May 19th meeting in person; eleven attended via Zoom. The remaining attendees were MWG affiliate employees and consultants. Attendees who wished to sign up for a copy of the meeting summary and/or be added to Illinois EPA's listserv for the facility were asked to sign up via a form provided at the in-person location or a link to a Google form that was provided within the chat function of the Zoom meeting and posted on MWG's website, midwestgenerationllc.com. Seventeen attendees requested a copy of the meeting summary, eleven of whom requested transmittal of their email address to the Agency to be added to the Agency's listserv for the facility. It was also announced that the link would be available on MWG's public website for two weeks. After an introduction and approximate 50-minute presentation on the proposed retrofit and closure construction plans, the public was given approximately 1 hour during each meeting to ask questions and provide comments.

This document serves as a summary of the issues and questions raised during the meeting.

MWG proposes to retrofit the Bypass Basin by removing and disposing of the remaining material in the basin, decontaminating the existing geomembrane liner so that it will act as another protective layer in the composite liner system, and installing a composite liner system and leachate collection system. MWG proposes to close the Former Ash Basin in-place by installing an alternate final cover system (ClosureTurf®).

SUMMARY OF ISSUES AND QUESTIONS RAISED DURING THE MEETING

General

Powerton Lake

In response to a specific question, there is one fish advisory specific to Powerton Lake, for the channel catfish. The advisory is for polychlorinated biphenyls (PCBs) and the Illinois Department of Public Health recommends that people consume no more than 1 meal per week of channel catfish that are between 15 and 19 inches in size, and no more than 1 meal per month of channel catfish that are 19 inches or longer. Note that the Illinois Department of Natural Resources (IDNR) leases Powerton Lake for fishing, waterfowl hunting, and other recreation uses; IDNR has leased Powerton Lake since 1984. In 2021, IDNR stocked the Powerton Lake with over 230,000 fish across three species: blue catfish, smallmouth bass, and hybrid striped bass. Information on IDNR's management of the fishery at Powerton Lake can be found on IDNR's website (https://www.ifishillinois.org/profiles/waterbody.php?waternum=00039).

Labor

Midwest Generation, LLC operates under a Power House Labor Agreement (PHLA) that gives preference to Union labor for construction and maintenance activities at all plants that MWG owns and/or operates in Illinois. MWG will continue to abide by PHLA.

Availability of Information

Questions were raised about availability of information regarding MWG's plans for retrofitting the Bypass Basin and closing the FAB. Generally, MWG posts all required reports and assessments to its publicly available website within 14 days of completion. This information can be found at midwestgenerationllc.com.

Former Ash Basin

FAB History

Questions were asked about whether ash has washed out of the FAB into the Illinois River, if MWG has studied whether potential contaminants have leached over time into the Illinois River, and whether MWG has studied the Illinois River.

> The ash that is currently in the FAB is stable and not moving. Powerton Station personnel inspect the FAB weekly and the FAB is inspected by a third-party Professional Engineer annually. The inspection reports are posted at midwestgenerationllc.com.

MWG has not studied whether potential contaminants have leached over time because MWG is unable to recreate the initial conditions that likely produced the ash that is in the FAB. Powerton Station began operation in the late 1920's with pulverized coal-fired (PC) boilers (Units 1 through 4) that burned Illinois coal. Units 1 through 4 were retired before MWG began operating Powerton Station, presumably in the 1970's, the same decade that placement of ash in the FAB ceased.

Ash from the FAB was sampled and analyzed as required by the IL CCR Rule. The results of that sampling can be found in the Initial Operating Permit application, available at midwestgenerationllc.com. MWG did not identify any constituent levels of concern in that sampling.

MWG does not study the Illinois River. Instead, we monitor our discharges to the Illinois River and report those to the Illinois EPA as required by the Station's NPDES permit.

Groundwater Monitoring

Groundwater monitoring at the FAB shows that groundwater from each of the four downgradient monitoring wells meet the Section 845.600(a) groundwater protection standards which are based on the Illinois Class I Potable Resource Groundwater standards.

Closure in Place Regulations and Financial Assurance

Several questions were asked about whether the regulations allow for closure in place of the FAB as it is unlined and not separated from the uppermost aquifer by at least five feet.

The regulations do not distinguish between closure methods for unlined or lined CCR surface impoundments, nor do the regulations distinguish between closure methods for CCR surface impoundments that fail any location restrictions. Instead, the regulations require impoundments that are unlined or fail one or more location restrictions to close. The closure alternatives analysis compared three methods of closure in place and one closure by removal. Various transportation methods were examined for closure by removal.

Under Illinois EPA oversight, MWG will be required to inspect and monitor any CCR surface impoundment that is closed in place for at least 30 years after the closure construction is complete. Post-closure care includes continued groundwater monitoring, impoundment inspections, as-needed repairs to the final cover system, and corrective actions as necessary. Once 30 years of monitoring have been completed, the owner or operator of a CCR surface impoundment must request Illinois EPA approval to terminate post-closure care. While MWG cannot predict future events, the Illinois EPA will continue to have oversight for CCR surface impoundments until the Agency agrees that its oversight is no longer necessary.

Owners and operators of CCR surface impoundments are required to financially assure the costs of closure and post-closure care through the end of the post-closure care period. Financial assurance would be used only in the case of owner insolvency; otherwise costs for closure, post-closure care, and any necessary remedial activities are paid by the surface impoundment owner and/or operator. The responsibility for a CCR surface impoundment would transfer to any future owner, similarly to how the FAB responsibility transferred to MWG when MWG became the operator of Powerton Station in 1999. Additionally, should any additional corrective actions be required in the future, 35 IAC Part 845 requires the owner to financially assure the costs of the additional corrective actions. In addition, the corrective action would be performed by the CCR surface impoundment owner to ensure that impacts to the environment, including groundwater, do not occur or are corrected under EPA oversight. Groundwater modeling may be used as part of evaluating the appropriate corrective action to demonstrate the selected corrective action's effectiveness in remedying the environmental impacts.

<u>Closure in Place Design</u>

Several questions were asked about the northern berm that is included in the closure in place design. The berm is designed to be three to four feet above grade to prevent flooding of the impoundment once the final cover system is placed. The berm will be constructed of fill material composed of natural soils, but the specific materials have not been chosen at this time. Material specifications will be included in construction bid requests. Construction bid requests will not occur until a final closure construction permit is issued by the Agency.

The FAB will be dewatered before placement of the final cover system. The final cover system will be the proprietary ClosureTurf cover system that consists of an impermeable geomembrane liner covered with synthetic turf and sand infill. The impermeable geomembrane liner is a specially designed plastic liner that minimizes precipitation from passing through it and moves precipitation off the liner, so it does not accumulate on top of the liner. The synthetic turf and sand infill protect the geomembrane liner from animal, weather, and UV damage. Third party testing has demonstrated the geomembrane liner has a permeability of $1x10^{-13}$ centimeters per second (cm/s) and a lifespan of at 100 years. Additional testing has demonstrated that the freeze-thaw cycle has no impact on the integrity and effectiveness of the geomembrane liner.

Questions were raised regarding potential future concerns, specifically seismic activity and rising water levels. On its website, the United States Geological Survey (USGS) lists earthquakes in Illinois since 1900. No earthquakes have been recorded in Tazewell County in the 122-year period recorded by the USGS. Closure in place requires continued monitoring of the surface impoundment and corrective action if necessary. As part of the Initial FAB Operating Permit application, the location of the FAB was determined to not be located in a seismic impact zone, not in a fault area, and not in an unstable area.

Onsite Landfill/Consolidate and Close

An onsite landfill was considered and ultimately ruled out because of the lengthy process of siting a new landfill and lack of available space vertically and horizontally. One commentor suggested MWG examine removing ash from the northern portion of the FAB, placing a liner in that area, and consolidating the ash in the northern portion. While MWG did not overtly examine this scenario in the closure alternatives analysis, it was considered and eliminated because installation of a liner and consolidating the ash in the northern portion could be considered construction of a CCR landfill, further delaying the closure of the FAB.

The rail line that separates the northern portion of the FAB from southern portion acts as a berm to prevent flooding of the southern portion from the Illinois River, so consolidation in the southern half could be the better option for protection of the environment. This alternative option is still being internally considered/evaluated, but consideration could not be finalized within the 14 days that this summary is required to be posted.

Closure Costs

The selected option for closure of the FAB is not the least expensive based on engineering analysis that is documented in the Closure Alternatives Analysis. Costs were not determinative in selecting closure in place.

Bypass Basin

Bypass Basin Underlying Surface

Questions were asked about whether the Bypass Basin currently has a Poz-o-Pac liner, had a Poz-o-Pac liner, and whether the Bypass Basin retrofit includes reusing the Poz-o-Pac liner if it exists.

> During the May 18 meeting, MWG mistakenly stated that the Bypass Basin never had a Poz-o-Pac liner and corrected that statement during the May 19 meeting when the question was asked again. The original construction documents show that a 12-inch-thick layer of Poz-o-Pac was installed over the Bypass Basin's original Hypalon® liner along the basin floor.
>
> Both the Poz-o-Pac and Hypalon® liners were removed from the Bypass Basin when the basin was relined in 2010 with a 60-mil HDPE geomembrane liner. Currently, the Bypass Basin does not have either of its original Poz-o-Pac or Hypalon® liners; only the relatively new 60-mil HDPE geomembrane liner is present.

It should be noted that Poz-o-Pac is a cementitious material and has been used as a supporting surface for things like roads, highways, and parking lots (in addition to similar pozzolan-stabilized base materials). According to the Federal Highway Administration, Poz-o-Pac was used at over 100 sites throughout Illinois between 1955 and 1985.

Questions were asked about the material that underlies the Bypass Basin's current HDPE geomembrane liner and whether this material will be tested during the retrofit process. The plan for retrofitting the Bypass Basin does not include testing of soils beneath the HDPE geomembrane liner unless tears in the liner are discovered which may indicate the potential release of contaminants into the Bypass Basin's subgrade. The competency of the Bypass Basin's existing HDPE geomembrane liner will be verified by conducting an electrical leak location survey, which involves placing a voltage across the entire liner and using a detection probe to determine whether any tears are present in the liner. Where a tear is present, the probe will identify an electrical current flowing through the tear. If a tear is discovered, the soils under the tear will be inspected to determine whether any contaminants have been released into the basin subgrade. Contaminated soils identified during this inspection will be removed and replaced with structural fill.

Retrofit Design

Questions were asked about the structural fill material that will be used to establish the slopes for the retrofitted Bypass Basin's leachate collection system. This fill material will be comprised of natural soils, not CCR; however, the specific soil materials have not been chosen at this time. Material specifications will be included in construction bid requests. Construction bid requests will not occur until a final retrofit construction permit is issued by the Illinois EPA.

SUMMARY OF REVISIONS, CHANGES, AND CONSIDERATIONS

Public engagement is an important part of the permitting process. Midwest Generation, LLC valued the opportunity to hear and consider the comments of community members and others who participated in the public meetings. At this time, Midwest Generation is proceeding with the proposal for retrofitting the Bypass Basin and closing the Former Ash Basin in-place as presented at the public meetings. Taking public comments into consideration, the current analysis continues to indicate that the proposed plan – which remains subject to regulatory review and approval – prioritizes the environment and community well-being.

Timestamp	Email Address	Name	What is your home city?	The Illinois Environmental Protection Agency is creating a listserv for the facility. Would you like us to transmit your email address to the Agency to be added to the listserv?
Virtual				
5/18/2022 16:37:26	kg@nijmanfranzetti.com	Kristen Gale	La Grange	Yes
5/18/2022 18:02:59	kcourtney@elpc.org	Kiana Courtney	Chicago	Yes
5/19/2022 10:04:22	fbugel@gmail.com	Faith E Bugel	Wilmette	Yes
5/19/2022 12:03:21	ryan.hidden+NRG@sierraclub.org	Ryan Hidden	Peoria	Yes
5/19/2022 12:18:59	ewatkins@forgen.com	Emily Watkins	Point Pleasant	Yes
5/19/2022 15:46:20	hannahlee.flath@sierraclub.org	Hannah Flath	Chicago	Yes
5/20/2022 9:22:13	logan@iuoe649.org	Luke Ogan	Bloomington	Yes
5/23/2022 12:52:40	tsshel1@ilstu.edu	Tim Shelley	Peoria	Yes
In-Person				
5/18/2022	rowe@bradley.edu	Robert Rowe	Peoria	No
5/18/2022	johnwosik@outlook.com	John Wosik	Dunlap	No
5/18/2022	jestpn@aol.com	Diane Jorgensen	East Peoria	No
5/18/2022	johchoices@hotmail.com	Joyce Harnett	Pekin	Yes
5/18/2022		Dave Grooms	Pleasant Baine?	No
5/18/2022	jobluem@yahoo.com	Joyce Bluemshine	Peoria	No
5/18/2022	jdickson@comcast.net	Jeff Dickson	Green Valley	No
5/19/2022		Lawrence Farlington	Pekin	No
5/19/2022		Joseph Kotas	Aurora	No
5/19/2022	petalnrose@gmail.com	Robin Nolting	Pekin	Yes
5/19/2022	jestpr@aol.com	Bob Jorgensen	East Peoria	Yes
5/19/2022	nclong405@yahoo.com	Nancy Long	Peoria	Yes
5/19/2022	moseynme@mtco.com	David Grebner	Peoria Heights	No